Access to Quality Teaching:

An Analysis of Inequality in California's Public Schools

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As the 21st century dawns, it is increasingly clear that schools must become more successful with a wider range of learners if citizens are to acquire the sophisticated skills they need to participate in a knowledge-based society. It is also increasingly clear that teachers' expertise and effectiveness is critical to the success of education in California as elsewhere in the nation. New state standards for student learning reflect greater demands for higher order thinking and performance. The kind of teaching needed to help students to think critically, solve complex problems, and master ambitious subject matter content is much more demanding than that needed to impart routine skills. And, in an era when the student population is more diverse than ever before, teachers are being asked to achieve these goals for *all* children, not just the 10 or 20% who have traditionally been selected into "gifted and talented" or "honors" programs.

In a typical public school classroom in California, at least 25% of students come from families with incomes below the poverty line, more than 25% speak a first language other than English, at least half are members of racial/ethnic "minority" groups or recent immigrants, and more than 10% have identified learning disabilities. Whereas in the past, schools varied the curriculum and learning standards for different learners, today's students are being asked to master the same curriculum standards and pass the same tests for promotion and graduation, regardless of their different learning needs, starting points, and prior experiences. This poses even greater challenges for teaching. Only teachers who are both knowledgeable in their content areas and skillful in using a wide range of teaching methods can respond appropriately to diverse students' needs and enable them to succeed at these challenging learning goals.

Yet in 2000, as new standards for California's students were taking effect, there were more than 42,000 teachers working in California's schools without full preparation or credentialing (Shields et al., 2001), more than in 25 other states combined. In addition to at least 38,000 teachers working on emergency permits or pre-intern credentials without having met the state's standards for content knowledge and teaching skills, more than 2,700 were working on waivers without even having passed a basic skills test (CCTC, 2002). In some schools, the proportions of teachers on emergency permits and waivers total well over half of the staff. These schools were almost invariably those serving large concentrations of low-income and minority students in urban schools, and they were often the same schools that lacked supplies, materials, adequate facilities, and the other elements of a sound, basic education.

This paper addresses four core questions:

1. What does the State of California expect of its students and its teachers? What standards has the state set for student learning? What qualifications does it require of teachers so that they can support student learning?

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2. How does teacher quality matter for equal educational opportunity?
3. Do California students have equal access to the qualified teachers who can offer the instruction they need to master the state standards?
4. How might these discrepancies best be remedied given the California policy context and knowledge about successful policy elsewhere?

I. Introduction: Opportunities to Learn in California

Following the passage of Proposition 13 in 1979, California's expenditures on public education declined markedly. Between 1979 and 1994, the state's spending per pupil fell about 25% relative to the average for the other states, rebounding somewhat between 1995 and 1998 (Sonstelie, Brunner, & Ardon, 2000, p. 90). Although California has a higher cost-of-living than the national average, it spends well below the national average on education both in absolute dollars and as a share of personal income. By 1999-2000, California ranked first in the nation in the number of pupils it serves but 38th in expenditures per student, 48th in K-12 expenditures as a share of personal income, and 50th in the ratio of students per teacher, despite the influence of class size reductions during the late 1990s (Ed Source, 2001, p. 1). By the late 1990s, California employed a greater number of under-qualified teachers[2] than any other state in the country, and California ranked in the bottom decile among states on class sizes, staff/pupil ratios, libraries, and most other school resources.

In 2001, California's per pupil education spending, adjusted for cost of living, ranked 48th in the nation, reaching only 79% of the national average ($5,603 as compared to a national average of $7,079), earning it a grade of "F" for funding adequacy from Education Week. Fully 98% of California's students were in districts that spent below the national average (Quality Counts, 2002, p. 87). Growing inequalities in funding are also a problem. In 1998, the California Postsecondary Education Commission (CPEC) noted that:

> The gap in expenditures for education between the high-spending and low-spending school districts in our state in the 1991-92 school year was $1,392 – a figure that placed our state at approximately the 30th percentile nationally. Today, that gap has risen to $4,480…. Perhaps the most disturbing part of this statewide picture is that many of the disparities noted above are consistently and pervasively related to the socioeconomic and racial-ethnic composition of the student bodies in school as well as the geographical location of schools. That is, schools in our low socioeconomic communities as well as our neighborhoods with a predominance of Black and Latino families often have dilapidated facilities, few or inadequate science laboratories, teachers in secondary schools providing instruction in classes for which they have no credential, curriculum that is unimaginative and boring, and teachers who change schools yearly and lack the professional development to complement their teaching with new instructional strategies and materials…. (CPEC, 1998, p. 29).

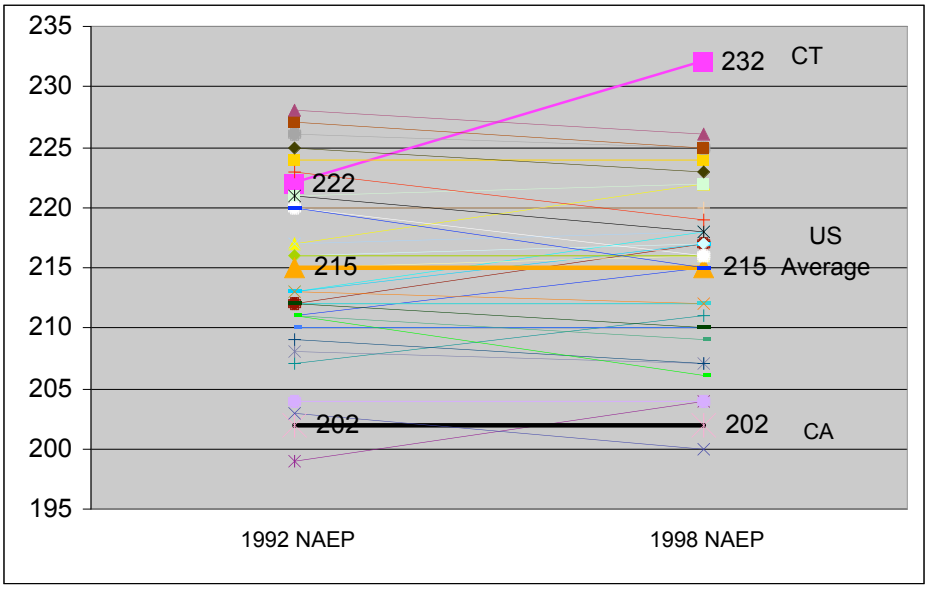
[2] Here and elsewhere, "under-qualified" means teachers who lack a preliminary or clear credential in their teaching field, the standard credential recognized by the state of California as reflecting full attainment of its standards for beginning and veteran teachers.

Once among the highest-achieving states in the nation, California now ranks nationally among the bottom three states in average reading and mathematics achievement on the National Assessment of Educational Progress. (See Figure 1.) A recent RAND Corporation report (Carroll, Reichardt, & Guarino, 2000) noted:

> California's public education system is widely thought to be ineffective. When 40 states and other jurisdictions are ranked according to the reading performance of eighth graders on the 1998 National Assessment of Educational Progress (NAEP), California ranked 35th. The reading performance of California's fourth graders was worse when compared to the rest of the nation. California ranked 40th of 43 states and other jurisdictions on that measure. While the characteristics of California's students differ from those in other states in several important respects, these differences cannot account for California's students' poor performance on these tests. For example, when the states are ranked according to the reading performance of students eligible for free or reduced cost school lunch, California ranks at the very bottom of the list both for fourth graders and for eighth graders (p.1).

An analysis by the Public Policy Institute of California (PPIC) (Sonstelie, Brunner, & Ardon, 2000) confirmed this view, noting that while California schools lost ground relative to other states across the country in terms of revenues and expenditures during the 1980s and '90s, California students lost ground in terms of achievement. Although California students are more likely to be new immigrants and new English language speakers, as well as members of minority groups, these demographic differences do not explain all of the difference in their performance. After adjusting for the demographic characteristics of the student population, PPIC found that California students still perform considerably worse than those in other states on the NAEP, the tests used in the National Education Longitudinal Study (NELS), and the SAT (also adjusted for participation rates). On national tests, after adjusting for language backgrounds, ethnicity, and parental education, the performance of low-income students was "especially hard hit by the decline in school quality in California" (p. 136).

Figure 1
State Average Student Achievement In Reading, 4th Grade
National Assessment of Educational Progress, 1992-1998



The RAND Corporation report notes that the quality of teachers available to students is a critical element in the provision of educational opportunity. The number of underqualified teachers has risen steeply over the decade and has contributed to growing inequality in opportunity to learn. Students in high-minority and low-income schools are several times as likely to have underqualified teachers as those in more affluent schools. This closely tracks the distribution of achievement and the strong relationships between socioeconomic status and student performance. Students in the lowest achievement quartile on the API are almost five times as likely to have under-qualified teachers as students in the highest quartile. The relationship between the characteristics of students, the qualifications of their teachers, and their levels of achievement is extremely strong in California. According to an analysis by PACE (2000), "Over the past six years, this relationship (between socio-economic measures and achievement scores) has strengthened, not diminished."

The unequal allocation of teachers has worsened each year since the early 1990s. While the proportion of California schools staffed completely with fully qualified teachers has increased in response to recent policy initiatives (from 24% in 1997–98 to 28% in 2000-01), the share of schools in which more than 20% of teachers are under-qualified has also increased sharply, from 20% in 1997–98 to 24% in 2000-01 (Shields et al., 2001, p. 20). The schools with these large proportions of underprepared teachers – about 1,900 schools enrolling more than 1.7 million children – serve mostly children of color, who frequently experience a parade of short-term, under-prepared instructors throughout their school careers. As the SRI report notes:

> In these schools, as students proceeded through the grades or moved through classes in different subject areas, they were highly likely to have an underprepared teacher. For example, at the secondary school, each student probably would be in the class of an underprepared teacher one period per day (p. 20).

Several California studies have found that these differences in teacher quality are significantly related to student achievement in both mathematics and reading (Betts et al., 2000; Fetler, 1999; Goe, 2002; Los Angeles County Office of Education, 1999). Other national studies have found that differences in teachers' qualifications -- including teachers' general ability, content background, preparation for teaching, and certification status, which reflects aspects of all of these other indicators -- have a significant effect on student achievement levels for states, districts, schools, and individual students (Darling-Hammond, 2000b; Ferguson, 1991; Goldhaber & Brewer, 2000; Monk, 1994; Strauss & Sawyer, 1986).

II. State Standards and State Guarantees[3]

In 1995, California passed the California Assessment of Academic Achievement Act.[4] The Act established "a system of individual assessment of pupils" for the purpose of both identifying student strengths and needs and determining the effectiveness of schools and districts "as measured by the extent to which pupils demonstrate knowledge of the fundamental academic skills, as well as the ability to apply those skills" (Cal. Educ. Code Section 60602 (a)). The legislature viewed these skills as "fundamental," and it required the establishment of a set of

[3] This section draws heavily on William Koski and Hilary Weis (2002).
[4] Cal. Educ. Code Sections 60600-60700.

statewide content and performance standards for student learning to guide the construction of the tests and the curriculum of local school districts. The Act required that these standards:

- be measurable and objective;
- reflect the knowledge and skills necessary for California's workforce to be competitive in the global, information-based economy of the 21st century;
- be comparable in rigor to the academic content and performance standards used in the school systems of America's global competitors; and
- include input from parents, educators, and the public in all geographic regions of the state, including at least six public hearings.[5]

These standards are much more than window-dressing in the policy landscape. While the standards are characterized as "model" standards rather than as mandates, they are the basis for many other state requirements and for holding students and schools accountable. All state-adopted curriculum frameworks, instructional materials, examinations, teacher credentialing standards, and school accountability initiatives are to be aligned to the standards.[6] School districts in California have been mandated to end the practice of social promotion, and are encouraged to tie grade advancement to achievement on the state's standards-based exams.[7] The state has developed a system of rewards for schools that meet targets for average gains on the tests and has also established an intervention program followed by punitive sanctions for those that fail to show annual improvements.

Finally, by 2004, all California children will be required to pass a high school exit examination in language arts and mathematics in order to earn a high school diploma (Cal. Educ. Code Section 60850). The tests are constructed to evaluate compliance with the State's academically rigorous content standards. Thus, the standards and tests associated with them matter intensely for children in California schools.

Content standards and curriculum frameworks aligned to these standards have been adopted by the State Board of Education in four areas: English-Language Arts, Mathematics, History-Social Science, and Science. The curriculum frameworks describe the instructional content and activities that students are expected to engage in to master the standards. The "Frameworks and Materials Commission" that undertook the development of the frameworks is also charged with evaluating instructional materials submitted for adoption. (Unlike most states that leave materials selection in the hands of local districts, California requires districts to select from among state-approved texts and other materials.) The criteria for adoption include a determination of how well texts and other materials are aligned with the frameworks and, by genealogy, the standards.

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[5] Cal. Educ. Code § 60605 (Historical notes indicate that Section (b) of Chapter 330 of the Statutes of 1998 established the requirements for the content standards).

[6] Cal. Educ. Code Sections 60604 (a), 60605 (a)(2)(A), 60618, and 60850.

[7] Cal. Educ. Code Section 48070.5 provides that promotion and retention for students in the 2nd to 9th grades shall be determined on the basis of either (a) the results of the state's STAR tests and minimum proficiency levels recommended by the State Board or (b) the pupil's grades and other indicators of academic achievement designated by the district.

It is not only fair but essential, then, to ask what the standards require regarding students' opportunities to learn and to evaluate whether all students have access to these opportunities. There are a number of things that are necessary for students to be taught to the standards, including facilities and equipment that enable students to work effectively on academic tasks and curricular programs, technologies, and instructional materials that are aligned to the standards and frameworks. (These issues are discussed in Oakes & Saunders, 2002, and UCLA School Conditions Research Project, 2000). These tangible resources, however, can only be as effective as the teachers who employ them. Here we focus particularly on the kinds of teaching and capacities of teachers anticipated by the standards and frameworks. (For a fuller treatment of the requirements of each curriculum framework, see Koski & Weis, 2002).

Teaching Requirements of the California Standards and Curriculum Frameworks

As detailed in Koski & Weis (2002), the process of evaluating needed resources for teaching each of the standards included judgments of three separate reviewers, instructed to assess the requirements conservatively, in terms of minimum necessary knowledge, skills, or resources, rather than the most ideally desirable. Their evaluation documents how the standards articulate expectations for teaching content, materials, and strategies. As they describe, the standards indicate that, to be effective, teachers must understand the content they are expected to teach and be able to use a wide range of teaching techniques to convey this content.

For example, the English language arts standards convey the expectation that early grade teachers must have a deep understanding of reading development and a range of sophisticated skills to enable reading, including knowledge of the structure of the English language and how to apply best practices of reading instruction. More specifically, teachers must be able to provide instruction and support in phonemic awareness (through grade one), phonics, word decoding and word-attack skills, spelling, vocabulary, reading comprehension, writing skills and strategies, written and oral English language conventions, and listening and speaking skills. At higher grade levels English-Language Arts teachers are also expected to know how to continue to develop reading skills as well as to be familiar with historically and culturally significant texts and be able to convey the themes and meaning of these texts to his or her class.

In each subject area, the standards provide evidence that teachers must not only know the content students are expected to learn, but also have a repertoire of teaching strategies to engender and support student understanding. A teacher of History-Social Science must not only know the details of particular historical events, but also be equipped with the requisite skills to effectively relate these events to his or her students. Instructors of science must not only be able to conduct experiments, but also must be prepared to enable students to perform and understand the experiments themselves. And, in the area of mathematics, it is not sufficient for a teacher of algebra to know the order of operations; he or she must also be able to teach his or students to apply the order of operations on their own.

There are clear and direct links between the standards established for student learning in California and the standards established for teaching credentials. These are described in detail in Koski & Weis (2002) and summarized, with further elaboration, below.

The State's Role in Ensuring that Teachers can Teach the Standards

The primary tool the state of California uses to ensure that teachers are prepared to teach in the manner required by the standards is its teacher credentialing system. The California Commission on Teacher Credentialing is charged with ensuring that candidates who are recommended for a credential (pursuant to a program of professional preparation) have demonstrated satisfactory ability to assist students to meet or exceed state content and performance standards for pupils (Cal. Educ. Code Section 44259(b)(3)). The CCTC has integrated preparation for teaching the standards into both the subject matter requirements for receiving a credential and the professional preparation requirements.

California issues two types of clear teaching credentials: Single subject (for those who teach a specific subject in a departmentalized class, usually in secondary school) and multiple subject (for those who teach all subjects in a self-contained classroom, most often used in elementary schools). In order to earn either type of teaching credential, candidates are required to demonstrate their subject matter competence. This can be accomplished either by completing an approved subject matter preparation program in a California college or university or by passing one or more subject matter competency tests adopted by the California Commission on Teacher Credentialing.

Authorizing legislation (Cal. Educ. Code Section 44259(b)(5)) provides that both subject matter competence exams and subject matter preparation programs must be aligned with the state content standards and curriculum frameworks. "The commission [on teacher credentialing] shall ensure that subject matter standards and examinations are aligned with the state content and performance standards adopted for pupils." This mandate is reiterated in the *Single Subject Assessments for Teaching: 2000-2001 Registration Bulletin*, which states, "The content of the SSAT reflects the knowledge required of teachers in California classrooms. The tests are based on California content frameworks and other curriculum and instructional materials" (p. 1).

In addition to demonstrating subject matter competence through specified coursework or test passage, candidates for a single subject or multiple subject credential must also complete an accredited program of professional preparation. Minimum requirements for a professional clear teaching credential, set by the California Commission on Teacher Credentialing, also include:

(1) A baccalaureate degree or higher degree from a regionally accredited institution of postsecondary education;
(2) Passage of the state basic skills examination (CBEST);
(3) A professional teacher preparation program including student teaching;
(4) A course in reading instruction and study of alternative methods for developing English language skills;
(5) Passage of the Reading Instruction Competence Assessment (RICA) for Multiple Subjects credential candidates;
(6) Demonstration of a knowledge of the principles and provisions of the Constitution of the United States through course or test passage;
(7) Coursework in the laws, methods, and requirements for providing education opportunities to individuals with exceptional needs in the regular classroom;

(8) A course in health education, including nutrition, the physiological and sociological effects of abuse of alcohol and narcotics and the use of tobacco, and training in cardiopulmonary resuscitation; and

(9) Demonstration of competency in the use of computers in the classroom.

In order to gain a preliminary teaching credential, candidates must complete the first six items listed above plus the demonstration of subject matter competence. Until recently, candidates also had to complete a fifth year of study after college to receive a clear credential. With recent legislation (SB 2042, Chapter 548, Statutes of 1998), the clear credential will no longer require the 5th year, but it will require candidates to complete all of the 9 items above plus an individualized induction plan and two years of successful teaching experience (CCTC, 2001b, pp. 376 ff).

The courses and tests required of candidates are carefully mapped onto the CCTC's standards describing what teachers should know and be able to do, which are in turn directly related to the content standards expected of students. For example, the Reading Instruction Competence Assessment (RICA) was constructed "to ensure that these prospective teachers have learned the knowledge and skills they need to provide effective reading instruction in a balanced, comprehensive program for K-8 students."[8] It includes a written examination and a video performance assessment covering 43 teacher competencies within 13 content areas, including assessment of reading development, planning and managing reading instruction, phonemic awareness, phonics and other word identification strategies, concepts about print, spelling instruction, reading comprehension, literary response and analysis, content area literacy, student independent reading, relationships among reading, writing, and oral language, vocabulary development, and structure of the English language (CCTC, 1999a). These are skills the content standards make clear that students are expected to acquire.

At the secondary level, the knowledge required of secondary English teachers, for example, is reflected in the course requirements for approved English Education programs and the English language arts subject matter tests. These requirements map closely onto the content standards for high school students. Teachers' preparation must include "a basic knowledge of literature, language, linguistics, rhetoric, composition, and various issues related to the study of English (e.g., literacy, access and equity, dialects, the canon, and second language acquisition). The student should also be skillful at planning and writing well-developed, well-crafted essays on literature, language, and issues related to the study of English" (English Teacher Preparation in California, Specifications for the Subject Matter Knowledge and Competence of Prospective Teachers of English, English Teacher Preparation and Assessment Advisory Panel, Commission on Teacher Credentialing, 1991).

Similarly, in mathematics, science, and history-social science the knowledge requirements of the CBEST, the MSAT (for elementary teachers), the SSAT and Praxis examinations (for secondary teachers) map onto the content students are expected to learn (see Koski & Weis, 2002, and Table 1 below). Table 1 provides selected examples in four subject

[8] RICA: Why, What, When and Who? California Commission on Teacher Credentialing, California Reforms in Reading Instruction (K-8)

areas and a range of grade levels illustrating how the knowledge required for teaching to the student content standards is reflected in the credentialing requirements for teachers.

Table 1: The Relationship between Student Content Standards and California's Requirements for Credentialed Teachers

Student Content Standards	Knowledge Requirements for Credentialed Teachers
English Language Arts Grades 1-4: R-1.0 Word Analysis, Fluency and Systematic Vocabulary Development: Students understand the basic features of reading. They select letter patterns and know how to translate them into spoken language by using phonetics, syllabication, and word parts. Students apply knowledge to achieve fluent oral and silent reading.	**RICA**, 3.2: The beginning teacher knows ways in which phonemic awareness is related to reading achievement both before students are reading and as they are learning to read. The teacher understands the instructional progression for helping students acquire phonemic awareness skills (i.e., words, syllables, onsets and rimes, and phonemes). **RICA**, 5.2: The beginning teacher knows that rapid, automatic decoding contributes to reading fluency and comprehension. The teacher is able to plan and implement systematic, explicit phonics instruction that is sequenced according to the increasing complexity of linguistic units. These units include phonemes, onsets, teacher-developed instructional programs, materials, and activities that will be effective in the systematic, explicit teaching of phonics. **Program Standard 4a: Multiple Subject Reading, Writing, and Related Language Instruction in English:** For each candidate, the study of reading and language arts methods includes instruction and experience in teaching organized, systematic, explicit skills that promote fluent reading and writing including: phonemic awareness; direct, systematic, explicit phonics; and decoding skills including spelling patterns, sound/symbol codes (orthography), and extensive practice in reading and writing connected text. (CCTC, 1998b, p. 41.)
English Language Arts Grades 5-8: R-2.0 Reading Comprehension: Students read and understand grade appropriate material. They describe and connect the essential ideas, arguments, and perspectives of the text by using their knowledge of text structure, organization, and purpose. The selections in Recommended Readings in Literature, Kindergarten Through Grade Eight illustrate the quality and complexity of the materials to be read by students. Students will work toward Grade Eight goal of reading one million words annually on their own, including a good representation of grade-level-appropriate narrative and expository text (e.g., classic and contemporary literature, magazines, newspapers, online information).	**RICA**, 7.1: The beginning teacher is able to use informal and formal procedures to assess students' comprehension of narrative and expository texts and their use of comprehension strategies. **RICA**, 7.3: The beginning teacher is able to facilitate comprehension at various stages of students' reading development. The teacher is able to select and use a range of activities and strategies before, during, and after reading to enhance students' comprehension (e.g., developing background knowledge, encouraging predictions, questioning, conducting discussions). **RICA**, 7.4: The beginning teacher knows the level of comprehension and is able to model and explicitly teach comprehension skills. These include (a) literal comprehension skills (e.g., identifying explicitly stated main ideas, details, sequence, cause-effect relationships, and patterns); (b) inferential comprehension skills (e.g., inferring main ideas, details, comparisons, cause-effect relationships not explicitly stated; drawing conclusions or generalizations from a text; predicting outcomes); and (c) evaluative comprehension skills (e.g., recognizing instances of bias and unsupported inferences in texts; detaching propaganda and faulty reasoning; distinguishing between facts and opinions; reacting to a text's content, characters and use of language). **RICA**, 10.1: The beginning teacher is able to determine each student's reading interest and preferences, survey the quantity of students' reading, consider each student's independent reading level, and use that information to promote extensive independent reading.... **Program Standard 4a: Multiple Subject Reading, Writing, and Related Language Instruction in English:** Each candidate participates in intensive instruction in reading and language arts methods that is grounded in methodologically sound research and includes exposure to well-designed instructional programs, which enables her/him to provide a balanced, comprehensive program of instruction…. For each candidate, the study of reading and language arts methods includes strong preparation for teaching comprehension skills; a strong literature component; strategies that promote and guide pupil independent reading; and instructional approaches that incorporate listening, speaking, reading and writing for speakers of English and English language learners (, pp. 40-41).
Mathematics Grade 3: Number Sense 1.0 Students understand the place value of whole numbers. 2.0 Students calculate and solve problems involving addition, subtraction, multiplication, and division. 3.0 Students understand the relationship between whole numbers, simple fractions, and decimals.	**MSAT** Content Knowledge: Number sense and numeration: understand the meaning/implications of number and number concepts as they relate to problem solving, using cardinal and ordinal numbers, place value, ordering of fractions, decimals, whole numbers. **CBEST**: Computation and Problem Solving: Add, subtract, multiply, and divide with whole numbers; Add, subtract, multiply, and divide with fractions, decimals, and percentages... Numerical & Graphical Relationships: Recognize relationships in numerical data; Recognize the positions of numbers in relation to each other; Understand and use rounding rules when solving problems.

Mathematics Grades 8-12: Algebra 1.0 Students identify and use the arithmetic properties of subsets of integers and rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable.	**Mathematics Teacher Preparation: Standard 7. Algebra**: "Each program requires students to have an understanding of the foundations of high school algebra from an advanced standpoint, and linear and matrix algebra...The program requires students to understand the different use of variables and the power of mathematical abstraction and symbolism; The program requires students to understand a variety of algebraic techniques and to analyze mathematical situation; The program requires students to use a variety of algebraic expressions to model problem situations." **SSAT Mathematics**: Proofs, Models, and Problems, Part I: Basic Content Categories: Arithmetic and Basic Algebra, Geometry, Analytic Geometry, Functions and their Graphs, Probability and Statistics (without Calculus), Discrete Mathematics. Proofs, Models, and Problems, Part II: Advanced Content Categories: Functions and Their Graphs, Probability and Statistics, Calculus, Discrete Mathematics, Abstract Algebra, Linear Algebra.
History-Social Science Grade 5: 5.3 Students describe the cooperation and conflict that existed among the American Indians and between the Indian nations and the new settlers. 5.4 Students understand the political, religious, social, and economic institutions that evolved in the colonial era. 5.5 Students explain the causes of the American Revolution. 5.6 Students understand the course and consequences of the American Revolution. 5.7 Students describe the people and events associated with the development of the U.S. Constitution and analyze the Constitution's significance as the foundation of the American republic.	**MSAT-Content Knowledge:** VI. History/Social Studies: "Focus is on essential understanding of important historical events and issues and basic social science concepts…United States history: Native American civilizations; European exploration and colonization; the American revolution and the founding of the nation; growth of the new republic; the Civil War and Reconstruction: causes and consequences; industrialization of America; World War I: causes and consequences; post-World War I America; World War II: causes and consequences; post-World War II America. **Requirements for the Preliminary Credential: 6. Provisions and Principles of the U.S. Constitution:** "Completion of a course (two semester units or three quarter units) in the provisions and principles of the United States Constitution OR passage of an examination in the subject given by a regionally accredited community college, college, or university." (CTC)
History-Social Science Grade 10: 10.3 Students analyze the effects of the Industrial Revolution in England, France, Germany, Japan, and the United States. 10.4 Students analyze patterns of global change in the era of New Imperialism in at least two of the following regions or countries: Africa, Southeast Asia, China, India, Latin America, and the Philippines	**Social Science Teacher Preparation, Standard 5: World Perspectives,** "The program develops each student's knowledge and understanding of the historical and contemporary experiences and interrelationships of people of Africa, the Americas, Asia, and Europe. Students acquire world perspectives (western and non-western) in studies of human history, culture and geography...The program includes required study of world history, with emphasis on interrelationships between western and non-western ways of living and thinking, and on the economic interdependence of world regions...In studies of western civilization, students examine traditional and contemporary sources of American political institutions, laws and ideologies (p.18) **SSAT: Interpretation of Materials:** "The test contains one question from each of the following five fields: United States history, world history, government/civics/political science, geography, and economics...At least one of the five questions contains content reflecting the diverse experiences of people in the United States as related to gender, culture, and/or race, and/or content relating to Latin America, Africa, Asia, or Oceania."
Science Grades K-5: Physical Science -- Properties of materials can be observed, measured, and predicted. -- Materials come in different forms (states), including solids, liquids, and gases. -- The motion of objects can be observed and measured. -- Energy and matter have multiple forms and can be changed from one form to another. -- Light has a source and travels in a direction. -- Electricity and magnetism are related effects that have many useful applications in everyday life. -- Elements and their combinations account for all the varied types of matter in the world.	***Subject Matter Preparation Programs for Elementary School Teachers: Standards of Program Quality and Effectiveness*** (CCTC, revised 1996), p. 11. "[C]andidates must know and understand the subjects of the elementary [science] curriculum with considerable breadth and depth." **Elementary Teacher Standards, p. 33, 39.** "A student who seeks to earn the Multiple Subject Teaching Credential should have basic knowledge of the subject matter commonly taught in elementary schools.... To verify that these expectations have been attained, the Commission has developed and adopted a standardized subject matter assessment for elementary and middle school teachers. Content descriptions reflect the test specifications... Physical Sciences: a) matter: characteristics, structure, and physical and chemical properties, b) reactions and interactions: kinetic theory, changes in state, chemical reactions, oxidation and reduction, acids and bases, catalysts, and chemical bonding, c) macromechanics: straight line, projectile, circular, and periodic motion, Newton's laws of motion, gravity, mass, and conservation laws, energy: sources and transformations, and heat, d) electricity and magnetism: static and current electricity, circuits, magnetism, and applications, e) wave phenomena: electromagnetic spectrum, mirrors, lenses, sound production, and applications, and f) modern physics/nuclear chemistry, relativity, radioactivity, fusion, and fission….Focus is on the ability to demonstrate an understanding of scientific concepts, identifying concepts, identify problems, formulate and test hypotheses, design experiments, analyze and evaluate data, use instruments."

Science Grades 9-12 Investigation & Experimentation. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop their own questions and perform investigations. *Students will* [a] select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data; [e] solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions.	**Science Teacher Standards, pp. 33, 40**. "Students who seek to earn a Single Subject Teaching Credential in Science should have a basic knowledge of biological sciences, chemistry, geosciences and physics. The students should also be well acquainted with the underlying interrelationships among the sciences, and must have a depth of scientific knowledge and skill in one of the four concentration areas.... In the concentration, the teacher's content knowledge and skills should have sufficient depth to enable him/her to design and critique scientific inquiries, make sound curriculum plans, and select teaching methods that foster the scientific accomplishments of all students in departmentalized classes." **California Commission on Teacher Credentialing, Technology Standard 20.5 (1998)**. "Candidates are able to use appropriate computer-based technology to facilitate the teaching and learning process….The new technology standard requires credential candidates to… demonstrate their effective use of technology at an 'advanced' level prior to the issuance of a professional clear credential." Each candidate demonstrates knowledge of basic computer hardware and software terminology... [and] demonstrates competency in the operation and care of computer related hardware... [and] demonstrates competence in the use of electronic research tools (e.g. access the Internet to search for and retrieve information)... [and] uses a computer application to manipulate and analyze data... [and] creates or makes use of learning environments inside the classroom, as well as in the library media labs, that promote effective use of technology aligned with the curriculum... [and] uses technology in lessons to increase each student's ability to plan, locate, evaluate, select, and use information to solve problems..."

Equally important are the state's expectations – reflected in its requirements for the teacher credential and for the accreditation of teacher education programs – for teaching content to diverse learners: knowledge of second language acquisition and development, knowledge of child development, and knowledge of the needs of exceptional learners and strategies for teaching to these special needs. For example, the state requires that teacher education programs must be designed to ensure, among other things, that each candidate:

- Demonstrates understanding of the scope and sequence of the curriculum in each subject area that he or she teaches.
- Engages in intensive study of pedagogical approaches and materials for teaching the subject(s) and language(s) to be authorized by his her credential.
- Reviews research on effective teaching practices, and examines the use of those practices among students of differing gender, ethnicity, and handicapping conditions.
- Develops the crosscultural knowledge and multicultural competencies necessary to interact effectively with children and adults from linguistically and culturally diverse groups.
- Studies human development throughout the life span with special emphasis on cognition, language, physical, social, and emotional development, both typical and atypical.
- Examines theories of human learning and cognition, including first and second language acquisition, and studies ways to identify students' preferred learning modes or styles.
- Studies classroom practices and instructional materials that promote educational equity and ones that undermine equity among students of different ethnicity, gender, socio-economic status, and handicapping conditions (CCTC, 1998b, 31-33, 37-38).

Over 1.5 million students enrolled in California's K-12 public schools are classified as English Language Learners (ELLs). (California Department of Education Website, January, 2002). This represents more than a quarter of California's K-12 student body population. This heterogeneous group of students comes to California's classrooms with varying degrees of proficiencies in both their native language and English, differing amounts of academic content knowledge and prior schooling, and from varying socioeconomic and political circumstances, all

of which affect learning needs and readiness. Instructors of these students need additional teaching skills and theoretical knowledge beyond that which is taught to mainstream teachers in order to effectively instruct this population. Such considerations have resulted in the creation of the Cross-cultural, Academic, and Language Development (CLAD) and Bilingual Cross-cultural, Academic, and Language Development (BCLAD) certificates. Both certificates have served as add-ons to a teacher's existing credential. In the newest revision of the state's teaching standards under SB 2042, the requirements will soon be included under the standard credential. To receive CLAD certification, teachers must illustrate competencies in the following three broad areas of content either through college level course work or comprehensive exams:

> 1) *Second language acquisition*. Includes basic theories of second language acquisition linked to instructional strategies and pedagogical techniques related to the teaching/learning of language minority students. Also includes psychological, socio-cultural, political, and pedagogical factors affecting students' language development.
>
> *2) Bilingual, English Language Development, and content instruction theories and methodology*. Includes methods of instruction both in and through English, including approaches with a focus on English language development (ELD) and with a focus on content area instruction (including Specially Designed Academic Instruction delivered in English, or SDAIE). Methods for explicitly teaching listening, speaking, reading, and writing skills in English to ELL students are modeled and taught.
>
> *3) Culture and cultural diversity.* Includes cultural diversity in California and the U.S., the roles of family and community resources, cross-cultural interaction, and culturally responsive pedagogy. Also includes historical and contemporary demography, migration, and immigration.

For BCLAD certification, teachers are required to demonstrate knowledge of the above, either through coursework or examinations, and exhibit proficiency in a target language, knowledge of the target culture, and methodology for instruction in the target language.

Since all students are expected to meet the state's standards, the state has deemed it critical for teachers to have the knowledge they need to teach all children. The state endeavors to ensure that teachers have this knowledge through its regulation of teacher education accreditation and credentialing.

Authorization to Teach for Those who Have not Met Credential Requirements

As noted earlier, however, a sizeable minority of California's teachers – well over 40,000 in 2000-01 – lack a full credential for all or part of their teaching assignment (CCTC, 2002),[9] and many have not completed, or even begun, a teacher education program. Candidates who receive other credentials, permits, or waivers satisfy some but not all of the requirements outlined above.

[9] Here and elsewhere, a "full" credential refers to a preliminary or clear credential held by a beginning or veteran teacher who has met all of the basic skills, content, and teaching standards for a regular credential set by the CCTC. In 2000-01, the CCTC reports that it issued 32,573 emergency permits, 2,265 waivers, 8,092 pre-intern credentials, and 3,953 intern credentials, for a total of 46,683 substandard credentials (CCTC, 2002).

To hold an intern credential, candidates must have satisfied most of the subject matter requirements detailed above, passed the CBEST, and hold a bachelors degree.[10] They must also be enrolled in an approved internship program that provides coursework and a supervised teaching experience. Generally, interns serve as teacher of record for all or part of the school day: Some programs provide some student teaching experience before candidates take on this role; others do not. Interns generally complete the professional preparation requirements over a two-year period while they are teaching (CCTC, 1999c).

Teachers on emergency permits or pre-intern credentials lack either the professional preparation and/or the content preparation expected of a fully prepared teacher or both. To hold an emergency permit or a pre-intern credential, candidates must have passed the CBEST, hold a bachelors degree, and meet a less rigorous subject matter standard.[11] Emergency permit holders must submit a statement "demonstrating intent" to complete requirements for a credential. Emergency permits can be renewed for five consecutive years, during which the candidate is expected to complete a minimum of six semester units of coursework annually to renew the permit. Some teachers who are fully prepared and credentialed in another state teach on emergency permits while they are completing specific California requirements; some who are credentialed in another field hold emergency permits while they teach out of field.

Pre-interns are emergency permit teachers who have not yet satisfied the subject matter competence requirement for entry into an internship program and who have agreed to work toward subject matter competence while they are teaching as teachers of record. They also have not generally begun studying toward the professional preparation requirements. They must "demonstrate intent" to take the state's subject matter examinations for teachers and take content courses in a university while they hold the certificate (CCTC, 2001b, p. 379). Pre-interns are not expected to have met the longer list of professional preparation requirements outlined above. If they enter an intern program, they will then be expected to pursue those requirements.

Finally, the Commission on Teacher Credentialing also grants short-term and variable term waivers that allow non-credentialed teacher candidates to waive any of the

[10] University or district internship credentials can be issued to candidates on a showing of: (1) A baccalaureate degree or higher degree from a regionally accredited institution of postsecondary education; (2) Passage of the state basic skills examination (CBEST); and (3) Demonstration of a knowledge of the principles and provisions of the Constitution of the United States through course or test passage (university intern only). Interns may be issued a credential if they have completed 80% of an approved subject matter program, rather than the entire program. Interns are expected to satisfy the remaining requirements – including all of their professional preparation requirements, with the exception of student teaching – while they are serving as interns.

[11] The minimum requirements for a multiple subject emergency permit candidate are 10 semester units of college coursework in each of any four of the following subject areas: language studies, literature, history, social science, mathematics, science, humanities, art, physical education, and human development. In contrast to the approved subject matter program requirements, this requirement requires fewer courses and less comprehensiveness. For example, a candidate could lack courses in certain areas, such as mathematics or science, entirely. The minimum requirements for a single subject candidate are 18 semester units in the subject area to be listed on the permit. These expectations are also less rigorous than the requirements for completing an approved subject matter program, both in quantity and expectations for breadth of content coverage. The emergency permit requirement can also be satisfied by passing a subject matter examination.

statutory and regulatory requirements for credentials (Cal. Code of Educ. § 44225(m)). Waivers are generally issued to candidates who have not passed the CBEST or met the subject matter standards.

None of these adjunct categories of credentials, permits, or waivers requires that candidates fully meet the state's subject matter competence standards, which are tied to the student learning standards, before they assume teaching responsibilities. Furthermore, none of them requires that teachers have studied or demonstrated proficiency in standards-based methods of teaching subject matter, methods of teaching reading, methods of teaching English language learners, or methods of teaching special education students before they take responsibility for students, as full (preliminary or clear) credential holders are required to have done. None of the alternative credentials requires that teachers have had the opportunity to work under the direct daily supervision of a practicing veteran teacher available to demonstrate effective strategies.

Thus, while it is possible that some individuals who work in California on less-than-full credentials, permits, or waivers have the preparation and teaching skill needed to teach students to the state's learning standards, there are few guarantees that non-credentialed teachers have the depth of content knowledge and the breadth of teaching skills needed to assure access to equal educational opportunities for the diverse set of learners found in California classrooms.

Although large numbers of teachers are allowed to practice without having met the standards the state has set for their preparation and competence, students in California will, as of 2004, not be allowed to graduate without having met the state standards. There are no exceptions to this policy for students. The latitude granted to teachers about whether they will meet the state's standards is not granted to children, despite the fact that these teachers' abilities to a large extent will determine students' chances of success, not only in school but in life.

III. The Importance of Well-Qualified Teachers

Strong evidence suggests that teachers affect student learning. Recent studies using value-added student achievement data have found that student achievement gains are much more influenced by a student's assigned teacher than other factors like class size and heterogenity (Sanders & Horn, 1994; Sanders & Rivers, 1996; Wright, Horn, & Sanders, 1997). Students who are assigned to several highly effective teachers in a row have significantly greater gains in achievement than those who are assigned to several ineffective teachers in sequence (Sanders & Rivers, 1996). These influences can be quite large and can also exert residual effects in later years. That is, having a high quality teacher in one year increases learning not only in that year but also in subsequent years. A recent analysis by Rivkin, Hanushek, and Kain (2000) attributes at least seven percent of the total variance in test-score gains to differences in teachers.

A variety of teacher experiences and attributes appear to contribute to this effect. Looking across studies, several aspects of teachers' qualifications have been found to bear some relationship to student achievement. These include teachers' 1) general academic and verbal ability; 2) subject matter knowledge; 3) knowledge about teaching and learning as reflected in teacher education courses or preparation experiences; 4) teaching experience; and 5) the combined set of qualifications measured by teacher certification, which includes most of the

preceding factors. The size of these relationships varies from study to study, depending on measures used, which other variables are examined, content area and grade level of teachers, and other factors. There are, of course, many other attributes that matter for teaching, such as enthusiasm, perseverance, flexibility, and concern for children that have been evaluated in various studies (e.g. Schalock, 1979). There are also many specific teaching practices that make a difference for learning as well (see e.g. Good & Brophy, 1995). We review these aspects of teacher competence below.

Certification Status

Certification or licensing status is the state's legal vehicle for establishing competence for members of professions, including teaching. It is meant to represent the minimum standard for responsible practice. As a measure of teacher qualifications, the requirements for certification include measures of many of the other variables noted above, including basic skills and general academic ability, knowledge about subject matter, knowledge about teaching and learning, and some teaching experience. In most states, candidates for teaching must 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 secure a major or minor in the subject(s) to be taught and/or pass a subject matter test, take specified courses in education and, sometimes, pass a test of teaching knowledge and skill. In the course of teacher education, candidates are typically judged on their teaching skill, professional conduct, and the appropriateness of their interactions with children during the student teaching experience. Since there are limits on the number of years a person can teach without earning a credential, there also tends to be a correlation between teaching experience and credential status.

To earn a clear credential in California, teachers must possess a bachelor's degree from an accredited college or university, pass the California Basic Educational Skills Test (CBEST), demonstrate subject matter competence through either completion of specified courses in the content area(s) to be taught or passage of one or more tests of content knowledge.[12] In addition, teachers must complete at least thirty semester units in education.[13] This training includes study of content pedagogy, curriculum, assessment, strategies for teaching reading, English language development, special needs learners, health education, technology use, and more. Furthermore, teachers must have some experience in the classroom through student teaching or an internship in order to gain a credential.

California Studies. Several recent studies in California have pointed to strong relationships between measures of teacher qualifications and student achievement, with teacher certification status and experience being among the strongest and most consistent predictors of student achievement, in addition to student socioeconomic status. Certification status generally

[12] For single subject credentials, candidates who have not completed an approved subject matter program must take and pass two subject matter tests in their field: the SSAT and the Praxis. For multiple subject credentials, candidates who have not completed an approved subject matter program must take and pass the MSAT. All candidates must also take and pass the RICA, a test of knowledge about the teaching of reading.

[13] This requirement was once limited to post-baccalaureate training but can now be folded into an undergraduate program.

shows a larger effect size than experience. Factors like teachers' level of general education (e.g. possession of a masters degree vs. a bachelors degree) appear as occasional, but less strong contributors to student achievement. These general patterns are seen in a number of studies conducted outside of California as well.

A recent study of student achievement across more than 7,000 California schools by the Public Policy Institute of California found that teacher qualifications variables were the strongest predictors of student achievement in a regression analysis, after controlling for the substantial effects of socioeconomic status. The report noted:

> Among the school resource measures, the level of teacher experience and a related measure – the percentage of teachers without a full credential – are the variables most strongly related to student achievement. Teachers' level of education, measured by the percentage of teachers with a master's degree or higher, in some cases is positively and significantly related to test scores but not nearly as uniformly as the measures of teacher experience. Similarly, a higher percentage of teachers with only a bachelor's degree within a given grade is negatively related to student achievement (Betts, Rueben, & Dannenberg, 2000, p. xxii).

This study joins a number of others in finding that, among school resources, teacher qualifications often appear to have the greatest influence on what students learn. In addition, like others, Betts and colleagues found that teacher qualifications are unequally allocated to students by race, income, and location. These unequal distributions are further discussed below.

In a recent school level analysis of test performance in 795 California high schools, Fetler (1999) found a significant negative relationship between average student scores on the state mathematics examination and the percentage of teachers on emergency permits. He also found a smaller positive relationship between student scores and teacher experience levels, after controlling for student poverty rates and test participation rates. The author concluded that, "After factoring out the effects of poverty, teacher experience and preparation are significantly related to achievement" (p. 13).

More recently, Goe (2002) examined the relationship between student and teacher characteristics for nearly 6400 schools and schools' scores on California's Academic Performance Index (API), which is calculated based on average test scores and score gains on the SAT-9 tests. Like Fetler, Goe found that, among school resources, the strongest predictors of API rankings were a school's proportion of teachers on emergency permits and the proportion of first year teachers, both showing a significant negative relationship to school-wide student achievement after student characteristics were controlled. She also found a strong relationship between teacher qualifications and the race / ethnicity, language background, and income of students and families.

These studies, like many others, find very strong influences of student socioeconomic status on student achievement. These effects appear not only to be a function of the non-school resources for learning (including health and welfare supports) that may be represented in homes and communities, but also a function of the fact that many school resources are inequitably

distributed to students in ways that are strongly associated with race and class, including the numbers of teachers and size of classes, materials, books, and equipment, facilities, and course offerings. The PPIC study found that resource disparities in California are compounded for the most disadvantaged schools. As the authors note, "By and large, if students at a given school have relatively little of one resource, they are likely to have relatively little of other resources as well" (Betts, Rueben, & Dannenberg, 2000, p. 55). Thus, the influences many studies have observed of socioeconomic status on student achievement may represent in part the influences of unequally allocated school resources on students' opportunities to learn.

Many principals and teachers in California, who are exposed to unprepared teachers to a degree unusual in the country, are particularly forceful in their conviction that teacher certification is an important indicator of teaching ability. Principals and teachers interviewed for this case noted that credentials are a high priority for them when hiring teachers, because the credential shows that teachers have education training of the kind they find valuable (Banda, v. 1, 137:20-138:10. Muzinich, v. 1, 63:20-64:3, 119:9-15. Roland, v. 1, 31:24-32:16. Walden, v. 1, 251:4-20. Pechthalt, v. 1, 108:11-24.)

In their experience, credentialed teachers "know what to do and require less assistance" (Hines, v. 3, 496:13-25), have had mentored student teaching and methodology classes (Lane, v. 2, 74:20-75:14, Pechthalt, v. 1, 110:11-18), are better prepared (Carey, v. 1, 228:8-229:2), and have fewer problems with classroom management and teaching strategies (Salyer, v. 1, 138:23-139:3, Medina, v. 2, 203:5-18; 208:7-16; 209:9-13; Rodriguez, v. 1, 99:9-23). They compare credentialing "as important to teaching as a driver's license is to driving a car" (Roland, v. 1, 32:17-33:5) and as essential as such training is to the qualifications of a dentist (Pechthalt, v. 1, 135:10-20). As one principal noted regarding the importance of effective preparation, including student teaching,

> I think a lot of people think they can be a teacher because they've gone to school, and I don't necessarily think that that is a fact. For a person to come to the educational setting, they need to be armed, if you will, with various strategies that they are going to use in the classroom…. So I would like to see future teachers truly have a year of methodology classes and observation and student teaching under a quality master teacher where they can try things…. (and) effectively evaluate what you are doing…. (Lane, v. 2, 74: 20-75:14.)

Friedlaender & Frenkel (2002) observed in their study of 17 hard-to-staff California schools that "school and district officials consider credentialed teachers to be a 'valued commodity' and quickly hired the best qualified credentialed teachers" (p. 8). Principals and teachers attributed the shortages of such teachers to low salaries, poor working conditions, inadequate district or school recruitment, the after-effects of California's class size reduction initiative, and difficult neighborhoods where living conditions are poor and housing is in short supply. The authors note that uncredentialed teachers who were hired because of these conditions often commented on their own lack of preparation. For example, at one school, the researchers wrote of three teachers they interviewed (two interns and one emergency permit teacher):

All three teachers asserted that they did not feel adequately prepared to teach in their current teaching assignment. They agreed that they had a difficult time with curriculum development and implementation as well as classroom management. In addition, they expressed feeling challenged by all of their "administrative responsibilities such as standardized testing, assessment, and the planning of field trips. All three teachers ascribed their inadequacy to the fact that they had not participated in a formal teacher education program before entering the profession…. All of the teachers also spoke extensively about the fact that most of their students are English Learners (most of whom speak Spanish). The teachers agreed that they were not adequately trained to teach this population of students. They also seemed to resent the fact that the students and their families are not proficient in English because it creates "double the workload" for them as they planned instruction and carried out the required assessment measures (RE3, p. 4).

Similarly, the researchers observed of another school:

In one urban middle school, all three teachers interviewed not only lacked credentials but had received only six weeks of teacher training from the Teach for America program. While school administrators provided helpful curricular ideas, these teachers' lack of teaching experience dramatically limited their effectiveness as educators (p. 11).

Finally, they observed of the more than 50 teachers they interviewed overall:

….Across most schools, teachers of English Language Learners (ELL) felt least prepared. For example, one teacher explained that she was assigned a sheltered class when she first came to the school and thought it was for foster care students from homeless shelter." Several reading teachers also had no preparation in reading instruction and were teaching students who were reading well below grade-level. According to both teachers and administrators, teachers' inexperience accelerates teacher burnout…. (p. 11).

Teachers deposed for this case described how teaching alongside uncredentialed teachers is a problem not only for these novices without training, but also for prepared teachers who must deal with the spillover effects of the lower levels of competence untrained teachers possess:

(One teacher) was considering a career change and came in and taught our special ed. class for a year. During the time she was in that class, she was taking one or two courses out at San Francisco State to get her credential in teaching special ed, but she wasn't technically qualified and there was no one on the site who was able to advise her or train her or support her appropriately. She had a pretty miserable year and she admitted candidly to many of us that she felt underqualified, sometimes unqualified and absolutely did not know what she was doing in there, so it was hard watching her teach. You could tell she was very stressed and very strained. As a peer, it was hard to watch her and it was hard to watch her kids function in the room with somebody who was not experienced and qualified (Malabed, v. 2, 308:19-309:17).

> (I)t was a topic that was … discussed at the lunch table about the fact we had a class that had had so many substitutes and had had an uncredentialed teacher who was not able to handle the situation and ended up not returning and the kids were going to struggle and that the … teachers who received them the next year would probably have a difficult time with those students because of what they had been through the prior year (Salyer, v. 1, 167:21-168:15).

In addition to many principals who described their desire to hire credentialed teachers because they know how to manage classes and plan and teach a curriculum, teachers described how what is learned in a credential program makes a differences for their skills and those of their colleagues:

> (W)hen you get your credential you go through a battery of classes that teaches you how and what to teach. And, generally being prepared for a profession makes you better at it. I also have the added perspective now of having worked both as a mentor teacher to these uncredentialed teachers and as supervisor to students who are getting their credential at UC Berkeley. And, so, I actually have firsthand knowledge of the types of courses and conversations that they have pre-service and not while teaching. And, I think that credentialing classes deal with a lot of issues that come up in the first year of teaching that can either be dealt with on the fly or dealt with thoughtfully before one enters the classroom (Carey, v. 1, 228:8-229:2*)*.

> I would say my experience was that teachers who had not been through credential programs had more concerns about classroom management and about effective methods for delivering instruction to the student population at our school than teachers who had been through credential programs (Salyer, v. 1, 138:23-139:3).

Teachers who entered teaching without preparation provide the most eloquent assessment of what they learn from a teacher education program:

> I believe that emergency-credentialed teachers, generally speaking, are not going into classrooms with enough tools, nor are they going in with appropriate lenses for looking at the classroom (Medina, v. 2, 383:3-20). (T)he best way to do this is to compare myself as a teacher now and myself as a teacher back then. Upon entering … my teacher-credentialing program, I've gained a lot of tools how to better address students' needs. As an uncredentialed teacher, I was not aware that I should take literacy into a large consideration into their education. As an uncredentialed teacher, I wasn't emphasizing reading as a skill as the very backbone of communication to my students. As an uncredentialed teacher, I didn't have tools for discipline. I didn't have tools for what good discipline is and what bad discipline looks like. I wasn't taking into consideration the long-term effects of how my classroom policies shifted. As an uncredentialed teacher, I didn't have great record-keeping skills. As an uncredentialed teacher, I had no idea how students were developing biologically, socially during this high time of change. As an uncredentialed teacher, I hadn't looked at or I hadn't compared formally what good teaching looks like and what bad teaching looks like and I've since done so, looking at teachers internationally and just across the state. I didn't have the tools. I wasn't thinking about multiple representations. I wasn't

> thinking about multiple intelligences. I wasn't thinking about equity. I wasn't thinking about gender equity, racial equity while I was teaching and all of these things really stem from my experience in my credential program and so with these lenses, I'm better able to serve my students. But before those lenses were available to me, I don't think I was doing an adequate job…. (Medina, v. 2, 375:17-377:6).

National Studies. Studies using national data and other state data sets have found significant relationships between teacher certification measures and student achievement at the levels of the individual teacher (e.g. Goldhaber & Brewer, 2000; Hawk, Coble, & Swanson, 1985); the school (Betts, Rueben, & Danenberg, 2000; Fetler, 1999); the school district (Ferguson, 1991; Strauss & Sawyer, 1986); and state (Darling-Hammond, 2000b). The convergence of findings in analyses using different units of analysis reinforces the strength of the inferences that might be drawn from any single study, since analyses at different levels of aggregation can produce different results. On the one hand, disaggregated data can exhibit greater measurement error; on the other hand, some argue that aggregated data may overestimate the effects of school input variables if key variables are omitted (Hanushek, Rivkin, & Taylor, 1996). Of course, omitted variables can bias results at any level of aggregation. When interpreting the evidence on an issue, it is important to consider whether consistent results are found at different levels of aggregation.

A large-scale study of high school students' performance in mathematics and science using data on more than 3,400 teachers from the National Educational Longitudinal Studies of 1988 (NELS) found that fully certified teachers have a statistically significant positive impact on student test scores relative to teachers who are not certified in their subject area, as do teachers who hold a degree in mathematics or mathematics education (Goldhaber & Brewer, 2000). The same trends were true in science, but the influences were somewhat smaller. Furthermore, in states with licensing examinations, newly trained teachers (those with probationary licenses granted to fully prepared new entrants) showed a strong positive influence on student achievement. Goldhaber and Brewer report:

> (W)e 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 (in these data we cannot distinguish between no certification and certification out of subject area) 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. Teachers who hold private school certification or are not certified in their subject area have a negative (though not statistically significant) impact on science test scores (p. 139). [14]

[14] The study also found that students of a small number of science teachers who held temporary or emergency certification (24 out of the 3,469 teachers in the overall sample) did no worse than the students of certified teachers,

Correlational studies like the one above can suggest relationships, but experimental or matched comparison designs are needed to examine directly the outcomes of different groups of teachers. A matched comparison group study of 36 middle school mathematics teachers and 826 students in North Carolina, where teachers were matched by years of experience and school setting, found that students of fully certified mathematics teachers experienced significantly larger gains in achievement than those taught by teachers not certified in mathematics. The differences in student gains were greater for algebra classes than general mathematics (Hawk, Coble, & Swanson, 1985). The difference in certification status between the groups indicated differences in their background coursework in both mathematics and mathematics teaching methods.

School level studies like those conducted in California have produced similar results elsewhere. Examining data on schools in Texas, Fuller (1998, 2000) found that students in schools with greater proportions of certified teachers are significantly more likely to pass the Texas state achievement tests (TAAS), after controlling for student socioeconomic status and teacher experience. In one set of studies, Fuller (1998) found that the likelihood of elementary school students in grades 3, 4, and 5 passing all subtests of the TAAS was greater in schools with higher proportions of certified teachers, controlling for teacher experience. He also found that gains in pass rates were also related to the proportion of properly certified teachers, with prior achievement and student demographics taken into account. The differences were significant for Hispanic students and economically disadvantaged students. In a second set of studies, Fuller (2000) found that the percentage of properly certified Algebra I teachers in a school was positively and significantly associated with gains in student achievement as measured by the Algebra end-of-course examination for all students, after controlling for student and school characteristics and prior test scores.

Some studies have gone beyond measures of general certification status to include teachers' licensure test scores, which reveal the relative ranking of candidates on assessments that are part of the certification process, rather than merely whether they have passed or failed.[15]

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although they, too, did better than the students of uncertified teachers. Another analysis of these data (Darling-Hammond, Berry, & Thoreson, 2001) showed that about two-thirds of the teachers in this sample holding temporary / emergency certificates were experienced and had subject matter and education training comparable to that of the certified teachers, suggesting that they were likely to be licensed teachers from out-of-state who held temporary licenses while securing a new state license or experienced teachers teaching out of their main field. For those with similar training, it is not surprising that their students did about as well as those of certified teachers holding similar qualifications. Only a third of the NELS sample teachers on temporary / emergency licenses were new entrants with little education training, such as those who enter via some alternate routes in California and elsewhere. The students of this sub-sample of teachers had smaller achievement gains than those of the more experienced, traditionally trained teachers in an analysis of co-variance that controlled for pre-test scores, content degrees, and experience.

[15] It is important to note that these studies were based on individuals already in the teaching force, most or all of whom were already certified and had met the other requirements of subject matter background and education courses, student teaching, and test passage. They were conducted using data from the 1980s, when most teachers were fully certified and states admitted few teachers to practice if they had failed a licensure test. Thus, the effect of teacher licensing test score differences – which may capture a range of academic and teaching abilities – were evaluated on top of the pre-existing knowledge and skill represented by having passed the test and completed

In an analysis of nearly 900 Texas school districts that controlled for student background and district characteristics, Ronald Ferguson (1991) found that combined measures of teachers' expertise—scores on a licensing examination, master's degrees, and experience—accounted for more of the inter-district variation in students' reading and mathematics achievement (and achievement gains) in grades 1 through 11 than student socioeconomic status. An additional, smaller contribution to student achievement was made by lower pupil-teacher ratios and smaller schools in the elementary grades. Altogether, the school variables accounted for about the same proportion of total variance as the student background variables: poverty, race, language background, proportion of single-parent households, and adult education levels in the community.[16]

Of the teacher qualifications variables, the strongest relationship was found for scores on the state licensing examination, a test that is described by the test-maker as measuring basic communication skills, research skills, and teaching knowledge. The effects were so strong, and the variations in teacher expertise so great, that after controlling for socioeconomic status, the large disparities in achievement between black and white students were almost entirely accounted for by differences in the qualifications of their teachers. Ferguson also found that every additional dollar spent on more highly qualified teachers netted greater increases in student achievement than did less instructionally focused uses of school resources.

Another study (Strauss & Sawyer, 1986) found that student test performance in North Carolina districts was strongly associated with teachers' average scores on the most commonly used teacher licensing examination, the National Teacher Examinations. (The NTE Core Battery, in use in North Carolina at that time, including components measuring basic skills, general knowledge, and professional teaching knowledge). Taking into account per-capita income, student race, district capital assets, student plans to attend college, and pupil/teacher ratios, teachers' test scores had a strikingly large effect on students' failure rates on the state competency examinations: a 1% increase in teacher quality (as measured by NTE scores) was associated with a 3 to 5% decline in the percentage of students failing the exam. This effect was much larger than the effect of student race.[17] The authors' conclusion is similar to Ferguson's:

> Of the inputs which are potentially policy-controllable (teacher quality, teacher numbers via the pupil-teacher ratio and capital stock), our analysis indicates quite clearly that improving the quality of teachers in the classroom will do more for

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preparation for a license. The studies were not designed to evaluate the effects of test score differentials below this threshold.

[16] Ferguson reports that "After the first grade, teacher scores on the TECAT account for about one fifth to one quarter of all variation across districts in students' average scores on the TEAMS exam" (p. 475). "Experience accounts for a bit more than ten percent of the interdistrict variation in student test scores" (p. 476); and "the percentage of teachers who have master's degrees accounts for about five percent of the variation in student scores across districts for grades 1 through 7. Master's degrees have no predictive power after the seventh grade" (p. 477.).

[17] The authors use the district average NTE score as their measure of teacher quality. Thus, a 1% increase in the district average NTE score for teachers was associated with a 3-5% decrease in the district fail rate on the exams. The authors found that teacher's NTE scores mattered more for rates of failure on the exam than for average student achievement, and that in both sets of estimates, teacher quality mattered more to these outcomes than the proportion of black students in the district – which had a noticeable but smaller effect. They note that "the impact of teacher quality on the rate of failure varies from an elasticity of 5.02 to one of 6.30, while the elasticity of the effect of race on the rate of failure varies between 0.060 and 0.089" (p. 44.)

> students who are most educationally at risk, those prone to fail, than reducing the class size or improving the capital stock by any reasonable margin which would be available to policy makers (p. 47).

Finally, Darling-Hammond (2000b) used state-level data from the National Assessment of Educational Progress and the Schools and Staffing Surveys to examine test score differentials in reading and mathematics across states, controlling for student poverty and language status. In regression estimates, the study found that measures of teacher preparation and certification were the strongest correlates of average student achievement in reading and mathematics, while class size had very modest additional effects. The most strongly significant predictor was a state's proportion of "well-qualified teachers," defined as the proportion holding both full certification and a major in the field taught. The proportion of teachers with masters degrees exerted an additional small positive effect on achievement in 5 of 6 estimates and the proportion of emergency credentialed teachers in the state exerted an additional small, negative effect on student achievement. The study concluded that,

> (S)tates interested in improving student achievement may be well-advised to attend, at least in part, to the preparation and qualifications of the teachers they hire and retain in the profession. It stands to reason that student learning should be enhanced by the efforts of teachers who are more knowledgeable in their field and are skillful at teaching it to others. Substantial evidence from prior reform efforts indicates that changes in course taking, curriculum content, testing, or textbooks make little difference if teachers do not know how to use these tools well and how to diagnose their students' learning needs.

Debates about the Importance of Teacher Education and Certification

Despite consistent evidence that the knowledge captured by teacher certification status is significantly related to student achievement, there are those who have recently argued that teacher education and certification do not matter for teacher effectiveness, and, further, that certification of teachers should be abandoned by states in order to remove "regulatory barriers" to teaching (see e.g. Ballou & Podgursky, 1997; Walsh, 2001; Walsh and Podgursky, 2001). These arguments are linked to arguments against state requirements for teacher preparation, especially for those who will teach students in urban districts (Walsh, 2001, pp. 1-2), against the professionalization of teaching – which is seen as a barrier to charters and other forms of school choice (Ballou & Podgursky, 1997, p. 44), and against greater investments in public school funding and resources (Hanushek, 1996).

For example, Kate Walsh (2001) argues in a paper written for the Abell Foundation that proponents of securing fully credentialed teachers for Baltimore, MD schoolchildren are misguided (pp. 1-2). The report maintains that disparities in qualified teachers between Baltimore and other districts are not a problem because teacher certification does not mean that teachers are more effective, and thus it is not a problem that many teachers in inner city schools are not certified. Walsh cites an earlier paper by Hanushek (1996) that argued against investments in smaller class sizes or higher salaries in poorly funded Baltimore, in which he contends that, "Baltimore City would not benefit from additional resources as much as it could

benefit by better school management."[18] The likely outcome of these arguments would be continued inequality in funding, depressed salaries for teaching in high-need areas, and continued lack of access for poor children to a stable teaching force of well-qualified teachers.

Those who argue against teacher education and certification assert that 1) the research linking teacher education or certification to student learning is weak; 2) the aspects of teacher abilities that matter for student achievement (primarily verbal ability and subject matter knowledge) are not associated with teacher education or certification; and 3) free market strategies (i.e. elimination of requirements for certification) will increase supply and allow principals to staff schools with better teachers. Walsh and other authors cited above seek to make this argument by dismissing studies that find evidence that knowledge about teaching makes a different for teacher performance, claiming that studies that have been cited for this finding are too old, too small, too highly aggregated, or are not really about certification after all, even if their authors claim they are.

As documented elsewhere, these claims are made by ignoring much of the evidence that exists on these questions (including many of the studies summarized here); misrepresenting the methods and findings of some studies, as well as the views of their authors; discounting many studies based on their age, sample size, or publication venue (but citing the same studies and others of similar age, size, or publication status when the findings are viewed as compatible with the authors' arguments); and making claims about the effectiveness of uncertified teachers that are not supported by research (Darling-Hammond, 2001, 2002). For example, for her proposition that "new teachers who are certified do not produce greater student gains than new teachers who are not certified," Walsh cites seven studies, none of which provides any support for this proposition, and five of which actually provide evidence that contradicts this claim. (For further discussion of this research, see Appendix A.)

In addition, the notion that eliminating certification requirements will solve teacher supply problems ignores the fact that underresourced schools with low salaries and poor working conditions do not attract high quality teachers even when they can freely hire individuals who are not credentialed. For example, we provide evidence in this paper that principals in disadvantaged schools perceive no barriers in hiring untrained and uncredentialed teachers, but find low salaries and poor working conditions to be major obstacles to hiring the prepared and credentialed teachers they prefer. There is also strong evidence from New York that non-competitive salaries in New York City – where for many years there has been no effective bar to hiring thousands of uncertified teachers annually – produce a less well-qualified teaching force by any definition of quality, and that multiple indicators of quality point in the same direction.[19]

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[18] Cited in the original appendix to Walsh's paper, entry 88, July 23, 2001.

[19] Researchers in New York have found that schools with less qualified teachers by one measure (e.g. certification status and certification exam scores) tend to have less qualified teachers by other measures (e.g. selectivity of colleges, degree status, tenure). These strong correlations suggest that schools are not trading off one type of qualification for another in their hiring practices. Instead, some schools simply employ more qualified teachers than other schools. The differences across schools in teacher qualifications are related to measurable characteristics of the schools. Urban schools differ in the qualifications of their teachers from suburban and rural schools; schools with high proportions of minority students differ from schools with low proportions of minority students; schools with many children in poverty differ from schools with few children in poverty (Loeb, 2001; Lankford, 1999; Lankford, Loeb, & Wyckoff, 2002).

Finally, the argument that eliminating certification standards will result in better quality teachers ignores the fact that certification standards are the major lever for ensuring the verbal ability and subject matter knowledge of candidates that antagonists of certification argue are important for teaching.

To be sure, certification is but a proxy for the subject matter knowledge and knowledge of teaching and learning embodied in courses and in supervised student teaching. It is true that certification is a relatively crude measure of teachers' knowledge and skills, since the standards for subject matter and teaching knowledge embedded in certification have varied across states and over time, are differently measured, and are differently enforced from place to place. The quality of preparation in both university programs and other alternatives has varied as well, although a number of states have made substantial recent headway in strengthening teachers' preparation and reducing this variability. Given the crudeness of the measure, it is perhaps remarkable that so many studies have found significant effects of teacher certification on student achievement and that these effects remain significant when other student characteristics and teacher qualifications measures have been taken into account.

One claim made by those who would reduce or eliminate requirements for teacher preparation is that candidates learn little in professional education courses and may be dissuaded from entry by education requirements (Ballou & Podgursky, 1997, pp. 39-40). Citing critiques of preparation that are 35 years old, these authors do not acknowledge recent studies that have found graduates rating themselves well prepared by their teacher education programs (Howey et al., 1994, pp. 24-29; Kentucky Institute for Education Research, 1997) and significantly better prepared than those who lacked preparation (Darling-Hammond, Chung, & Frelow, 2002; Jelmberg, 1995).

Certification is not a perfect measure of teacher quality. Continuing improvement in the quality of tests, courses, and institutions is the subject of study and action across the country (see, for example, Darling-Hammond, Wise, & Klein, 1999; Wilson, Floden, & Ferrini-Mundy, 2001). Indeed, some California officials have suggested that the state's teacher certification system does not adequately measure teacher quality. However, it is the measure the state itself has created. Both as a matter of law and as a matter of rational social policy, the answer to flaws that may be perceived in the state's certification system is not to eliminate or ignore these requirements but to improve them. Such standards, in teaching as in other professions, are a means to encourage teachers to gain knowledge and to enable students to have access to knowledgeable teachers. If teacher knowledge and skill about both content and how to teach it is important, as substantial evidence suggests it is, policymakers have an obligation to work to improve preparation and certification standards so that they increasingly approximate what teachers need to know and do in order to be successful with diverse students.

As Levin (1980) notes, certification is a critically important exercise in the economics of information that should be a target of continual improvement:

> (T)he facts that we expect the schools to provide benefits to society that go beyond the sum of those conferred upon individual students, that it is difficult for many students and their parents to judge certain aspects of teacher proficiency, and that teachers cannot be instantaneously dismissed, mean that somehow the state must be concerned about the quality of teaching. It cannot be left only to the individual judgments of students and their parents or the educational administrators who are vested with managing the schools in behalf of society. The purpose of certification of teachers and accreditation of the programs in which they received their training is to provide information on whether teachers possess the minimum proficiencies that are required from the teaching function. Because this is an exercise in the provision of information, it is important to review the criteria for setting out how one selects the information that is necessary to make a certification or accreditation decision (p. 7).

Evidence about Important Aspects of Teacher Knowledge and Skill

As noted above, certification alone is a relatively crude measure of teaching quality. Although it incorporates a number of important indicators, it is a measure of minimal competence. As in other professions, licensure or certification does not, by itself, indicate the degree to which a practitioner will be successful in a given setting. There are undoubtedly some teachers who are licensed who are not highly effective, both because of variability in the quality of teacher education they received and variability in other traits not well-assessed by licensing procedures (level of energy, perseverance, enthusiasm, and fit with their teaching position, for example). State licensing systems also vary in their quality – that is, the extent to which the mix of requirements they impose are strongly related to the ability to teach well and set an appropriate minimal standard while not overregulating the teacher labor market in ways that have unintended side-effects. There are also undoubtedly some unlicensed teachers who are effective – either because they are well-prepared to teach but have not completed all of the specific requirements associated with the certification process in a given state (many fully prepared out-of-state and some in-state entrants fall into this category) or because they are not teaching content or populations of students whose needs exceed what they know about difficult problems of learning and teaching (many private school teachers whose students are pre-selected to be academically successful may fall into this category).

Despite the limitations of formal licensing systems, the evidence noted above suggests there is a strong tendency for teachers who have completed the requirements for certification and who have performed well on certification tests to be more effective than others. An important question is what kinds of specific training and abilities have been found to make a difference for teacher effectiveness?

Research on teaching suggests that general knowledge and ability, verbal ability, and subject matter knowledge provide important foundations for expertise; knowledge of teaching, learning, and children enables teachers to translate ideas into useful learning experiences; abilities to plan, organize, and implement complex tasks are additional factors predicting effectiveness; and greater experience – at least during the first years of practice – enables teachers to apply knowledge increasingly appropriately in non-routine situations. All of these factors appear to have a bearing on what makes teachers effective; it is difficult to measure

precisely the relative effects of each factor, as many are highly correlated and different data sets include different measures, with few containing the more fine-grained measures of specific kinds of knowledge.

Measures of **general academic and verbal ability** have been most readily available in large data sets since the 1960s, and a number of studies have suggested that teachers' verbal ability is related to student achievement (e.g., Bowles & Levin, 1968; Coleman et al., 1966; Hanushek, 1971; Hanushek, 1992). Among more recent studies, Ferguson and Helen Ladd (1996) conducted an analysis in Alabama similar to Ferguson's Texas study (1991) using a data set that included ACT scores instead of teacher licensing examination scores. They found significant but somewhat smaller influences of these test scores, which are pre-college measures of general academic ability, as compared to the licensing examinations in Texas, and somewhat larger influences of master's degrees on student achievement than the Texas study found. The findings were consistent for analyses conducted at both the district and school levels.

Some researchers have found a relationship between the selectivity of the college a teacher attended and their students' achievement (Ehrenberg and Brewer, 1994). College selectivity is likely another proxy for general academic or verbal ability. Some research has suggested that the effects of teachers' general academic or verbal ability on achievement may be differentially strong for teachers of different types of students (Summers & Wolfe, 1975).

Some critics of teacher education have pointed to these studies as evidence that verbal ability is the most important predictor of teacher effectiveness (Walsh, 2001). However, the data sets used for these analyses did not have other measures of teacher knowledge and skill available. Economist Richard Murnane (1983) pointed out nearly twenty years ago that evidence about the influence of verbal ability was partly a function of the fact that standardized test scores were one of the few variables about teachers available in large-scale databases at that time, which did not include good measures of teacher education. He noted:

> Clearly one should not interpret these results as indicating that intellectual ability should be the sole criterion used in recruiting teachers or that formal teacher training cannot make a difference. In fact, the lack of evidence supporting formal preservice training as a source of competence may be to some extent a result of limitations in the available data. For example, all databases suitable for examining the correlates of teaching effectiveness as measured by student achievement gains pertain to a single school district. Since there is less variation in training among teachers within a district than among teachers in the country at large, these databases do not permit the most powerful possible tests of the efficacy of alternative teacher training programs (p. 565).

Thus, it would be incorrect to infer that these findings are evidence that other kinds of knowledge do not matter for teaching effectiveness. As noted below, data sets that include measures of other kinds of teaching knowledge, including knowledge of content and pedagogy, find that they are significant contributors to teacher effectiveness.

Measures of **general education level** (e.g. presence or absence of bachelors or masters degrees) appear to exert a small influence on teacher effectiveness. For example, in studies

noted earlier (Betts, Rueben, & Danenberg, 2000; Ferguson, 1991; Ferguson & Ladd, 1996), a teacher's possession of masters degrees accounted for a small but noticeable portion of the measured variance in student achievement, while teacher certification status or test scores accounted for more.

Across studies, masters degrees have been inconsistent predictors of teacher effectiveness (see e.g. Greenwald, Hedges, and Laine, 1996). In general, masters degrees have been a crude proxy for teaching expertise, given the wide variability in the content of masters degrees pursued by teachers. Whereas some masters degrees are directly related to teaching (e.g. degrees for reading specialists, special education teachers, 5-year teacher education programs, and degrees related to content and/or pedagogy, such as science or science education), many have traditionally been focused on jobs outside of teaching, such as administration, counseling, measurement and evaluation, and the like. Goldhaber and Brewer (1998, 2000) found that there is a greater influence of teachers' education levels on student achievement when they have bachelors and masters degrees in the content area taught (e.g. mathematics or mathematics education) as compared to undifferentiated degrees. Thus, there is reason to expect that some masters degree studies would affect teaching ability, but not much reason to expect the effect of masters degrees as an undifferentiated variable to be large or uniform in the aggregate.

Policy contexts can influence what a specific degree measures. For example, some states have recently required masters degrees focused on teaching for teachers to secure a professional license, whereas most do not. Betts et al. (2000) found in California that the proportion of a school's teachers with a bachelors degree only (rather than a BA+30) influenced student achievement negatively, and the proportion with a masters degree influenced achievement positively. In California, most teacher credentials are secured in post-baccalaureate programs of 30 semester units. A minority of teacher education programs also award a masters degree. Thus, in the context of California's requirements these degree attainment variables are more likely measuring preparation for teaching than degree status would elsewhere.

Teaching experience appears to matter, especially in the early years, and often shows up as a modestly significant predictor of teacher effectiveness (e.g. Betts, Rueben, & Danenberg, 2000; Ferguson, 1991; Murnane & Phillips, 1981). Inexperienced teachers (those with less than two to three years of experience) are often found to be noticeably less effective than more senior teachers (e.g. Goe, 2002; Hanushek, Rivkin, & Kain, 1998; Kain & Singleton, 1996); however, the benefits of experience appear to level off after about 5-7 years. As Murnane and Phillips (1981) point out, this may or may not be a function of the career trajectories of individual teachers. Possible causes of this observed trend in cross-sectional data sets may be that differently able teachers may recruited at different points in time as a result of labor market changes ("vintage" effects), or more able teachers might leave sooner ("selection" effects), thus leaving a less effective senior workforce. Another possible cause of this curvilinear trend is that teachers do not always continue to grow and learn and may grow tired in their jobs. Furthermore, the benefits of experience may interact with educational opportunities. Veteran teachers in settings that emphasize continual learning and collaboration appear to continue to improve their performance (Rosenholtz, 1989), but settings that promote ongoing learning for teachers are relatively rare.

One other mediating variable on the effects of experience may be the quality of early preparation and the extent to which it provides extensive practice teaching. Some recent studies of 5-year teacher education programs—programs that include a bachelor's degree in the discipline and master's in education as well as a year-long student teaching placement—have found graduates to be more confident than graduates of 4-year programs, more likely to stay in teaching (Andrew & Schwab, 1995), and as effective as more senior teachers (Denton & Peters, 1988). Similarly, a recent study found that graduates of the California State University who had had student teaching felt better prepared than those who had had an internship or who had taught on an emergency credential without student teaching (California State University, 2002a, 2002b).

Teachers' **subject matter knowledge** and **knowledge of teaching and learning** appear to influence teacher effectiveness to varying degrees. A number of studies suggest that these two kinds of knowledge appear to be important both independently and in combination. In separate reviews of research, Ashton and Crocker (1986; 1987) and Evertson, Hawley, and Zlotnik (1985) reported positive effects of subject matter background and teachers' formal education training on supervisory ratings and student learning in many of the studies they reviewed.

Byrne (1983) summarized the results of thirty studies examining the relationship between student achievement and teachers' subject matter knowledge, as measured either by a subject knowledge test (standardized or researcher-constructed) or number of college courses taken within the subject area. Among these studies, 17 showed a positive relationship between subject matter knowledge and student achievement. Byrne noted that many of the "no relationship" studies had so little variability in the teacher knowledge measure that insignificant findings were almost inevitable. In addition, Byrne suggests that the positive effect of subject matter knowledge is likely mediated by knowledge of how to teach the subject to various kinds of students:

> It is surely plausible to suggest that insofar as a teacher's knowledge provides the basis for his or her effectiveness, the most relevant knowledge will be that which concerns the particular topic being taught and the relevant pedagogical strategies for teaching it to the particular types of pupils to whom it will be taught. If the teacher is to teach fractions, then it is knowledge of fractions and perhaps of closely associated topics which is of major importance… Similarly, knowledge of teaching strategies relevant to teaching fractions will be important (p. 14).

Both the importance of subject matter knowledge and the additional influence of teaching knowledge and skill are suggested in other research. Based on data for 2,829 students from the Longitudinal Study of American Youth (LSAY), Monk (1994) found that teachers' content preparation, as measured by coursework in the subject field, was usually positively related to student achievement in mathematics and science. In mathematics, teachers' subject matter courses showed diminishing returns as an influence on student achievement above a threshold level (e.g., five courses). In addition, teacher education coursework (e.g. mathematics or science methods courses) had a positive effect on student learning at each grade level in both fields and, in mathematics, these courses sometimes had "more powerful effects than additional preparation in the content area" (p. 142). Monk concluded that, "a good grasp of one's subject area is a necessary but not a sufficient condition for effective teaching" (p. 142).

Monk's findings appear to suggest that subject matter knowledge influences teacher effectiveness up to some level of basic competence in the subject but may be less important thereafter. Begle and Geeslin (1972) also found in their review of research on mathematics teaching that the absolute number of course credits in mathematics is related to teacher performance but not linearly so. It makes sense that knowledge of the material to be taught is essential to good teaching, but also that returns to subject matter expertise might grow smaller beyond some essential level that exceeds the demands of the curriculum being taught. Like Monk, Begle (1979) found in his review of findings of the National Longitudinal Study of Mathematical Abilities that the number of credits a teacher had in mathematics methods courses was an even stronger correlate of student performance than was the number of credits in mathematics courses.

The strength of the relationship between subject matter knowledge and student performance may also depend on the level of the content being taught. In a multilevel analysis of the LSAY, Monk and King (1994) found small influences of teacher content background on student performance in science and mathematics. They found some evidence of cumulative effects of prior as well as proximate teachers' subject matter preparation on student performance in mathematics. The effects of teachers' subject matter background differed for high- and low-achieving students as well as for different grade levels.

Similarly, in a review of 65 studies of science teachers' characteristics and behaviors, Druva and Anderson (1983) found students' science achievement was positively related to the teachers' background in both science coursework and education,[20] with the amount of science coursework showing a stronger relationship to student achievement, especially in higher-level science courses, and the amount of education coursework showing a significant correlation with ratings of teacher effectiveness. Hawk, Coble, and Swanson (1985) also found that the effects of having a fully certified teacher in mathematics – one with strong background in the content as well as knowledge of teaching methods in the subject – were greater for algebra courses than for general mathematics courses. Mandeville & Liu (1997) found that teachers' specialized training in mathematics was a more important predictor of 7th grade students' math performance on high-level mathematics problems than on low-level problems.

One important issue surfaced by some of these studies is the problem of misassignment of teachers – that is, the assignment of teachers to content fields they were not prepared to teach. The degree of misassignment of teachers has been quite large in a number of states, including California, for more than a decade (Darling-Hammond, 1997; Ingersoll, 2002). At least two studies have found that, at least for mathematics learning, student achievement is significantly enhanced when teachers are certified in the content field they teach (Goldhaber & Brewer, 2000; Hawk, Coble, & Swanson, 1985). In both of these data sets, some of the teachers who were not fully certified in mathematics were likely to have been certified as generalists or in another field. The combination of content and content pedagogical training represented by field-specific certification seems to have made a difference in teachers' effectiveness. In addition, Darling-

[20] Education background was measured as a composite variable consisting of overall GPA and grades in education courses, performance in student teaching, and experience. In a separate analysis, the amount of education coursework was significantly related to ratings of teacher effectiveness.

Hammond (2000) found that the most significant predictor of state-level average student achievement in mathematics and reading was the overall proportion of teachers holding both a major and full certification in the field they taught. The influences of this variable were stronger than the influence of certification alone.

Two other studies of students from large colleges of education have found positive influences of both teachers' subject matter background and education coursework on teacher performance as measured by systematic ratings by trained observers (Ferguson and Womack, 1993; Guyton and Farokhi, 1987). In each of these studies, ratings of classroom performance on a number of dimensions of teaching were significantly correlated with education training; correlations between performance ratings and measures of subject matter knowledge were positive but smaller.[21] Since it is likely that all or most of the teachers being evaluated in these studies were teaching in their fields of preparation, the effects of differential subject matter knowledge are likely to be less visible than they would be in a study that included out-of-field teachers.

Finally, student achievement appears to be especially influenced by the use of specific **teaching practices**, which also appear related to teachers' knowledge of content and teaching methods. There are a number of studies on the uses of particular practices that have been associated with student achievement on various measures and on successful teacher training for these practices. For example, in the 1970s and '80s, a number of studies of teacher behaviors found that students learn measurably more from teachers who engage in "active teaching" based on a "mastery" orientation. Active teaching is generally described as a form of practice in which teachers actively demonstrate skills, explain concepts and assignments, support guided practice and the use of skills in context; spend more time on academic tasks, focus on key ideas, and develop applications for using skills in context; manage the classroom to create strong social relationships and foster productive work time; use pacing that allows continuous progress; re-teach as needed, use alternative strategies, and encourage revision to mastery (for reviews, see Brophy & Good, 1986, Good & Brophy, 1995; Reynolds, 1992; Waxman & Walberg, 1991).

Studies using experimental or matched comparison group designs have found that teachers can successfully be taught to use teaching strategies that positively influence their students' learning. For example, Needels and Gage (1991) report on reviews of 16 experimental studies of the outcomes of teacher training on teachers' practices and student outcomes, finding that "the teacher education programs brought about substantial increases – in fifteen of the

[21] Ferguson and Womack (1993) examined correlations between 13 dimensions of teaching performance rated by trained observers and education coursework, NTE subject matter test scores, and GPA in the student's major in a single large teacher education program. They found that the amount of education coursework completed by teachers explained about 16 percent of the variance in performance ratings; measures of content knowledge (NTE scores and GPA in the major) explained just under 4 percent. In a similar study of another large program, Guyton and Farokhi (1987) found significant, positive relationships between teacher education coursework performance (upper division GPA, completed substantially in the education program) and teacher performance on 14 dimensions of teaching as measured through a standardized observation instrument (the Georgia Teacher Performance Assessment Instrument) (overall $r=.34$, $p<.01$). Relationships between classroom performance and subject matter test scores (the Georgia Teacher Competency Tests) were positive but less often significant (overall $r=.07$) and relationships between classroom performance and basic skill scores (the Georgia Regents Test) were close to zero. In this study as in some others, candidates' sophomore and upper level GPAs (reflecting subject matter courses as well as education courses) were more strongly correlated with teaching performance than subject matter test scores.

sixteen experimental groups – in the use of the recommended teaching practice" (p. 17). The median effect size for achievement gains in the thirteen studies for which effects sizes could be calculated was 0. 52. (See also, Gage & Needels, 1989.) Johnson & Johnson (1989) have reviewed a large body of experimental research, much of it examining the teaching practices and student outcomes resulting from specific teacher training on cooperative learning methods, showing large and consistent effects of the use of cooperative learning on student effort, achievement, and productivity.[22] (See also Stevens & Slavin, 1995.)

Other evidence shows that teachers who have experienced specific kinds of targeted professional development focused on effective teaching practices produce student achievement gains on standardized tests that are significantly greater than those of comparison or control group teachers (see e.g. Angrist & Lavy, 1998; Crawford et al., 1978; Ebmeier & Good, 1979; Gage, 1985; Good & Grouws, 1979; Lawrenz & McCreath, 1988; Mason & Good, 1993). However, not all training is based on well-grounded conceptions of either student learning or teacher learning. The content as well as the form of professional development appears to influence its effectiveness (Kennedy, 1998). In addition, certain kinds of teaching practices (and associated professional development) appear to be more effective in bringing about basic skills learning, while other approaches to teaching and teacher development appear to be more effective in supporting more complex learning of higher order skills (Brophy & Good, 1986; Crawford & Stallings, 1978).

Cognitive science research has produced evidence about an expanded repertoire of teaching strategies that appear to foster higher order thinking and performance. Cognitive scientists have found, for example, that students better acquire complex skills when their teachers use approaches that focus on developing conceptual understanding; help students recognize patterns and develop self-monitoring strategies; model thinking, scaffold the learning process, and provide coaching while students use their knowledge in a variety of applications. In addition, students learn more when their teachers help them develop the ability to evaluate and regulate their own learning; for example, when teachers support students in talking about their understanding and evaluating different solutions; help students see patterns and connections for transferring their knowledge; and gradually enable students to take on more independence in their learning (Anderson, 1989; Good & Brophy, 1995). Teachers who have learned to use aspects of these approaches have produced increased student learning of higher order skills and greater conceptual understanding in the areas of reading (Duffy, Roehler, Sivan et al., 1987; Palincsar & Brown, 1984; 1989), writing (Englert & Raphael, 1989; Englert, Raphael, & Anderson, 1992), mathematics problem solving (Carpenter et al., 1989; Fennema, Carpenter, & Peterson, 1989; Wood & Sellers, 1996), and science (Otto & Schuck, 1983; Rubin & Norman, 1992).

In addition to specific kinds of teacher training, some research has examined links between the amount of teacher education, teachers' use of practices that support complex learning, and student achievement. For example, in an analysis of science teaching, Perkes

[22] In reviewing more than 300 experimental and correlational research studies conducted over 90 years, for example, Johnson & Johnson report an overall effect size of 0.66 when cooperative and individualistic classroom efforts are compared; among methodologically high-quality studies the effect size was 0.88 (Johnson & Johnson, 1991, p. 283).

(1967-68) found that teachers with greater training in science teaching were more likely to use laboratory techniques and discussions and to emphasize conceptual applications of ideas, while those with less education training placed more emphasis on memorization. Teachers' coursework in science education was significantly related to students' achievement on tasks requiring problem solving and applications of science knowledge.

Some research has suggested that teacher education influences the use of practices that respond to diverse students' needs and that encourage higher order learning (Hansen, 1988; Skipper & Quantz, 1987). Doyle (1986) hypothesizes that since the novel tasks required for problem-solving are more difficult to manage than the routine tasks associated with rote learning, lack of knowledge about how to manage an active, inquiry-oriented classroom can lead teachers to turn to passive tactics, like the completion of workbooks, that "dumb down" the curriculum (see also Carter & Doyle, 1987), rather than complex tasks that require more skill to orchestrate.

In a set of studies of two groups of secondary student teachers with different amounts of education preparation within the same institution, the group with more extensive education preparation (more field experiences and more extensive education coursework) produced stronger student achievement gains on pre- and post-tests of learning within curriculum units designed by the student teachers. Larger student gains were also associated with stronger supervisory ratings of the student teachers on measures of instructional planning and instructional skills and with practices that created more opportunity to learn time for students (Denton & Lacina, 1984; Denton & Norris, 1981; Denton & Tooke, 1981-82; Denton & Smith, 1983).

Recently, the collection of data about teacher practices in large-scale data sets has allowed correlational analyses of teachers' practices and student achievement that control for student and teacher characteristics. For example, using data from the National Assessment of Educational Progress, Wenglinsky (2002) examined the relationships between teachers' training, teaching practices, and student achievement, controlling for student characteristics and other school inputs. He found that 8th grade students do better on the NAEP mathematics assessments when they have had teachers with a major or minor in mathematics or mathematics education, teachers who have had more professional training in how to work with diverse student populations (a combined measure of training in cultural diversity, teaching limited English proficient students, and teaching students with special needs), and teachers who have had more training in how to develop higher-order thinking skills, and who engage in more hands-on learning (work with real-world problems and use of manipulatives) emphasizing higher-order thinking. Similarly, students whose teachers have majored in science or science education and who have had more training in how to develop laboratory skills and who engage in more hands-on learning do better on the NAEP science assessments.

In his path analysis, Weglinsky concluded that teachers' preparation in content and specific methods appears to be associated with teaching practices, which in turn influence achievement. Like Ferguson (1991) and Ferguson and Ladd (1996), Wenglinsky found that the combined effects of teaching variables can outweigh the effects of SES on student achievement:

> The sum of the effects from the three aspects of teacher quality [teacher major, professional development, and practices] is .98. The effect sizes for SES range from .74 to .83, with a value of .76 in the model where all three aspects of teacher quality are included. Thus, the impact of teaching can be said not only to be comparable to that of SES, but even to be somewhat greater (p. 25).

There is a substantial consensus that teachers' specific practices, which are informed by their preparation, matter especially for the teaching of such key basic skills as reading. The National Reading Panel of the National Institute of Child Health and Human Development recently published a major review of carefully controlled research which concluded that a set of identifiable teaching practices are strongly associated with improvements in children's reading achievement. These include the systematic teaching of phonemic awareness, guided repeated oral reading, direct and indirect vocabulary instruction with careful attention to readers' needs, and a combination of reading comprehension techniques that include metacognitive strategies.

The report notes that teacher education is critical to the success of reading instruction with respect to both instruction in phonemic awareness and more complex comprehension skills:

> Knowing that all phonics programs are not the same brings with it the implication that teachers must themselves be educated about how to evaluate different programs to determine which ones are based on strong evidence and how they can most effectively use these programs in their own classrooms. It is therefore important that teachers be provided with evidence-based preservice training and ongoing inservice training to select (or develop) and implement the most appropriate phonics instruction effectively. (p. 11)

> Teaching reading comprehension strategies to students at all grade levels is complex. Teachers not only must have a firm grasp of the content presented in the text, but also must have substantial knowledge of the strategies themselves, of which strategies are most effective for different students and types of content and of how best to teach and model strategy use…. (Data from the studies reviewed on teacher training) indicated clearly that in order for teachers to use strategies effectively, extensive formal instruction in reading comprehension is necessary, preferably beginning as early as pre-service (National Reading Panel, 2000, pp. 15-16).

Studies have found that teachers can learn strategies that enable them to teach these complex comprehension skills and that specific teaching practices acquired through professional training enable teachers to improve student reading outcomes (e.g, Duffy, Roehler, Sivan et al., 1987; Duffy & Roehler, 1989, regarding explicit strategy instruction; Palincsar & Brown, 1989, regarding reciprocal teaching).

The National Assessment of Educational Progress studies of achievement have examined how specific kinds of teacher learning opportunities are related to their students' reading achievement. In both 1992 and 1994, 4th grade students of teachers who were fully certified, who had certification in reading, who had master's degrees, and who had had professional coursework in literature-based instruction scored better on average on the NAEP reading assessments than students whose teachers lacked general certification or certification in reading,

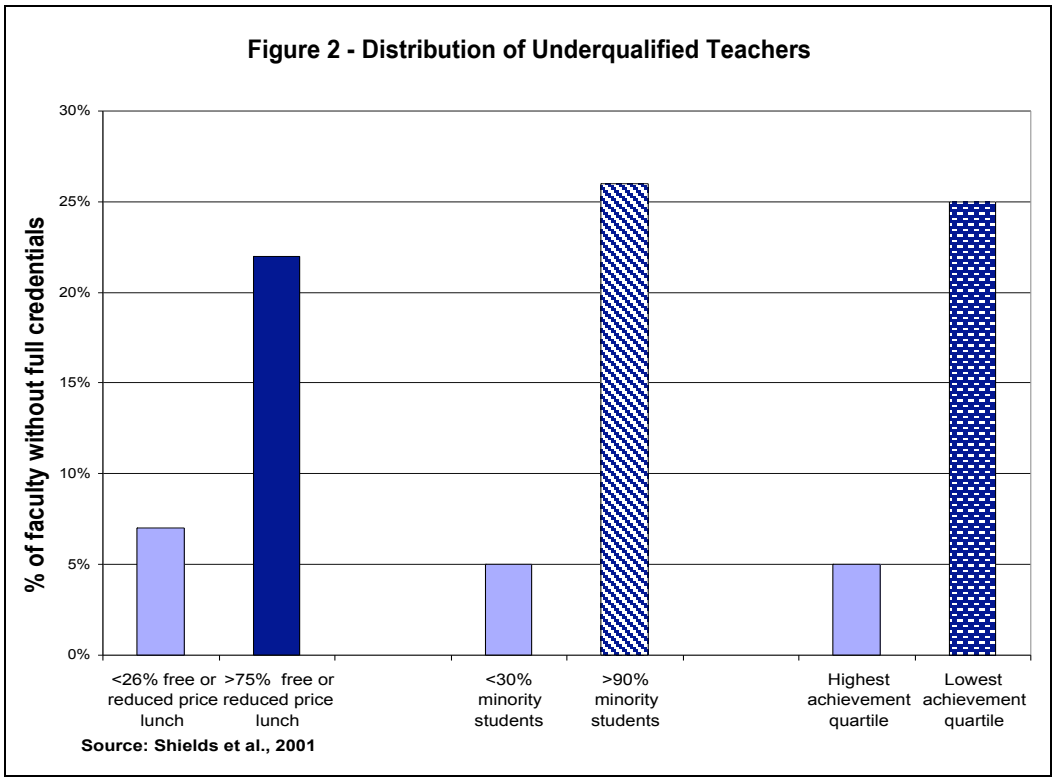
masters degrees, or this particular kind of professional development (NCES, 1994; 1996). While these relationships were generally modest, the relationships between specific teaching practices and student achievement were larger, and use of these practices was in turn correlated with teachers' preparation. Teachers who had more professional training were more likely to use teaching practices that are associated with higher reading achievement—use of trade books and literature, integration of reading and writing strategies, assessment of reading through writing—and were less likely to engage in practices, such as extensive use of reading kits and workbooks, found to be associated with lower levels of student achievement. Although these correlations are bivariate and cannot be interpreted as causal, the findings are similar to those found in Wenglinsky's (2002) multivariate study of teacher training, teaching practices, and student achievement on the NAEP mathematics and science tests.

The aspects of teachers' qualifications that appear to influence student learning include their verbal and general academic ability, level of experience in the early years of their careers, knowledge of subject matter and of teaching and learning, and the specific practices in which they engage. All of these are incorporated into California's teacher credentialing system, which requires fully certified teachers to provide demonstrations of basic skills, subject matter knowledge, knowledge about teaching and learning, including the teaching of reading, and supervised experience in student teaching and induction programs measured against standards (the California Standards for the Teaching Profession) that include evidence of practices research has found to be effective. Evidence suggests that access to fully prepared and certified teachers in California and elsewhere is associated with greater student achievement. However, this access is far from universally available, and in California, it appears to be strongly correlated with students' race, ethnicity, language background, and socioeconomic status.

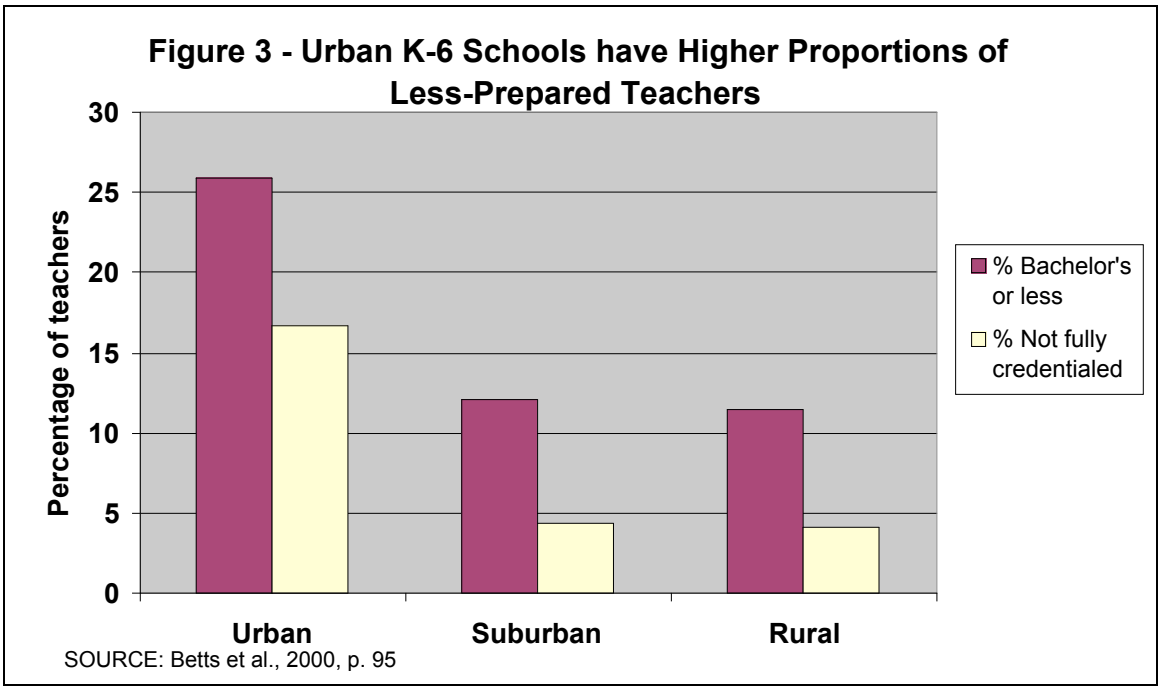
IV. Access to Quality Teaching in California

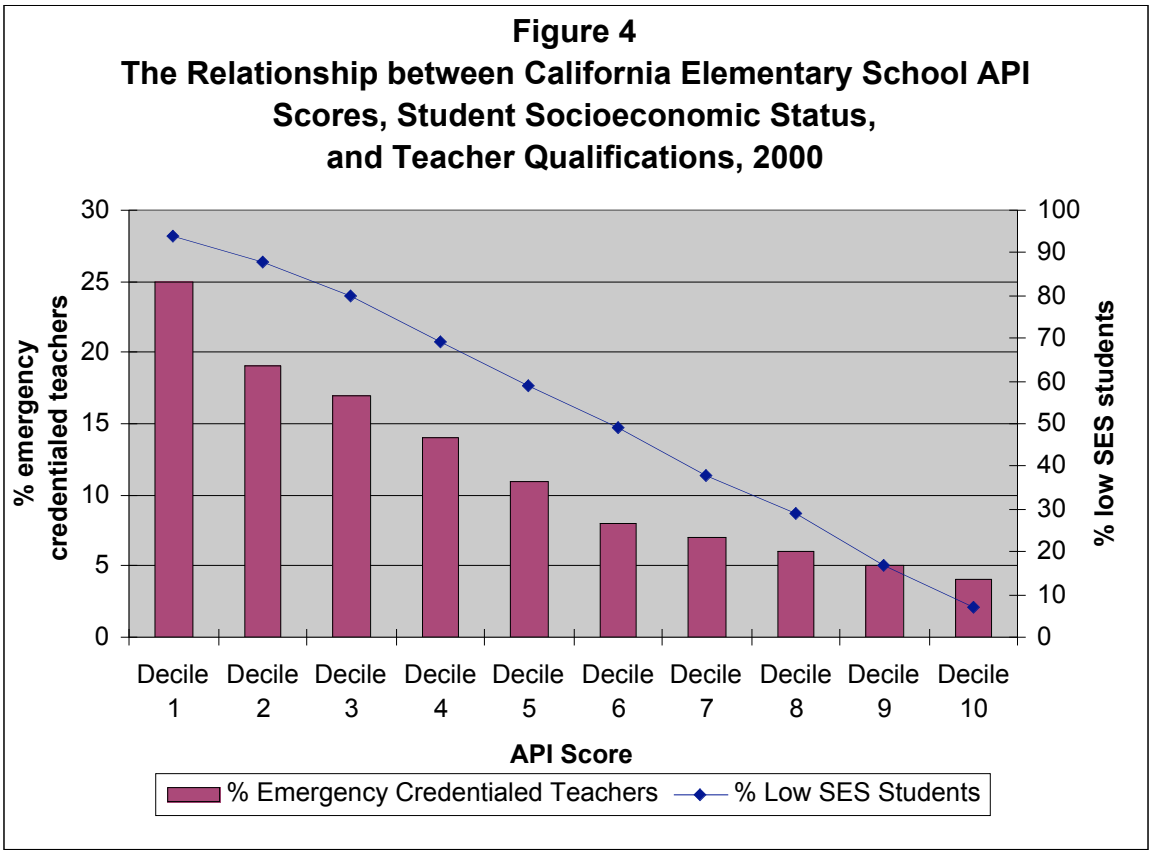
While there is substantial evidence that well-qualified teachers who use effective practices are an important component of educational opportunity, there is great inequality in access to this critical resource. Studies by Stanford Research International (SRI), the Public Policy Institute, PACE, the RAND Corporation, and the American Institutes of Research, among others, have all documented the large and growing and disparities in California children's opportunities to learn, especially their access to well-qualified teachers.

In a series of studies over the last several years, SRI has documented large and growing disparities in the access California school children have to qualified teachers. As Figure 2 illustrates, schools serving the greatest proportions of low-income and minority students are four to five times more likely to hire teachers without full certification. Unqualified teachers are also concentrated in the lowest-achieving schools (Shields et al., 2001).



Many California districts do not experience great difficulty hiring qualified teachers. In 2000-01, about 47% of California's school districts (and 41% of schools) had fewer than 5% uncredentialed teachers. About one-fourth hired no unqualified teachers at all (Shields et al., 2001, pp. 21-23). However, in nearly a quarter (24%) of the schools in the state, more than 20% of the teachers are under-qualified (that is, they lack a preliminary or professional clear credential). These are disproportionately schools in high-poverty communities serving large proportions of students of color and English language learners, mostly in urban areas. (Betts et al., 2000, p. 95). (See Figures 2 and 3.) The presence of underqualified teachers is strongly related both to student socioeconomic status and to student achievement (See Figure 4.)





Source: Data reported in California Teachers Association, Low-performing schools = High priority schools. Sacramento, CA: CTA, 2000, pp. 19, 37.

Among teachers in the early elementary grades (grades K-3) surveyed for the California class size reduction study (CSR Research Consortium, 2002), there are substantial differences in the training possessed by emergency permit teachers and others in terms of the extent of coursework they have had in elementary education, reading and mathematics methods, special education, and strategies for teaching ELL students. (See Table 2.)

Table 2
Training of Emergency Permit and Other Teachers, 2000
Mean (Standard Deviation)
(Unweighted n=786)

Amount of Coursework	Preliminary, Clear, or Intern Credential	Emergency Permit or Waiver
# elementary education courses (exclusive of other courses listed below)	7.40 (10.03)*	3.99 (4.60)
# reading methods courses	3.60 (4.10)**	1.89 (1.25)
# mathematics education courses	2.66 (2.77)**	1.66 (1.10)
# special education courses	1.68 (3.73)*	0.84 (0.70)
# ELL / LEP courses	2.68 (3.77)	2.05 (1.79)

ANOVA conducted with weighted sample estimates, unweighted F-tests of significance, *p < .05; **p<.01
Tabulations conducted by Linda Darling-Hammond and John Luczak using CSR data.

However, among teachers on emergency permits there are very large differences in the qualifications of those hired into schools serving different proportions of minority and low-income students. In 2000, the teachers hired on emergency permits in predominantly white schools were much more highly experienced and had much more extensive training in elementary education than those in high-minority schools. (See Table 3.) Nearly _ (72%) of these teachers in predominantly white schools had at least 6 years of experience, as compared to only 7% of the emergency permit (EP) teachers in high-minority schools. In addition, EP teachers in predominantly white schools had nearly three times as much training in elementary education as did EP teachers in high-minority schools. Since emergency permits can be renewed for a maximum of 5 years, these experienced and trained teachers are most likely to be prepared teachers from out-of-state or re-entrants who were credentialed at one time but need to complete specific requirements to be re-certified in California.

Table 3
Characteristics of Emergency Permit Teachers, by School Type, 2000

	Total Sample	<30% minority	>90% minority
Total years teaching - mean (standard deviation)	5.43 (4.87)	9.96** (6.50)	3.55 (1.43)
% with 0-3 years*	43.7%	8.4%	54.3%
% with 4-5 years*	26.2%	19.9%	38.8%
% with 6 years or more*	30.1%	72.0%	6.9%
# of elementary education courses - mean (standard deviation)	3.87 (3.84)	6.16 (3.59)	2.48 (3.30)

ANOVA conducted with weighted sample estimates, unweighted F-tests of significance, *p < .05; **p<.01

The share of school districts with at least 20% of their teachers underprepared is increasing, reaching 17% in 2000-01, up from 12% in 1998-99 (Shields et al., 2001, p. 21). To a substantial extent, these schools and districts lack the human resources needed to create a productive learning environment. Schools with large proportions of under-prepared teachers have little instructional expertise on their staff and inadequate numbers of expert teachers to help novices develop their skills. As the SRI report noted:

> In such schools, teachers and administrators are hard pressed to provide adequate professional support to their entire faculty. In these hard-to-staff schools, a child's opportunities to receive the kind of instruction needed to meet the state standards are severely compromised (Shields et al., 2000).

Some indications about the characteristics of these schools can be gleaned from a recent survey of more than 1000 California teachers (Harris, 2002). That survey found that respondents from schools with more than 20% underqualified teachers were disproportionately from majority Latino schools and from schools with very high proportions of "at-risk,"[23] low-income, and ELL students. The schools were disproportionately likely to be year-round multi-track schools and to be places where teachers report high turnover, poor working conditions, low-quality materials, lack of technology, and low-quality professional development.

Table 4
Characteristics of California Schools with Concentrations of Underqualified Teachers
(Teacher Sample, respondent n =1009**)**

	Respondents from schools where at least 20% of teachers are underqualified	**Respondents from schools where 81% or more of teachers are fully qualified**
% of Respondents by School Type	**18.1%**	**81.9%**
School Demographics		
% from Majority Latino schools*	61.3%*	19.8%
% from Racially/ethnically mixed schools	28.6%*	36.6%
% from Majority non-Latino white schools	10.1%*	43.5%
% from schools with 81-100% at-risk score	54.3%*	13.1%
% from schools with 61- 80% at-risk score	26.2%*	19.4%
% from schools with 52- 60% at-risk score	7.9%*	8.3%*
% from schools with 0- 51% at risk score	11.6%*	59.3%*
% from schools in top quintile of free-reduced price lunch	51.8%*	12.8%
% from schools in top quintile of ELL population	50.8%*	14.7%
School Conditions		
% from Year round multi-track schools	24.0%*	12.5%
% reporting "serious" problem with turnover rate	48.4%*	16.0%
% reporting professional development poor	36.2%*	20.3%

[23] An "at-risk" index was calculated for the Harris study which calculates a combined value for the proportion for students who are eligible for free or reduced-price lunch, the proportion eligible for CalWorks, and the proportion of limited English proficient students.

% rating working conditions poor	34.1%*	20.2%
% rating physical facilities poor	43.4%*	31.0%
% reporting technology unavailable	41.7%*	29.9%
% reporting poor quality texts & materials	22.8%*	15.6%

[1] Underqualified includes all teachers who do not hold a preliminary or clear credential
Independent Z-tests for proportions, * $p < .05$
Source: Peter Harris Research Group, data tabulations, table 91.

Another way to examine these data is by student population served. Schools with high concentrations of Latino, ELL, and low-income students are extraordinarily likely to have high concentrations of underqualified teachers. For example, of teachers teaching in majority Latino schools, in schools at the top quintile of English language learners, or in schools with an "at risk" factor above 80%, nearly half are in schools that have more than 20% underqualified teachers (Harris, 2002, table 91).

The Problems of Heavily-Impacted Schools

SRI researchers have used a benchmark of 20% or more teachers without preliminary or clear credentials to demarcate schools that have "high concentrations" of underqualified teachers, arguing that such high levels "can create problems throughout the entire school community" (Shields et al., 1999, p. 47). These problems include a lack of mentors; high turnover of the untrained teachers, which creates continual hiring needs and instability; and an erosion of professional development for other teachers in the building. In addition, the report describes disincentives for keeping other credentialed teachers in the school, who describe their embarrassment about the "lack of professionalism" and low levels of skills displayed by many uncredentialed teachers, and the resulting instructional burden on other teachers to make up for the shortcomings of their colleagues (pp. 47-48).

In addition, schools with high turnover often staff classrooms with a continuous string of short- and long-term substitute teachers (Shields et al., 1999, p. 48). This contributes to the instability students experience and to the low quality of instruction, since substitutes are frequently also underqualified and there is little curricular coherence when personnel are constantly changing. Teachers and administrators interviewed for this case noted that many classes are taught for a substantial part of the year without a permanent, credentialed teacher (Dao, v. 1, 182:24-183:8; Salyer, v. 1, 152:19-154:1; Ibarra, v. 2, 346:11-23; LaCava, v. 1, 88:16-89:14; Michaelson, v. 1, 137:11-139:14; Safir, v. 2, 304:22-305:8). They repeatedly testified that little learning goes on in classrooms with substitute teachers, as many substitutes in highly-impacted schools lack the content knowledge and teaching skill for the class they teach and most focus only on classroom control or "babysitting." The effects on students' learning were generally described in negative terms:

> (The substitutes) were not trained and, honestly, they weren't qualified for the job. When a substitute teacher works as a long-term teacher, say, three months at a time, there is a lot of time they spend just kind of doing busy work and baby-sitting with the kids because they don't really understand how to deliver curriculum or how to assess. They don't know that. One man who was there was a nice man, but he was an art teacher and he didn't really know what he was doing and they really suffered and I

> know they suffered because I taught them the following year and they lacked some basic skills they should have gotten when they were in his class (Malabed, v. 2, 310:23-311:13).
>
> [In a case with multiple substitutes] Those kids were really suffering. They weren't learning for months…. I don't even remember there being somebody permanent in there, honestly. There may have been, but it seemed to me like when there was an adult in there, that they would be watching the non-educational films we talked about earlier or maybe doing textbook homework without any support from anybody who spoke Spanish or knew how to teach it (Safir, v. 2, 304:22-305:8).

In some schools, almost always in districts with high proportions of low-income and minority students, the proportion of underqualified teachers exceeds 50%. For example, a district-by-district analysis of the distribution of teachers in California shows the average proportion of under-qualified teachers at 57.2% in previously state-controlled Compton, where 99% of students are minority and 97% qualify for free and reduced price lunch. At least 10 schools in Compton have more than 70% of their teachers working without full credentials (Futernick, 2001, pp. 29-30). Similarly, in Ravenswood Elementary School District, where more than 90% of students are minority and low-income, the proportion of underqualified teachers is 56.3%. Five of the city's ten schools have at least half of their teachers teaching without full credentials (p. 139).

These heavily impacted schools experience a number of negative consequences in addition to the frequent lack of knowledge and skills on the part of individual teachers who are underprepared. One negative consequence is that students are more likely to encounter a string of underprepared teachers, thus experiencing a cumulative effect that is much more damaging to their learning than one year of poor teaching would create (see, e.g. Sanders & Rivers, 1996, for estimates of the cumulative effects of poor teaching).

A second consequence is that, beyond a certain point, the overall expertise in the school is inadequate to support sound educational decision making or collegial learning. When there are fewer people with training and experience, the "collective knowledge" of a school is weakened. There are few experienced personnel who know good practice, understand the school community, and can diagnose students' needs and how to meet them. Even if there are some knowledgeable teachers on staff, it is impossible for them to carry the load for the entire faculty. With a smaller pool of veteran teachers who can serve as mentors to beginners, there are few resources for novices to learn. The few relatively experienced teachers left in a school are overburdened with leadership responsibilities, thus contributing to their own "burn out" (Shields et al., 2000).

Finally, concentrations of under-prepared teachers create a drain on schools' financial as well as human resources. For example, emergency permit teachers have a high attrition rate: According to CCTC statistics, just over 40% (35% of elementary and 48% of secondary emergency permit recruits) leave the profession within a year,[24] and two-thirds never receive a

[24] CCTC reports 1-year attrition rates for emergency credentialed teachers of 35% for elementary recruits and 48% for secondary recruits (CCTC Emergency Permit Persistence Data, 1996-97, compiled by Certification and

credential. This means that schools must continually pour money into recruitment efforts and professional support for new teachers, without reaping dividends from these investments. A recent study in Texas found that teacher attrition can cost school systems $8,000 or more for each recruit who leaves in the first few years of teaching (Texas Center for Educational Research, 2001). Instead of using funds for needed school improvements, monies are spent in a manner that produces little long-term payoff. Teachers who benefit from the financial efforts of low-performing schools often end up leaving the profession or moving on to more "desirable" teaching positions (Carroll et al., 2000).

For these schools, there may be less visible long-term effects on teacher effectiveness for those who stay. Even the relatively small proportion of emergency permit teachers who manage to complete a credential are not necessarily as well-prepared as other teachers (Shields et al., 2001; CSU, 2002b). A study by SRI found that the many teachers in urban, disadvantaged schools who enter teaching on emergency credentials and take courses while they teach ultimately have fewer opportunities to develop expertise than teachers who are prepared in coherent programs of preservice preparation that include student teaching and thoughtful, well-sequenced coursework.

The report notes that these teachers – who comprised more than half of those surveyed by SRI – do some or all of their "student" teaching as teachers of record in their own classroom, thus not receiving the opportunity to learn to teach that comes from the modeling and daily supervision provided by a more expert mentor, something generally agreed to be one of the most features of successful teacher education (p. 53). These same teachers rarely receive intensive mentoring; furthermore, the courses they take are frequently out of sequence and watered down because teachers are focused more on classroom management than teaching and learning and have no time to do reading or homework while they are teaching and attending school simultaneously. Referring to the various shortcuts to these teachers' training both in the classroom and at the university, the researchers note that, "this situation raises the question of how much influence (the teacher education programs) can have over the development of pedagogical foundations of these teachers" (p. 55). A recent study of California State University teacher education graduates reinforces this point, noting that those who prepared to teach after having entered teaching through emergency routes or internships feel less well prepared than those who had experienced a coherent program of pre-service preparation and were perceived as less competent by their supervisors (CSU, 2002a; 2002b).

Although some universities and districts have developed high-quality internship programs (see, e.g. Snyder, 1999), recent evaluations of California intern programs have raised concerns about the lack of support interns receive. McKibbin's (1998) summary of two CCTC evaluations noted:

> The Commission's two evaluation studies showed that the quality and comprehensiveness of the curriculum in district intern programs varied a great deal… In the 1987 and 1994 studies, interns reported that the formal "mentor" support system is

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Waiver Division, 1/9/98 on first time Multiple and Single Subject Long Term Emergency Permits.) Linda Bond, director of governmental relations for the CCTC indicates that "two-thirds of emergency permit teachers do not receive full teaching certification" (personal correspondence, November 29, 1999).

> not supplying assistance at a level of intensity that would be beneficial…. Twelve percent of the interns reported that they had not had contact with a mentor or other person formally assigned to them. Others reported that formal support was inadequate because their mentors were employed at schools some distance from their sites, or taught subjects in different areas or grade levels than the interns. The numbers of support conferences and observations were lower than what would reasonably be expected, and these numbers declined from 1987 to 1994…. As a result of the two studies, the Commission concluded that significant aspects of district intern programs must be improved, such as the unevenness of intern support and the use of District Intern Certificates to provide a convenient hiring mechanism rather than as a professional preparation program (6-7).

The fact that entry without training is becoming the normal pathway into teaching for the teachers of disadvantaged students may mean that many fail to become as competent as other teachers, even if they eventually go through a teacher education program, since the kind of courses and coaching they eventually receive appear to be less rigorous and systematic. The SRI researchers raise the concern that even interns, who should typically have more support than emergency credentialed teachers, may be less well prepared in their content areas (a prerequisite to entry) as well as pedagogy:

> Principals reported that interns were less well prepared than fully credentialed recent hires in terms of their subject matter knowledge, their knowledge of instructional and assessment techniques, and their ability to teach basic skills to a diverse student population (p. 37).
>
> …. (I)t is hard to make the case for placing teachers with little preparation in the most challenging classrooms in the state. Similarly the rapid expansion of (intern and pre-intern) programs clearly will provide more support for teachers who otherwise might be on emergency permits. Yet these programs do nothing to shore up incentives for prospective teachers to get trained before taking over a classroom. In fact, the expansion of the intern programs without substantial efforts to reinforce incentives for teachers to receive training before teaching will only flood schools serving the neediest students with more underprepared teachers. (p. 67)

The Status of English Language Learners[25]

California's 1.5 million English language learners (ELLs) enrolled in K-12 schools are particularly impacted by the unavailability of qualified teachers. Schools with 40% or more ELLs have 6 times the percentage of teachers who are not fully credentialed than do schools that have fewer than 7.5% ELL students (Rumberger & Gandara, 2000).

Analyses of the year 2000 Class Size Reduction study teacher survey data suggest that among California's 102,266 teachers in grades K-3, just over three-fourths (75.6%) teach at least some students who are new English language learners and 63.9% teach more than 10% new

[25] Portions of this section were contributed by Kenji Hakuta.

English language learners.[26] Fewer than half of either group holds a CLAD credential, and a sizeable minority (17% of those who teach ELL students and 14% of those who teach more than 10 percent English language learners) have not taken a single course to help them prepare to teach this population.

The state standard for teaching ELL students is the possession of a CLAD credential.[27] Although most ELLs attend high-minority schools, among those who teach ELLs, the proportion of teachers who have earned a CLAD credential are noticeably lower in high-minority schools and in high-poverty schools than they are in more affluent and less heavily minority schools. For example, of teachers who teach at least 10% English language learners, 51% of those in low-minority schools and 55% in low-poverty schools have a CLAD credential as opposed to only 30% of those in high-minority schools and 35% in high-poverty schools. (See table 5 below.) In the most disadvantaged schools, teachers of ELLs appear to have the least formal preparation to teach limited English proficient students.

Table 5
Qualifications of Teachers Teaching English Language Learners in CA:
Proportions of K-3 Teachers with Different Levels of Training

	Of Teachers who Teach Any ELL Students (unweighted n=576)	Of Teachers who Teach > 10% ELL Students (unweighted n= 466)
% with CLAD credential	40.8%	41.2%
In schools <30% minority	37.9%	50.8%
In schools >90% minority	29.8%*	29.6%*
In schools <10% free/reduced lunch	51.5%	55.2%
In schools >90% free/reduced lunch	34.8%*	34.6%*
% with BCLAD credential	12.3%	14.2%
% who have had 0 courses	17.4%	13.7%
% who have had 1-3 courses	50.8%	52.0%
% who have had 4+ courses	31.7%	34.3%

Source: Tabulations based on data from the AIR/RAND Class Size Reduction Study follow-up survey conducted in 2000 with 786 elementary school teachers in grades K-3. Analysis uses weighted sample estimates and unweighted tests of significance. * $p<.05$

In addition, many instructors who are charged with special instruction in English language development have not completed the specialized training that is required by the state for this role. As of 2000-01, approximately 121,000 California public school teachers reported that they taught ELL students in classes that are intended to support English Language

[26] About 45% of California's new English language learners are in grades K-3, so this group of teachers represents a sizable share of those teaching ELL students statewide. California Department of Education, Educational Demographics Unit, 1999-2000.

[27] Although SB 1969 created a less intensive course of study as an option for in-service teachers, the standard that has continued to be used as the expectation for preservice teachers and the accreditation of teacher education programs is the set of knowledge and skills outlined in the CLAD regulations.

Development (ELD) or sheltered content instruction,[28] yet fewer than 60 percent were certified to do so by the CTC.[29] Additionally, more than 12,000 teachers reported teaching in bilingual teaching assignments, but only about 8,500 held the appropriate credentials for doing so.[30] In addition to the large proportion of unqualified teachers they encounter, ELLs often receive the bulk of their instruction from the over 30,000 bilingual aides and paraprofessionals employed by California school districts, most of whom are not specially trained (Proposition 227 Task Force, 1999).

In case studies of seventeen urban and rural California schools with large proportions of uncredentialed teachers, Social Policy Research Associates found that teachers generally felt especially unprepared to meet the needs of their English language learners and typically received little or no professional development training in this area. Although most of the schools had large proportions of ELL students, few offered any focused instruction on English language development and fewer had teachers with any preparation to do so. Many teachers reported that ELL students in their classrooms were frequently left to fend for themselves and were often unable to follow class instruction. With a few exceptions, the professional development offered in the small number of schools that provided any was deemed ineffective by the teachers who were interviewed (Friedlaender & Frenkel, 2002, p. 36).

Adequate materials are frequently as scarce as well-prepared teachers in schools serving large numbers of limited English proficient students. In a recent survey, nearly half (49.4%) of a sample of more than 1,000 California teachers said they did not have enough books and reading materials in the home language of the children of the class. Teachers in schools serving a majority of Latino students and those in predominantly minority mixed race schools were most likely to say they did not have enough home-language materials. In these schools most teachers reported not having enough materials or having none at all, whereas in predominantly white schools a large majority of teachers reported having enough of these materials (Harris, 2002, p. 13). (See also Table 8.)

The Confluence of Educational Disadvantages

Ultimately, those schools with the fewest resources in terms of teaching expertise, typically also have fewer resources of all other kinds as well. A recent Public Policy Institute study discovered that large disparities in teachers' experience, general education (degree level), and preparation for teaching (as measured by certification status) across schools are associated with equally large disparities in access to curriculum as measured through the percentage of high school courses that satisfy entrance requirements at the University of California (the "a-f" courses) and Advanced Placement courses. Both of these are strongly related to students' socioeconomic status (Betts, Rueben, & Dannenberg, 2000). (See Table 6.)

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[28] California Department of Education, *Teachers providing English Language Development (ELD), Specially designed Academic Instruction in English (SDAIE), or Primary Language Instruction to English Learner (EL) students in California Public Schools, 2000-01*, Education Demographics Unit, 2000-01.

[29] This figure represents certification through CLAD or its equivalent; SB 1969 teachers and teachers currently in training are not included in these figures.

[30] California Department of Education, Educational Demographics Unit, Language Census, 2000-01, *Bilingual staff, by type of teacher, by language of instruction, by school.*

Table 6
Disparities in Curriculum and Teaching Resources, by School SES

Characteristics of Teaching Force and Curriculum in Schools	Lowest SES Schools (bottom quintile)	Highest SES Schools (top quintile)
% with 0-2 years experience (K-6)	23.8	17.2
% with 10 or more years experience (K-6)	43.3	53.3
% with bachelor's degree or less (K-6)	32.6	8.8
% with master's degree or more (K-6)	21.7	27.0
% not fully certified (K-6)	21.7	2.0
% "a-f" classes (9-12)	51.8	63.2
% AP classes	2.0	3.2

Source: Betts, Rueben, and Danenberg (2000), Table B1.

State data also show that students in low-achieving and low-SES schools are more likely to be in large schools, overcrowded schools, and schools with year-round schedules, all of which pose disadvantages both for student learning and for attracting and retaining well-qualified teachers. (Betts et al., 2000; CTA, 2000).

The Harris survey data indicate that these are disproportionately schools that serve a majority of Latino and LEP students, where teachers are significantly more likely to report that their schools have negative working conditions and poor physical facilities, low-quality professional development, lack technology, and run a year-round multi-track schedule. Teachers in schools serving a majority of white students were least likely to report these conditions. These conditions appear to be strongly correlated. As Table 7 shows, teachers who report their schools have poor working conditions – most of which serve a majority of "at-risk" and minority students – are also significantly more likely to report that their schools have poor physical facilities, not enough books in classrooms or to take home, unavailable technology, and low-quality texts, and that professional development is poor. Such schools also report that they have difficulty getting substitutes and that turnover is a serious problem.

Table 7
Co-incidence of poor working conditions and other school conditions
(Unweighted n=1008)

Of teachers who rate their working conditions poor:		**% Of total sample:**
% in predominantly minority schools	85.5%**	61.0%
% in schools with at-risk score >50%	79.8%**	49.2%
% reporting poor physical conditions	75.6%**	32.3%
% reporting professional development is poor	63.1%**	24.4%
% reporting technology is unavailable	61.9%**	31.0%
% reporting turnover rate is a "serious" problem	51.6%**	21.5%
% reporting not enough books to take home	49.8%**	31.7%
% reporting low-quality textbooks	37.5%**	17.1%

% reporting a lot of trouble getting substitutes	38.2%**	12.9%
% reporting not enough books in classroom	28.4%**	11.7%

* p < .05; ** p < .01 in independent Z-Tests for proportions.

These conditions extend to nearly all kinds of instructional materials, and appear not to be improving substantially. In 1998, elementary teachers surveyed in the Class Size Reduction Study in low-income and high-minority schools were significantly more likely than those in high socioeconomic schools to say they lacked every kind of teaching material, with the exception of materials for ELL learners. (However, schools with fewer minorities and low-income students also much less likely to serve ELL students. As noted above, teachers who *serve* ELL students reported lower availability of such materials in high-minority schools).

Table 8
Availability of Materials in Elementary Schools, By Type, 1998
(% of K-3 Teachers Reporting Materials "Always Available" and "Never Available"
(Unweighted n=956)

Percent of teachers reporting materials were always available (never available), 1998	<30% minority	>90% minority	<10% free/ reduced lunch	>90% free/ reduced lunch
Textbooks – always available	87.6%	68.0%**	82.9%	56.8%**
(never available)	(.2%)	(.4%)	(0)	(.5%)
Workbooks – always available	67.6%	41.6%**	62.1%	38.2%**
(never available)	(5.3%)	(9.0%)	(5.3%)	(8.1%)
Manipulatives– always available	88.7%	75.0%**	81.4%	69.6%
(never available)	(.7%)	(5.3%)	(.5%)	(5.9%)
AV equipment– always available	66.9%	45.6%**	51.3%	46.3%
(never available)	(2.0%)	(2.0%)	(3.2%)	(3.1%)
Computer equip.– always available	50.6%	48.7%	58.9%	44.1%*
(never available)	(7.6%)	(13.9%)*	(9.4%)	(15.4%)
Art materials – always available	77.7%	53.8%**	80.6%	53.7%**
(never available)	(1.1%)	(5.1%)	(.5%)	(6.1%)
ELL materials – always available	29.5%	44.6%**	27.4%	49.0%**
(never available)	(4.1%)	(6.4%)	(4.6%)	(2.7%)
Materials for students with disabilities – always available	27.1%	14.1%**	23.7%	17.8%
(never available)	(8.1%)	(17.2%)	(7.3%)	(16.7%)

Tabulations using weighted sample estimates from the Class Size Reduction Study survey conducted in 1998 with elementary school teachers in grades K-3. Unweighted tests of significance. Chi Square, *p<.10, **p<.001

While a minority of California teachers reported improvements in the availability of some of these materials when they were re-surveyed in 2000 (between 10 and 20 percent, depending on the item), most said they had the same amount or less as two years earlier. The one item for which availability grew substantially was computer equipment: about 37% of teachers reported they had greater access to computer equipment in 2000 than in 1998. However, in this category as in every other one, teachers in high-minority and low-income schools were much more likely than those in more advantaged schools to say they had less availability in 2000 as compared to

two years earlier.[31] As Table 9 shows, teachers in low SES schools not only have less access to materials, they spend substantially more of their own money on class supplies. As one teacher explained, shortages of materials can affect teacher attrition:

> I know that a … substantial number of teachers at Muir purchase supplies from their own money…. it came up in a few conversations that I had with teachers who were leaving Muir as being one of the explanatory factors for why they were leaving…. (O)ne of the things that really got them down, was having to constantly go out and resupply their own classrooms with their own time and money (Caputo-Pearl, v. 1, 145:24-146:20).

Table 9
Amount of money K-3 Teachers Reported Spending in a Year on Materials for the Classroom (2000)
(Weighted mean)

< 10% minority	$466	<10% free / reduced lunch	$637
>90% minority	$687	>90% free / reduced lunch	$735

Tabulations using weighted sample estimates from the Class Size Reduction Study follow-up survey of teachers, 2000.

All of these things not only contribute to poorer quality education for students, they also contribute to the disincentives to attracting and retaining qualified teachers in these schools. Why would qualified teachers who have options choose to teach in overcrowded, underresourced schools with students who have high levels of educational needs when they could take other jobs in or out of teaching?

V. Reasons for Disparities in Qualified Teachers

With our current knowledge, there is every reason to believe that the differences in teacher qualifications across schools reflect differences in teacher quality, although these are not perfectly measured. The strong correlation among the various teacher measures, combined with the reliability of many of the individual measures and the agreement with the limited information on the distribution of teacher quality as measured by student value-added indicators, strongly suggests that the differences we see in qualifications reflect differences in teacher quality. As noted above, even among teachers holding emergency permits, the much smaller number hired in more affluent, low-minority schools have much greater teacher preparation and experience, suggesting labor market differentials that are associated with student socioeconomic status.

The Role of Salaries[32]

Teachers' salaries can affect the supply of teachers both in the short-run – especially the distribution of teachers across districts – and in the long-run, in terms of the proportion of individuals willing to prepare to teach. Starting salaries within districts can influence whether the district is an attractive employer for beginning teachers; salary structures can influence whether the district is an attractive employer for veteran teachers (Pogodzinski, 2000).

[31] Analyses of California Class Size Reduction teacher survey database by Darling-Hammond and Luczak.
[32] This section includes substantial contributions by Susanna Loeb.

There is a large literature suggesting that teachers respond to wages in their decisions to enter and remain in teaching. Studies of the decision to enter teaching typically rely on national survey data such as the National Longitudinal Study of the High School Class of 1972 (Manski, 1987; Stinebrickner, 2000), High School and Beyond (Hanushek and Pace, 1995) and comparable data from the UK (Dolton and Makepeace, 1993; 1999). As a group, these studies show that individuals are more likely to choose to teach when starting teacher wages are high relative to wages in other occupations. Manski (1987), for instance, estimated that an 11 percent increase in the weekly salary of teachers increases the proportion of college graduates who work as teachers by 26 percent.

National survey data have also been used to study teacher attrition and occupational change (Baugh and Stone, 1982; Dolton and van der Klaaw, 1999, Rickman and Parker, 1990; and Stinebrickner, 1998 & 1999). Baugh and Stone (1982), for example, find that teachers are at least as responsive to wages in their decision to quit teaching as are workers in other occupations. Teachers are more likely to quit when they work in districts with lower wages.

Studies employing administrative data to study teacher quits and transfers underscore the importance of higher teacher wages especially relative to alternative wage opportunities (Brewer, 1996; Mont and Rees, 1996; Murnane, Singer & Willett, 1989; Theobald, 1990; Theobald and Gritz, 1996). Hanushek, Kain and Rivkin (1999) found, using Texas panel data on teachers and students, that increasing teacher salaries within a district by 10 percent reduces the probability of a teacher leaving the district by 2 percent for a teacher with 0-2 years of experience and by 1 percent for a teacher with 3-5 years of experience. Gritz and Theobald (1996) found similar trends in retention linked to district and state wage levels for a sample of Washington State teachers, with the effects of salary differentials higher at the start of the teaching career. Murnane and Olsen (1990), using data on North Carolina teachers who began teaching in 1975, found that a $1000 increase in each salary step of a district's salary schedule would increase the teacher's mean duration in that district by 2-3 years. Teachers in high demand fields like mathematics and science were especially vulnerable to salary difference in their decisions to remain in teaching. Such fields have especially high opportunity costs for remaining in teaching given much higher salaries in alternative occupations. Beaudin (1995) found that among Michigan teachers who had left teaching and then returned, those who chose to return to their prior district were influenced by district salary levels and overall education funding. In addition, those who returned to teaching tended to be in teaching fields with lower opportunity costs (i.e. less well paying alternatives outside of education) (Beaudin, 1993).

A few studies have looked directly at the impact of wage increases on teacher quality. These studies suggest that wages do affect teacher quality. For example, Figlio's (1997) analysis of the Schools and Staffing Surveys found that a one percent increase in teacher salaries in a metropolitan area increases the proportion of teachers who have graduated from a selective college by 1.5 percent. Stinebrickner (1999), using a sample of college graduates from the National Longitudinal Study of the High School Class of 1972, found that, among certified teachers, those with higher SAT scores were less likely to be teaching because of better wage opportunities in other occupations. He estimates that increasing the wage of all teachers by 20 percent would increase the aggregate proportion of years teaching among members of the sample

by 30 percent. For those who scored in the top one-third of the SAT (presumably those with the greatest occupational options outside of teaching), the likelihood of entering and remaining in teaching is especially sensitive to the extent and nature of the wage incentive. DeAngelis (2000) also found that states in which teachers' salaries rose the most during the 1980s witnessed the greatest increase in the quality of teachers relative to non-teachers as measured by quality of undergraduate education.

An alternative way to assess whether wages can be used to attract higher-quality teachers is to look at the effect of teacher wages on student outcomes. Based on a meta-analysis of about 60 production function studies, Greenwald, Hedges, and Laine (1996) estimated larger effect sizes for student achievement associated with increases in teacher salaries (as well as for teacher experience and education, which are rewarded in teacher salary schedules) than for other resources like reduced pupil-teacher ratios. Ferguson's (1991) analysis of student achievement in Texas also concluded that there were increases in student achievement associated with the use of resources to purchase higher quality teachers. In a paper looking across states in the US from 1960 through 1990 and across districts in California from 1975 through 1995, Loeb and Page (2000) found that student educational attainment increased most in states and districts that increased their wages.

The Role of Working Conditions

Overall, substantial evidence suggests that wages play a role in attracting and retaining teachers. There is also evidence from surveys of teachers that working conditions, including professional teaching conditions, play a role in their decisions to leave teaching in a particular school or district or, sometimes, to leave the profession altogether.

Teachers' plans to remain in teaching are highly sensitive to their perceptions of their working conditions. In 1994, about 33 percent of public school teachers and 49 percent of private school teachers reported they plan to remain in teaching as long as they are able. These proportions were strongly associated with how teachers felt about the provision of resources, administrative support, faculty cooperation, and teacher influence over policy in their schools (Darling-Hammond, 1997, p. 23).

Nationally, there are large differences in the salaries and working conditions that affect teachers in high- and low-wealth schools. In 1994, the Schools and Staffing Surveys found that the best-paid teachers in low-poverty schools earned over 35% more than those in high-poverty schools. Furthermore, teachers in more advantaged communities experienced much easier working conditions, including smaller class sizes and pupil loads, and much more control over decision making in their schools (NCES, 1997, Table A 4.15). Teachers in high-poverty schools were much less likely to say they that they had influence over decisions concerning curriculum, texts, materials, or teaching policies. They were also much less likely to be satisfied with their salaries or to feel they had the necessary materials available to them to do their job (Darling-Hammond, 1997).

Of those who left teaching between 1994 and 1995, about 27% retired; 37% left for family or personal reasons; and 26% were dissatisfied with teaching or sought another career (NCES,

1997, p. 109). However, attrition rates in 1994 were higher in high-poverty than low-poverty schools, and those who left high-poverty schools were more than twice as likely as those in low-poverty schools to leave because of dissatisfaction with teaching.[33] The major areas of dissatisfaction concerned student motivation and discipline, on the one hand, and lack of recognition and support from administration, on the other. Salaries were also a factor, but a less prominent one.

A few studies have modeled the effect of working conditions or school resource allocation on teacher quality or teacher retention. Theobald (1990), for example, found that extremely large pupil-staff ratios are detrimental to staff retention. Theobald and Gritz (1996) found that increasing expenditures for teaching materials decreases the likelihood a male teacher will transfer to another school district from his first teaching position, suggesting that better resourced districts may have more holding power. These findings underscore the importance of school and district attributes as determinants of teacher attrition.

VI. The Situation in California

Throughout the 1990s, California has had steeply increasing demand for teachers due to growing enrollments, increasing retirements, and high attrition rates, especially for beginning teachers.[34] In addition to its burgeoning pupil population and its older-than-average teaching force, California's teacher hiring needs were spiked by the state's 1996 class size reduction initiative reducing class sizes to 20 students in the early elementary grades. As a consequence of these factors, California's teaching force grew from about 220,000 in 1991 to just over 300,000 in 2001. Analysts estimate that California will need to hire about 25,000 teachers annually over the next decade (Shields, et al., 1999; 2001) if attrition rates remain the same.

This steep growth and the widespread issuance of emergency credentials in the years since the class size reduction initiative have led to a common perception that there are severe and inevitable teacher shortages in California. This perception, at first blush, appears well-founded. According to the California Department of Education, in 2000-01, there were more than 42,000 teachers teaching without full certification (about 14% of the state's teaching force).[35] The

[33] Low-poverty schools are those with less than 5% of their students receiving free or reduce-price lunch. High-poverty schools are those with more than 50% of their students receiving free or reduced-price lunch. Schools and Staffing Surveys, Teacher Followup Survey 1994-95, Tabulations conducted by the National Commission on Teaching and America's Future.

[34] The number of K-12 students in California schools is expected to grow from 5.7 million in 1998-99 to 6.2 million in 2007-08 according to the State of California, Department of Finance (1998). Assuming the current pupil-teacher ratio, this growth will require adding about 21,500 new teachers by 2007-08. In 1994, California had a greater share of teachers over 55 (19%) than 49 other states (NCES, 1997), leading to higher retirements in recent years. Some estimate that current retirement rates averaging around 2% annually could rise to as high as 4 or 5% by 2007, resulting in a cumulative demand for as many as 50,000 replacement teachers from 1999 to 2007 (Shields, et al., 1999). Retirements in combination with other sources of teacher attrition (non-retirement attrition averages about 6% annually), produce a yearly demand for about 22,000 replacement teachers. Class size reduction brought approximately 27,000 additional teachers into the California teaching force between 1996 and 1998.

[35] This includes teachers teaching on emergency permits, waivers, pre-intern, and intern credentials. Some emergency permit holders possess full credentials in one field while they teach on an emergency permit in another. California Department of Education, Educational Demographics Unit, Teacher Credentials and Experience by School, 2001. CBEDS data files. http://www.cde.ca.gov/demographics/files.

comparable proportion of teachers holding substandard licenses in most other states is well under 5 percent, and in more than 20 states it is close to zero.[36] While some teachers on emergency or temporary licenses are fully trained out-of-state entrants who have not yet satisfied one or another requirement unique to California, most lack essential aspects of preparation for their jobs.

The problems in staffing California schools are not the result of absolute shortages of qualified individuals in the state or the nation, however. There are actually more credentialed teachers available to teach in California schools than there are positions to be filled. Whereas there are about 300,000 K-12 teaching jobs in California, by one estimate there are about 1.3 million individuals who hold teaching credentials in the state.[37] Some of these are individuals who prepared to teach and never entered teaching in the state, entering other careers or going to other states to teach. Many of these are individuals who taught in California and left teaching.

Of course, not all of these individuals would be prepared to re-enter the teaching force. Various studies of teacher supply have found that 20 to 30% of teachers who have left the classroom eventually returned to teaching in the same state (Beaudin, 1993; Massachusetts Institute for Social and Economic Research, 1987; Murnane et al., 1991). One estimate of California's potential reserve pool (Cagampang, et al., 1986) indicated that about half of the California registry actually holds valid credentials, and of these, about half (or a quarter of the total registry) are already teaching. Of the remainder, about 30% have reported they would be willing to consider teaching again. Using current numbers, this would suggest that about 100,000 credentialed teachers might be available to teach under the right set of incentives.[38]

In 1999-2000, before recently enacted policies intended to expand the teaching pool were implemented, there were at least 30,000 fully qualified teachers available to enter California's teaching force for the 25,000 job openings that year. This number included approximately 18,000 first time, new type credentials recommended by California colleges and universities in 1999, plus an additional 2,000 first time, new type special education licenses,[39] an estimated

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[36] According to the Schools and Staffing Surveys conducted by the National Center for Education Statistics, states that had fewer than 2% of their teachers working without a standard teaching certificate in their main assignment field in 1999-2000 included Alabama, Arkansas, Hawaii, Idaho, Illinois, Indiana, Minnesota, Montana, New Hampshire, New Jersey, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming (tabulations conducted by John Luczak using SASS Teacher Survey data; a standard certificate is defined as either a regular certificate or a probationary certificate granted to beginning teachers who have full preparation while they complete a probationary period).

[37] Personal communication, Michael McKibbin, CCTC consultant.

[38] A study that used a telephone survey and focus groups to estimate the actual size of the reserve pool suggested that about 50% of individuals in the CCTC registry had currently valid credentials, of whom about 47% were already teaching. Of the remainder, about 30% reported being potentially willing to return to teaching (Cagampang et al., 1985) – a proportion that other research has found is very sensitive to salary levels at any point in time. Applied to the current registry, these proportions would suggest that about 650,000 of 1.3million credential-holders are valid and about 350,000 are not yet in the teaching force. If these estimates were to hold in the current labor market, there would be about 105,000 individuals (350,000 x .30) who currently hold California credentials and are not teaching, but might be willing to under the right circumstances. These would comprise the potential reserve pool.

[39] CCTC, *Numbers of Multiple and Single Subject Teaching Credentials Issued by the Commission upon the Recommendation of California Institutions of Higher Education with Commission-Approved Programs, 1999-2000.*

4,000 out-of-state entrants who received licenses,[40] and approximately 8,000-10,000 re-entrants from the reserve pool of teachers in the state.[41] In addition to the large number of prepared and credentialed teachers in California, there are many states that have had surpluses of teachers for most of the last decade (AAEE, 1997) and are expected to have surpluses into the future, which should provide an additional pool.

If California does not lack a sufficient number of individuals prepared for teaching, why are there so many under-qualified teachers in California schools? The shortage problem may better be characterized as a problem of teacher attraction, distribution, and retention. One major problem is that individuals prepared to teach are not entering or staying in public education in California at rates high enough to meet the ongoing demand. Teachers prepared for teaching in California often leave the state or enter other careers when they confront the realities of salaries and working conditions, and attrition rates appear to be higher in California than elsewhere in the nation. Based on several sources of data, a reasonable estimate of current entry rates of California-trained teachers into California schools is between 70 and 85%, a figure that is similar to entry rates for individuals graduating from teacher education programs nationally.[42] Among those who do not accept jobs in California after they graduate, some unknown number leave the state to teach elsewhere, some pursue additional studies and enter teaching later (nationally, delayed entrants comprise almost one-third of new hires) (Boe et al., 1998), and some choose other occupations altogether. The likelihood that these individuals will eventually enter teaching is heavily dependent on salary levels and working conditions (Beaudin, 1993; 1995).

In addition to the fact that not all individuals who prepare to teach enter the field, large numbers of teachers leave the profession early in their careers. National data from the Schools and Staffing Teacher Follow-up Surveys suggest that about 30% of beginning teachers leave teaching within 5 years – a rate that is reduced by access to mentoring supports in the early years. Survival rate data through 1995 indicated that about 40% of California's beginning

[40] The number of California teaching credentials issued to out-of-state entrants in recent years dropped from 5,400 in 1997-98 to 3,800 in 1999-2000 and then increased to 4,700 in 2000-01 (California Commission on Teacher Credentialing, 1997-98 reports, CCTC, June 1998; personal correspondence L. Ford, October 1999; Shields et al., 2001; CCTC, 2001a, p. 13).

[41] This conservative estimate is based on an assumption that re-entrants comprise about 25%-30% of the total new hires. Nationally, former teachers comprised about 50% of new hires from the mid-1980s until the mid-1990s (Beaudin, 1995; Boe et al., 1998; Darling-Hammond, 1997). In California, the estimated number of re-entrants was only slightly lower. Fetler (1997) found 40% of California teaching positions (approximately 8500) were filled by re-entrants in 1995-96. This concords with data on licenses issued to in-state entrants from the California Commission on Teacher Credentialing, 1997-98 reports (CCTC, June 1998).

[42] The California Commission on Teacher Credentialing (1999) found in a survey of recent graduates from California institutions that more than 90% seek jobs after graduation and of these, more than 90% take jobs in teaching. This finding replicates that of an earlier similar study (Tierney, 1993). However, the CCTC survey response rate was relatively low (about 40%) and may have underrepresented individuals who left the state to work elsewhere or who did not take jobs. The Legislative Analysts Office in California estimates entry rates at 70% (Shields, et al., 1999), near the mid-point of other estimates. This is comparable to national entry rate data. National estimates of entry rates for bachelor's degree recipients of degrees in education in 1990 indicate that 73% were employed as educators a year later (Recent College Graduates Survey, 1991, as reported in The Digest of Education Statistics, 1993, National Center for Education Statistics, p. 397). Of newly qualified teachers in 1990 who held degrees in education, 78% were employed as teachers the following year (Choy, Bobbitt, et al., 1993; Gray et al., 1993), and a substantial proportion of the remainder enter as delayed entrants in the subsequent years (Boe et al., 1998).

teachers leave within that time frame (Fetler, 1997),[43] a rate than may have increased in recent years with greater hiring of new teachers and individuals who are unprepared, groups that traditionally leave teaching at higher rates. California data show that uncertified teachers leave at very high rates – about 40% within the first year – thus increasing the annual demand for replacement teachers and reducing the total supply.

In the heavily-impacted schools with large numbers of low-income and minority students and concentrations of uncredentialed teachers, turnover is extremely high. Teachers and administrators in a number of schools attended by plaintiffs report turnover rates of 50% or more annually, causing great disruption to the educational process:

> Teacher turnover at Bryant was very high. The first two years I was there, I think it was 50 percent both years… And it was very hard on the school. It was very hard on the administration of the school because they took with them wisdom and practices that were not written down. It was very hard on the kids, this lack of continuity, and it was hard on the community to have new teachers coming and going all the time. That is why I became a mentor teacher in my second year there because I had to. There was so much turnover, it was my turn to be a big buddy and it was only my second year. It was tough. (Malabed, v. 2, 333:12-18; 334:22-335:7).

> [Regarding concerns about teacher turnover] … (H)aving that many new teachers on the staff at any given time meant that there was less of a knowledge base. It meant that it was harder for families to be connected to the school because -- you know, their child might get a new teacher every year. It meant there was less cohesion on the staff. It meant that every year, we had to recover ground in professional development that had already been covered and try to catch people up to sort of where the school was heading (Salyer, v. 1, 141:3-142:9).

A second problem is that many qualified teachers do not find their way into jobs in the districts where they are most needed. The best-qualified teachers are typically recruited to better-funded districts with high levels of support. Teachers who have options want to work in schools that pay them adequately and support their efforts well. Increasing teacher production alone will not solve the distributional problems that create current shortages in disadvantaged schools. Qualified teachers need to find jobs that are appealing to them; they also need to be able to find and gain access to the jobs that are available.[44] In addition, teachers are most likely to stay in schools where they feel successful in their work. In contrast to some states that have enacted comprehensive policies to improve and equalize teaching salaries and conditions across schools and districts, teaching supports are unevenly available across California's schools.

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[43] Based on data for cohorts of first-time teachers from 1986-87 through 1995-96, Fetler (1997) estimates a survival rate of 62.7% of new teachers at the beginning of the 5th year (representing a 37.3% attrition rate at the start of Year 5 and a probable 40% or more attrition rate by the end of Year 5).

[44] A1999 survey of California teachers sponsored by the Center for the Future of Teaching and Learning found that 59% of teachers reported proximity of the district they teach in to their home as important to their choice, 48% cited salaries and benefits, 40% cited the availability of a position, 33% cited previous experience with the district, 33% cited positive reputation of the district, and 30% indicated that support for new teachers was important in their choice (Shields, et al., 1999, p. I-41).

Finally, there are actual teacher shortages in some fields. Data suggest that there are too few candidates in fields like mathematics, science, and special education. States that have solved the problems of specific field related problems have created substantial subsidies in the form of service scholarships and forgivable loans to underwrite the preparation of individuals who are willing to prepare to teach in these fields and to provide incentives for them to teach in high-need locations.

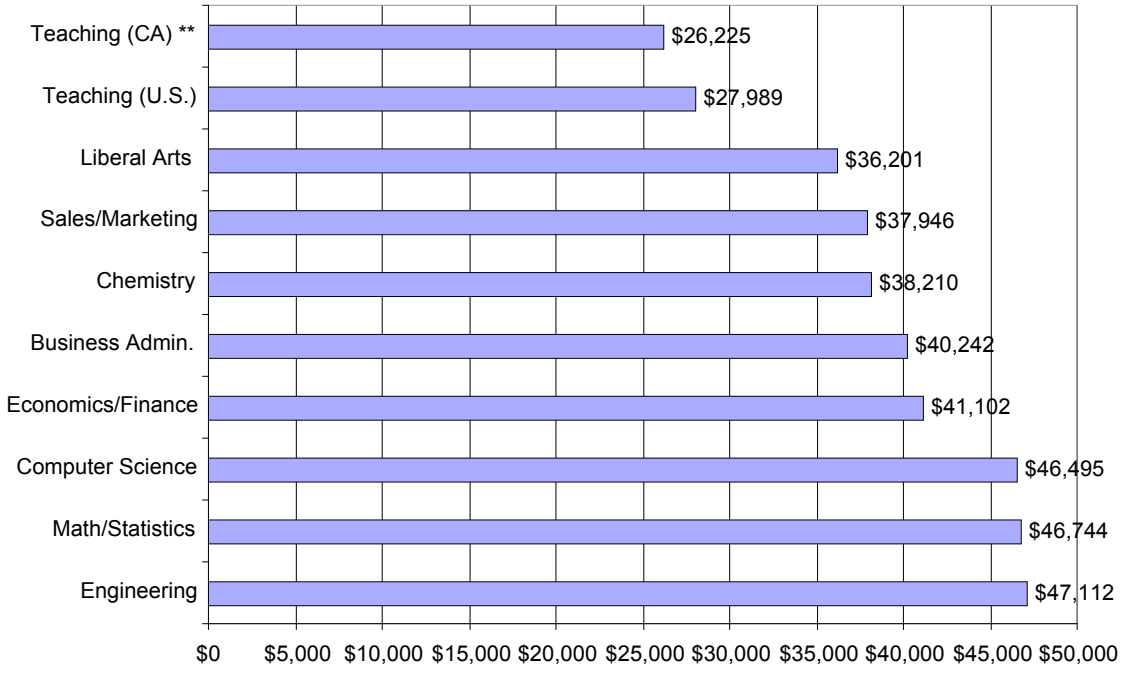
Analyses of California's teacher labor market suggest that the hiring of large numbers of under-qualified teachers in schools serving disadvantaged students has been a function of several factors over the last decade or more:

1. Noncompetitive teacher salaries that are also substantially unequal across districts.

Beginning and average teacher salaries in California, adjusted for cost-of-living, lag behind those of liberal arts graduates by 25% and behind those for computer science graduates and engineers by 40%. (See Figure 5.) Even adjusted for teachers' shorter work year (which many teachers spend planning and undertaking professional development), beginning teachers' salaries are nearly 15% lower than liberal arts graduates and about 33% lower than those of engineers. Many salary schedules are flat, so that teachers fall further behind their counterparts in other professions the longer they stay in teaching. These differentials are likely to contribute to high non-entry and attrition rates for teaching generally and for teaching fields like mathematics and science particularly. California's average salary ranks 32nd among the states when adjusted for cost of living (Nelson, Drown, & Gould, 2000). Both beginning and average teacher salaries in California fall below those of others in the continental Far West region, as shown in Table 10 below.

Teachers' salaries have slipped steadily both in real dollar terms and as a share of the education budget for more than two decades. As of 1999-2000, California spent 39.5% of its education expenditures on teachers' salaries, a decline of 13 percentage points since 1964-65, when more than 50% of the education budget supported teachers' salaries (Nelson, Drown, & Gould, 2000, p. 14).

Figure 5
Beginning Salaries in Teaching and Other Occupations, 200(



*Adjusted for cost of living
Source: F.H. Nelson, R. Drown, & J. GouldSurvey Analysis of Salary Trends , 2000 (Washington, DC: Americar Federation of Teachers, 2000).

Table 10
1999-2000 Teacher Salaries in the Continental Far West States, Adjusted for Cost-of-Living

	Beginning Salary	Average Salary	State Ranking
Oregon	31,403	47,652	3
Nevada	29,213	43,798	12
Washington	26,284	40,687	22
California	26,220	38,845	32
US Average	**27,989**	**41,820**	NA

Source: Nelson, Drown, & Gould, 2000, pp. 8, 13, 38 (with cost of living for beginning salaries calculated using beginning salary to adjusted average salary ratios).

Finally, and most importantly for the inequities documented in this paper, beginning teachers' salaries in California vary substantially across districts within local labor markets, creating labor market imbalances within and across regions. In an analysis of hiring practices and salaries in California counties, Pogodzinski (2000) demonstrated that teachers' real compensation varies considerably across schools districts within the same county, and that these wage differences are a significant factor in explaining the use of emergency permits and waivers.

It is important to take account of differences in teachers' wages within local labor markets where different costs of living and opportunity costs for jobs in other occupations pertain. By examining these factors along with teachers' salaries, Pogodzinski found, for

example, that teachers in Fresno County have substantial purchasing power and are considerably better off than most other workers in their county while those in Los Angeles County have lower purchasing power and are less well off than many other workers in their county. Thus, it may not be surprising that emergency credentialed teachers are relatively rare in Fresno County, whereas a large share of emergency permit teachers are hired in districts in and around Los Angeles. Furthermore, there is little dispersion in teacher pay in Fresno County, whereas there are considerable differences in pay in Alameda County. The study finds that the largest proportions of emergency credentialed in Alameda County are hired in lower-paying districts relative to others in the local area. Where teachers are not well-paid relative to other workers in the local county area, salaries are a statistically significant factor in explaining the use of emergency permits and waivers.

From the perspective of the field, educators point out that both recruitment and retention are more difficult in their districts where salaries are lower than surrounding districts. (*Rodriguez, v. 1, 97:15-98:8; 116:24-117:6. Tolbert, v. 1, 237:19-238:10)*. Statewide, salaries for comparably educated and experienced teachers varied by a ratio of almost 2 to 1 in 2000. Perhaps more telling is the range of teacher salaries after they have been adjusted for the local labor market. The range of salaries adjusted for the level of other county wages[45] shows a nearly 3 to 1 ratio for the highest- and lowest-paying districts across the state, relative to their local county labor markets. (See Table 11.)

Table 11
Range of California Salaries, 2000-2001

Salary Schedule Level	Range of Regular Salaries (County, District)		Range of Adjusted Salaries Ratio to State Average (County, District)	
	From	To	From	To
Lowest	**$23,194** (Lake County, Kelseyville Unified)	**$45,709** (Alameda County, Pleasanton Unified)	**0.502** (Santa Clara County, Alum Rock Union)	**1.601** (Calaveras County, Vallecito Union)
BA+30, step 1	**$27,639** (Tehama County, Reeds Creek Elementary	**$49,591** (Alameda County, Pleasanton Unified)	**0.597** (Santa Clara County, Gilroy Unified)	**1.601** (Calaveras County, Vallecito Union)
BA+60, step 10	**$37, 278** (Fresno County, Alvina Elementary)	**$69,478** (Santa Clara County, Mountain View-Los Altos Union)	**0.880** (Santa Clara County, Gilroy Unified)	**2.205** (Riverside County, Corona-Norco Unified)

Data for lowest salary offered and BA+60, step 10 are from the California Department of Education School Fiscal Services Division, "Certificated Teacher Salary Schedule with Placement, 2000-2001"(form J-90). Data for the County salary adjustment (average earnings per job, 1999) is from California Department of Finance Economic Research, "California County Profiles," February, 2002.

As described below, some other states that have overcome teacher shortages have addressed this kind of problem through school funding mechanisms that provide aid to equalize salaries across districts as well as to raise them to market competitive levels. While California

[45] This method of adjustment provides some measure of cost-of-living and job market opportunities. A shortcoming is that it does not take into account the mix of jobs in a local labor market – some have many more professional jobs and others have more low-skilled labor jobs. Nonetheless, it does suggest the options facing teachers who are relatively place-bound and its compensates in part for the large cost of living differentials across the state.

has increased teacher salaries very recently, the legislatively targeted salary level is not market competitive in all parts of the state, and the aid is not designed to equalize salaries across districts or to take cost-of-living differentials into account.

2. Poor working conditions in many schools, especially those serving the least advantaged students. Teaching conditions steadily worsened after the passage of Proposition 13 in 1979, especially in the least wealthy districts, eventually leading to what has been called the "Mississippication of California schools" (Schrag, 1999). Large classes, severe overcrowding of facilities, and inadequate stocks of books and materials have converged to create stressful settings for teaching and learning in many schools, especially those that serve the most economically disadvantaged students. A recent California Teachers' Association report found that schools serving high proportions of poor and minority students are markedly larger, have more crowded facilities, and are more likely to be running on year-round schedules (CTA, 2000). Districts with the neediest students generally pay the least and provide the fewest supports in terms of class sizes, materials, resources, and equipment.

The Harris survey found that California teachers in schools where turnover is a serious problem are significantly more likely to report that working conditions are poor, physical facilities are poor, there are not enough books to take home, technology is unavailable, texts are of low-quality, and professional development is poor ($p<.05$, Harris, 2002). Of these factors, those most significantly related to teachers' plans to leave their school soon ($p<.05$) include poor physical facilities, class sizes above 30 students, unavailability of technology, and lack of textbooks. In addition, plans to leave soon are significantly related to pessimism about whether working conditions for teachers, physical facilities, the quality of instructional materials, the availability of technology, or the quality of professional development will be better five years from now.

Teachers' reasons for planning to leave their school soon (within 1 to 3 years) differ by the type of school and conditions within that school. Overall, the top three reasons cited in the Harris survey by teachers who were planning to leave soon included:

1. lack of school leadership,
2. lack of time for planning and collaboration,
3. salaries, and
4. lack of supplies and materials.

School leadership was a top factor for teachers in all kinds of schools. Salaries were more often cited in high-minority, low-income schools than in others, perhaps because they experience lower salaries relative to those in surrounding districts and perhaps because of the non-compensated demands of their jobs in those schools. In addition, teachers in schools with poor working conditions and inadequate materials were much more likely to cite lack of materials as a reason for planning to leave.

Table 12
Most Important Reasons for Planning to Leave Current School Soon, by School Population
(Proportion of respondents in each school type citing each reason)

School Population / Reasons	All teachers planning to leave soon (n=181)	Majority Latino Schools	> 80% At-Risk Schools	Top Quintile ELL
Lack of School Leadership	14.0%	18.3%	19.0%	17.1%
Lack of time for planning & collaboration	9.0%	16.3%	17.9%	14.7%
Salary	6.7%	12.5%	16.1%	11.5%
Lack of supplies, materials	6.0%	10.3%	9.2%	13.4%
Class size or pupil load	3.8%	5.1%	--	5.3%
Lack of mentoring, pd support	2.4%	5.9%	5.3%	4.7%
School facilities	1.9%	1.4%	2.4%	4.3%

Source: Harris (2002).

Table 13
Most Important Reasons for Planning to Leave Current School Soon, by School Conditions
% of respondents in schools with each condition who cite each reason

School Conditions / Reasons	Poor Working Conditions	Not Enough Books	Techno-logy Unavail.	Over-crowded Classroom	Low-Quality PD
Lack of School Leadership	25.0%	23.5%	23.1%	32.5%	27.3%
Lack of time for planning & collaboration	16.4%	28.0%	13.3%	14.6%	15.3%
Salary	7.9%	16.3%	9.6%	10.2%	8.8%
Lack of supplies, materials	11.3%	17.8%	12.9%	13.4%	13.9%
Class size or pupil load	5.4%	12.4%	0.8%	8.8%	6.1%
Lack of mentoring, pd support	3.8%	8.0%	2.7%	--	4.3%
School facilities	3.9%	8.0%	1.9%	3.9%	4.4%

Source: Harris (2002).

Teachers and administrators deposed for this case described how many teachers have left schools and vacancies could not be filled because of poor conditions ranging from vermin and temperature problems to lack of repairs, lack of books and supplies, and lack of classrooms, requiring teachers to rove from room to room (*Vaca, v. 1, 202:21-204:10; Safir, v. 2, 305:18-306:7. 314:14-315:6. 351:23-352:10. Tolbert, v. 1, 238:8-10. Caputo-Pearl, v. 1, 101:21-102:12; 145:24-146:20; 147:21-148:5. Salyer, v. 1, 142:10-25. Salyer, v. 1, 147:8-148:3).* As teachers from various schools explained:

> (T)hey were overwhelming working condition-based things that would make [the teachers] leave…. [How teachers are paid] was a part of it, but overwhelmingly the things that would destroy the morale of teachers who wanted to leave were the working conditions, … working in these facilities, having to pay for these supplies, etcetera (Caputo-Pearl, v. 1, 147:21-148:5).

> (Hawthorne) was a difficult place to work. It was a very big school. The multi- track year-round (schedule) was very hard on teachers. The poor condition of the facilities made it an uncomfortable place to teach. Teachers who had to rove… found that so detrimental to the teaching process and the learning process and the professional growth process that they did not want to continue to have to work in that environment (Salyer, v. 1, 142:10-25).
>
> (W)hy are the teachers leaving? Well, at least in part because the facilities are horrific, uncomfortable, unhealthy, unsanitary and the teachers don't feel supported by the district or the State or even the administration in trying to fix that. I think they are completely related problems (Safir, v. 2, 351:23-352:10).

Some studies have found that teacher attrition seems related to the demographic characteristics of schools' student populations: specifically, that teachers transfer out of high-minority schools into schools with fewer minority students (e.g., Carroll, Reichardt, &Guarino, 2000). The Harris survey data show that long-term vacancies and rotating substitutes are much greater in schools with high proportions of "at-risk" students. The reasons for this may be because of the difficulties posed by the students or neighborhoods themselves or because of the kinds of working conditions and teaching conditions that often pertain in high-minority, low-income schools. The Harris data show some modest associations between the proportion of limited English proficient, low-income, nonwhite, or "at-risk" students in a school and teachers' reported plans to leave the school soon (within 1-3 years), although none of these bivariate relationships is statistically significant. However, a number of these demographic variables are related to school working conditions, and teachers are significantly more likely to say they plan to leave a school soon if the working conditions are poor.

A set of regression analyses using these survey data linked to other district data on salaries and staffing patterns indicates that turnover problems are strongly influenced by poor working conditions and low salaries, after student characteristics are controlled (Loeb, Darling-Hammond, & Luczak, forthcoming). While schools' racial compositions and proportions of low-income students are strong predictors of teacher turnover, these student variables become insignificant when district salary levels and teachers' ratings of working conditions are added to estimates predicting serious turnover problems, schools' reported difficulty in filling vacancies, and proportions of beginning teachers in a school (another proxy for high turnover). Working conditions variables -- including large class sizes, facilities and space problems, multi-track schools, and lack of textbooks -- are strong and significant predictors of these measures of turnover, as is a measure of beginning teacher salaries that has been adjusted for local labor market wages.

This suggests that the frequently observed flight of teachers from schools serving low-income and minority students is at least in part a function of the degree to which many of those schools also exhibit poor working and teaching conditions rather than solely attributable to the characteristics of the students or communities themselves. From a policy perspective this is good news, since it points to remediable factors – i.e. the availability of materials, class sizes, high-quality leadership, and professional learning opportunities – that can be altered by policy to shape the availability of teachers to all students.

The stark differences in working conditions in schools across California are a function of several factors that have especially exacerbated the overall decline in state resources for schools serving disadvantaged students. Among these factors is a funding system that allows inequalities in funding, which are further compounded in their effects on purchasing power by large differences in cost of living and in pupil needs that are not taken into account, especially in urban districts. Facilities standards and funding have been inconsistent in California (Ortiz, 2002). Categorical aid is not always allocated in ways that would allow districts to address the working conditions that matter most. Although the poorest districts are eligible for more categorical grants, these funds are often short-term, relatively small in size, targeted on tightly-specified expenditures, and frequently allocated at the school level. Hence they can rarely be spent on the kinds of investments that would make a difference for teacher supply: changes in district-level salary schedules and large-scale working conditions (e.g. facilities that would eliminate multi-track schools; teacher time for shared planning, collaboration, and coaching; or substantially smaller class sizes. Recent efforts to improve working conditions through allocations of categorical aid to low-performing schools have not always targeted the schools with the greatest needs or allowed enough funding per pupil to purchase many of the kinds of resources that would make a widespread difference.[46]

3. Restrictions of the pool of qualified teachers through limitations on teacher education pathways. In 1970, California became the only state in the nation to eliminate undergraduate teacher education. With the exception of California, most teacher education in the United States occurs within four- to five-year undergraduate programs, which provide about 80% of all teachers nationally. (Nearly all states now also have alternatives that provide post-baccalaureate training for those who decide to enter teaching later.)

Although the move to require post-baccalaureate credentialing programs was motivated by concerns for raising quality, it also sharply limited the supply of teachers, making it difficult for many young people to get the information and guidance they needed to enter teaching when considering careers in high school, community college, and college. This policy also raised the costs of entering teaching and made it more difficult to prepare teachers in an integrated fashion that would connect subject matter and teaching methods. Out-of-state entrants were required to complete a 5th year of teacher education even though they were already fully prepared and credentialed in other states. This was one of several disincentives for entry from other states. (See below for further discussion of the restriction of out-of-state supply.)

Recent regulatory changes that now allow blended programs of content and professional study beginning in the undergraduate years provide new options for recruiting people into teaching, but few of these programs exist, and incentives for colleges to create such programs are small in scale.[47] There have also been restrictions on the opportunities for community colleges

[46] For example, the Teaching as a Priority (TAP) Block Grant, funded at a level of $118.6 million in 2000-01 and 2001-02, offers competitive grants to districts to provide incentives to help lower the number of emergency teachers in low-performing schools. Funds may be used to improve compensation or working conditions. Districts receive $44 per pupil for schools ranked in the first, second, or third decile on the API and $29 per pupil for schools ranked in the fourth and fifth deciles (Shields et al., 2001).

[47] The process for creating these programs is fairly complicated as there are many new requirements for the kinds of courses they must offer, as well as a requirement that colleges must first start approved subject matter programs if

to offer courses that begin to prepare students for entry into teacher education. These restrictions have been lifted to some extent, but there remain limits on the number and kinds of courses for prospective teachers community colleges can offer. The California Professional Development Task Force (2001) recommended a set of incentives for more rapid pursuit of new blended program models for undergraduates and for the participation of community colleges in articulated pathways into teacher education.

Another factor that has restricted the pool of qualified teachers is the funding system for teacher education in the state. Despite rising demand from schools and from applicants who wanted to enter teacher preparation programs, the CSU system, hampered by budget limitations, has sometimes had to turn away qualified applicants (Shields et al., 1999). While the UC and CSU systems have increased enrollments and the legislature has increased supports, the funds arriving at teacher preparation programs have not been adequate to support the needed growth in program capacity and have not always been targeted to the campuses and subject area programs where the demands are the greatest.

Yet another set of restrictions on teacher education pathways exist because of the design of the teacher testing system in the state. In addition to their college admission test, candidates from in or out-of-state must take and pass at least one test, and sometimes as many as three, to be admitted into teacher education and student teaching.[48]

Cut-off scores on the two batteries of subject matter tests have, in some fields, been set substantially above those elsewhere in the country. For example, in terms of cumulative pass rates, only 21% of all candidates passed all of the mathematics test batteries, only 35% passed the social science batteries, and only 44% passed the English batteries through 1997-98, the most recent year for which data have been reported (Brunsman & Carlson, 1999, revised).[49]

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they do not already have them for each blended program they wish to have accredited. A separate blended program must be created and approved for each credentialing area. There is little financial support available from the state to enable colleges to engage in the changes needed to launch these programs after a 30-year hiatus. Meanwhile, there is much greater financial support for colleges and school districts to create pre-intern and intern programs that work with prospective teachers after they have already left college without a teaching degree and are seeking one while they are teaching, even though this is for many potential teachers a less efficient, and perhaps less effective, training route from both the candidate's and the college's perspective.

[48] To enter teacher education candidates must pass the CBEST, a basic skills test used only in California and Oregon. If they have not completed an approved subject matter program (see below), they must also pass a subject matter test before they can undertake independent student teaching: either the Single Subject Assessment Test (SSAT) or the Multiple Subject Assessment Test (MSAT), subject matter tests used only in California, or, for secondary teachers, Praxis II, a subject matter test offered nationally by the Educational Testing Service. The Praxis test has two subtests that must be passed. Secondary candidates must pass both the Praxis and the SSAT tests before being credentialed. At the elementary level, candidates must also pass the RICA, a testing of knowledge about the teaching of reading used only in California, before they receive a standard license. Approved subject matter programs are approved separately for each subject area on each California campus. Different campuses have approved programs in different sets of fields; some lack approved programs altogether. Such programs do not exist in colleges outside of California. In order for candidates to take advantage of such programs, they must be in a field in which their campus has an approved program and learn of the requirements during their undergraduate years in time to follow the requisite courses. Many do not have these opportunities.

[49] In addition to the extremely high cut-off scores, part of the problem may be that California has adopted only part of the Praxis examination – the performance component – without adopting the multiple choice component of the test commonly used in other states, which anchors scoring and provides an additional basis for examining

Ironically, candidates who do not pass these tests cannot enter or continue in teacher education, but they can teach in classrooms as teacher of record on emergency permits, waivers, or pre-intern credentials without the benefit of teacher education or mentoring supports. Among the 50 states, the combined restrictions on access to teacher preparation are unique to California, as is the ease of entering teaching without preparation.

4. Restrictions of the pool of teachers through limits on reciprocity with other states. In addition to these limitations on teacher supply, California until recently had no form of reciprocity in licensing with other states. Thus, despite nationwide surpluses of elementary teachers during the 1990s (AAEE, 1998), California hired tens of thousands of untrained teachers. Candidates coming into the state who had completed out-of-state teacher education programs could apply for temporary permits while they completed the CBEST, courses or examinations in the U.S. Constitution and the teaching of reading, verification of subject matter competence (through specific courses or tests); courses in health education, special education, and computer education, and a fifth year of study (CCTC, 1998a, p. 19).

A 1998 study commissioned for the CCTC (CCTC, 1998a) noted the surpluses in other states and also the difficulties out-of-state prepared candidates experienced trying to navigate the requirements they had to complete. The report documented concerns about costs of courses and examinations, confusion about how to complete the many and varied requirements, and redundancy with other requirements the teachers had already met elsewhere. In a survey of out-of-state teachers who had received an initial permit to teach in California, credential requirements were the number one factor in the decision of teachers who had left teaching in California. For those who had not yet left, credential requirements were also one of the top factors in decisions about whether to continue teaching in California, just behind salaries and working conditions (pp. 27-28). The report notes that, "many of these teachers felt that they were at least as well-prepared as fully credentialed California-prepared teachers but they would be working for the next several years to meet requirements before they would be granted the same certification" (p. 32). A large number of teachers in both groups thought the requirements for the CBEST, subject matter verification, and 5th year of study were redundant or inappropriate (p. 29-30). In particular, teachers said they had already taken similar tests and courses in other states. Recruiters also felt the requirements were a disincentive to recruiting teachers from out-of-state and listed them as one of the greatest difficulties in recruiting and retaining out-of-state teachers (pp. 33, 39).

In the spring of 1998, the legislature passed a bill authorizing the CCTC to establish reciprocity with other states and, in the spring of 2000, the CCTC approved a list of states with which it would seek to do so. The process does not establish full reciprocity, however, but ascertains "equivalences" for various aspects of the California requirements. A fully comparable program must meet California's requirements for equivalence in six areas: subject matter competence, developing English language skills, special education, computer education, U.S. Constitution, and health education. In all cases, candidates must take and pass the CBEST

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breadth of knowledge. As an indication that the validity of the testing program is questionable, among the group of candidates taking the mathematics examinations, those with undergraduate majors in mathematics passed at a rate of only 36.0%, and those with an undergraduate GPA of 3.5-4.0 passed at a rate of only 33.2% in the most recent analysis available (Brunsman & Carlson, 1999, revised 2000).

regardless of whether they have already passed a similar test in another state and regardless of any other equivalencies that have been determined for other aspects of the credentialing requirements.

The CCTC has done a thorough study of state credentialing programs to evaluate the comparability of each element with each of California's requirements in every field (CCTC, 1999b). Relatively few states have fashioned their requirements sufficiently like California's to be deemed comparable in all areas. As of May, 2002, only 7 states had been judged to have fully comparable elementary programs that meet all six areas of equivalence and another 7 had been judged to have mathematics programs that are fully equivalent in all respects to California's.[50] Candidates from these states can enter California with a window of time to complete the CBEST and the requirement for a 5th year of study after the bachelor's degree, if they have not already completed such additional study.[51] For other entrants, areas not deemed comparable must be addressed through coursework or examination meeting specific California requirements. Thus, California's policy does not constitute complete reciprocity. Although these recent efforts to acknowledge teachers' prior training are a useful step, this policy has not yet succeeded in increasing recruitment. Between 1997 and 1999-2000, the number of teaching credentials issued to out-of-state entrants actually went down from 5,400 to 3,800 (Shields et al., 2001). In 2000-01, the number rebounded to about 4,700 (CCTC, 2001a).

5. Inadequate recruitment incentives for high-need fields and locations. The barriers described above are problematic in all fields, but are especially so in high-need fields like mathematics, science, computer technology, special education, and bilingual education/ English language development where there are genuine undersupplies of candidates. While 6% of secondary social science teachers and 9% of English teachers were underqualified in California in 2000, the proportions grew to 14% in mathematics and physical science and 12% in life science. The proportion of underqualified elementary teachers increased to 13% and the share of special education teachers to 17% (Shields et al., 2001, p. 18). In special education, the number of emergency permits issued in 2000-01 was 6,646, more than double the 3,200 awarded three years earlier. This compared to only 2,488 credentials issued in 2000-01, down from 2,700 in 1997-98 (CCTC, 2002).

Until 1999, when subsidies for preparation were expanded, most financial incentives in the state favored entry without prior study. Before the expansion of the Cal T grants and APLE loan programs in 1999 – programs that provide service scholarships and loans to underwrite the preparation of those who will enter teaching – there were relatively few supports for individuals who wanted to become well-prepared before they enter teaching in California. These supports are still less well-funded than the incentives for candidates to enter prior to preparation. For example, the $23 million allocated to APLE and Cal T in 2000-01 was only half of the amount

[50] Although 36 states were deemed to have comparable *subject matter* requirements in for the Multiple Subjects credential and 47 were determined to have comparable *subject matter* requirements in mathematics (CCTC, "Summary of States Determined to be Comparable by Action of the Commission, 2/6/02), most of these states were not fully comparable because they did not meet other California requirements. CCTC, Multiple Subject Teaching Credential: Requirements for Teachers Prepared Outside of California, Document CL-561, May, 2002; CCTC, Single Subject Teaching Credential: Requirements for Teachers Prepared Outside of California, Document CL-560, May, 2002.

[51] This can now be satisfied through a BTSA program as well as a university-based 5th year of study.

allocated to pre-intern and intern programs that allow districts to hire teachers before they are prepared. Even with the addition of the Governors Teaching Fellowships, which have provided some scholarships for teacher preparation for those who will teach in underperforming schools, the incentives for preparing to teach have never reached a total investment of more than $50 million, even though the costs in professional development needs for underprepared teachers, extra services and summer school for students who were inadequately taught, and ongoing recruitment to replace emergency hires who leave quickly reach into the hundreds of millions. The recently enacted Teaching as a Priority Program provides small allocations to high-need schools (between $29 and $44 per pupil) to improve their capacity to recruit and retain qualified teachers; however, the funding levels are too small and the future of the funds too uncertain for districts to use them for supports like overall salary increases or large-scale new programs.

As a consequence of inadequate incentives coupled with massive demand, the percent of teachers completing preparation before entering teaching dropped precipitously from 78% in 1991–92 to 49% in 2000-01 (Shields et al., 2001, p. 17). And, as describe below, districts' financial problems have led some to hire inexpensive unprepared teachers even when more expensive, fully prepared teachers are available. The CCTC has not had authority or resources comparable to that exercised by its counterpart agencies in other states to ensure that the state's certification laws are enforced. (See, for example, descriptions of oversight systems in Connecticut and Minnesota, below.)

6. Overreliance on pathways into teaching, such as emergency hiring and short-term alternative routes, that have extremely high attrition rates. For many years, California responded to difficulties in hiring teachers in high-need schools primarily by reducing standards rather than by increasing incentives. This has led to a reliance on pathways into teaching that have extremely high turnover rates. As noted earlier, the CCTC reports that about 40% of emergency credentialed teachers in California leave within a year (nearly three times the rate for credentialed teachers), and two-thirds leave before gaining a credential. This estimate is consonant with other state and national data showing high attrition rates for entrants who have little training before they enter teaching.[52] A recent NCES report notes that 29% of new teachers who had not had student teaching left teaching within five years – an entry strategy that is typical of emergency hires and many of the shorter term alternative routes – as compared to only 15% of those who had had student teaching (Henke, Chen, & Geis, 2000). High turnover may be a function of both lack of preparation, which leads to discouragement and burnout, and lack of commitment on the part of those who enter because the job is readily available rather than because they are really interested in teaching.

An approach to recruitment that emphasizes ease of entry without preparation rather than incentives to support recruits in becoming well-prepared can be penny wise and pound foolish. It creates a revolving door of teachers into and out of teaching, rather than a stable teaching force. This strategy imposes high replacement costs for teachers who leave early and high educational costs for the under-education of students who have not had the benefit of trained and experienced teachers.

[52] National data from the Recent College Graduates Survey indicate that about two-thirds of unprepared entrants leave teaching within their first year (Grey et al., 1993). Other national data indicate that about 60-65% of entrants through short-term alternative certification routes have left within three years (Darling-Hammond, 2000a).

7. Inadequate supports for beginning and veteran teachers. In addition to the attrition caused by the large number of emergency hires and others with minimal training, teacher turnover in California has also been related to the unavailability of support for novices, only 16% of whom were working with a mentor teacher on a regular basis in 1998 (Shields et al., 1999). Even with recent expansions of the Beginning Teacher Support and Assessment (BTSA) and Peer Assistance and Review (PAR) programs, the share of beginning teachers working regularly with a mentor is still relatively small. In 2001, 39% of 1st and 2nd year teachers participated in BTSA and some unknown number participated in other support programs, including PAR. Although more than 70% of beginning teachers were assigned formal mentors, many did not see them regularly in their classrooms. The SRI 2001 teacher survey found that only 47% of BTSA participants received classroom visits from their support provider at least monthly and only 16% of other beginning teachers received such visits at least monthly (Shields et al., 2001, p. 102). More commonly, districts provide orientation sessions and workshops for beginning teachers, rather than on-site mentoring, which is the most powerful component of induction programs (Shields et al., 2001, p. 101).

While the state has provided significant funding for beginning teacher support through the BTSA and PAR programs, this has yet to translate into intensive mentoring for beginning teachers in many schools because the state does not require funds to be used for in-classroom mentoring; many districts have not had support to develop high-quality induction programs (like that offered by the New Teacher Center in Santa Cruz, for example); and many schools and districts lack a cadre of expert, veteran teachers to provide mentoring.

Finally, the lack of resources for both teaching and teacher learning in many districts appears to contribute to higher than average rates of teacher attrition in California. In addition to the poor working conditions noted earlier, teachers in some districts do not have the opportunity to engage in sustained, high quality professional development that will enable them to help their students meet the new learning standards in their subject area, and few have any regular time for shared planning and collaboration with other teachers to help them solve problems of practice (Shields et al., 1999). As noted earlier, these kinds of opportunities matter greatly to teachers. Teachers who are planning to leave their school soon rank lack of time for planning & collaboration as the second most frequent reason, behind poor leadership. In schools with the greatest proportions of English language learners, lack of time for collaboration is ranked as the top-most reason for thinking of leaving. California teachers who rate their professional development opportunities as poor are also significantly more likely to say they plan to leave their school soon (Harris, 2002).

The state made substantial investments in professional development for veteran teachers between 1998 and 2001 and targeted some of these programs toward the state's standards in reading and mathematics (specifically Algebra). While these investments were helpful, districts still have many difficulties accessing high-quality professional development for all of their teachers, including those who teach in other subject areas and those whose needs extend beyond the single approach offered. A number of reports have pointed out the problems of California's fragmented, uncoordinated system of professional development that over-prescribes offerings, makes them difficult to access, and leaves many needs unaddressed. For example, the

Legislative Analyst's Office (2002) noted that the current system, which offers a large number of individual categorical programs, all of which must be administered separately, is "incoherent," "duplicative," and mired in an "administrative quagmire" at both the state and local level:

> Fourteen years ago, when enacting Chapter 1362, the Legislature found: "The current array of staff development activities and incentives has grown by accretion, without a clear vision, remains largely unevaluated, and is unlikely to yield substantial improvement." Since the Legislature made this statement, the state has created 18 new teacher support and development programs…. The recently released Report of the Professional Development Task Force (2001), commissioned by the Superintendent of Public Instruction, reiterated similar concerns to the ones discussed above, including fragmentation, multiple funding streams, and the failure of one-size-fits-all-approaches. The recently released SRI report, The Status of the Teaching Profession, 2001, [(Shields et al., 2001)] also described the system as uncoordinated and ineffective (based upon teachers' assessments). Similarly, an EdSource report, Strengthening Teacher Quality in California (1999), highlighted the difficulty school districts have in leveraging professional development funds to support local reform efforts… (LAO, 2002, p. 8).

With many programs quickly funded and some nearly as quickly de-funded, it has been difficult for providers to develop and maintain high-quality offerings over time. Some programs are thrown together on an inadequate timeframe and hence are often poorly conducted; others, including some high-quality programs, have been de-funded in times of budget cuts or program shifts, leaving the teachers they served without good alternatives (California Professional Development Task Force, 2001). As a consequence of these difficulties, many of the state's teachers cannot get access to the kinds of professional development they need to develop the specific skills they require to teach the students in their classrooms.

8. Personnel practices that undermine the hiring and retention of qualified teachers, especially in many urban school systems. Evidence nationally and in California indicates that the hiring of under-qualified teachers in many communities is often exacerbated by cumbersome hiring procedures that can take months; late hiring caused by inadequate hiring projections, late budget decisions, and seniority transfer provisions; and, sometimes, preferences for hiring untrained, inexperienced teachers who cost less money (NCTAF, 1996; Shields et al., 1999; Shields, 2001, pp. 83-86). In California, nearly 50% of newly hired teachers in 1998 were hired after August 1, and 25% were hired after the start of the school year (Shields et al., 1999). For example, one witness for this case described how her district won't allow schools to hire new teachers until a few weeks into the school year when enrollment has "stabilized." By that time, all credentialed teachers are hired by other schools, only emergency credentialed teachers are left, and long-term substitutes are necessary until any teacher can be located (*LaCava, v. 1, 68:12-70:5).*

> …And so for a whole month there are classrooms that have way too many children, and then at the end of that month's period, the district would say, okay, you have this many students, we can allocate you this many more teachers to make more classrooms. And then at that point the students who have now been in one classroom for a month… are then pulled out of that class and an overflow class is made for them, which a lot of

> times is at first run by a sub. Because at the moment the month ends and we're allocated a teacher, then we start the hiring process, so it might be a few more weeks before we have the permanent teacher hired. And a lot of times that sub is someone with an emergency credential or noncredentialed who hasn't been through an education program of any sort. And the teacher who is generally hired is usually a noncredentialed teacher because by September or October of a school year all credentialed teachers have already been placed in a position in other schools.

Teachers in schools with large numbers of underprepared teachers are significantly less likely to report that they were actively recruited or assisted in the hiring process and more likely to report that the hiring process was slow and full of obstacles (Shields et al., 2001, p. 84). Analyses of district hiring practices by the state Fiscal and Crisis Management Assistance Team (FCMAT) in districts that hire large numbers of underqualified teachers often report hiring and screening procedures that are erratic and fraught with glitches, application processes that are not automated or well-coordinated, applicants and vacancies that are not tracked, and recruitment that is disorganized (see, e.g. FCMAT reports for Alum Rock Union Elementary, 2002; Los Angeles Unified School District, 2002; Pomona, 2002; Ravenswood, 2002). For example, in Los Angeles the FCMAT report noted, among many other problems:

> Due to the lack of an integrated electronic process management system, there are a number of procedures that make the Recruitment Center intake and selection processes and all placement processes cumbersome and counterproductive:
>
> a) Appointments for intake and interviews are given in four-hour window periods, with first come, first served within the four hours….
>
> b) It appears that the people who schedule candidates into the four-hour window period are not aware of which intake administrators will be available on which days. Sometimes there are full schedules when some of the intake administrators are on recruiting trips and others have chosen to review their files or answer e-mails rather than to meet with candidates on a particular day. Candidates become very anxious and must wait long periods of time. It has been necessary at times to close the Recruitment Center and send candidates away because of the number of people who are waiting.
>
> c) Intake administrators have been told to interview all candidates, including those in non-need areas, such as social studies candidates who hold emergency credentials.
>
> d) The applications, transcripts and related documents are imaged into the intake system. However, the imaged documents are not available to the school sites or to other offices within the division that have a need to see them, such as the placement, credentials, and salary placement offices.
>
> e) Three administrators are responsible for the referral of candidates to schools with vacancies. Candidates must come to the central office for referrals. (Parking is an extreme problem.) Candidates must make the telephone call to principals to get an appointment. In some cases, candidates become frustrated when principals do not return their referral appointment calls. Principals are frustrated because they do not know who has been referred to them or the candidates' qualifications. After interviews, principals may request that a particular candidate be hired; however, it may take days before the referral unit learns that a vacancy has been filled. Therefore, candidates are frequently referred for vacancies that have been filled.

f) The Placement Unit is responsible for keeping track of the vacancies that exist in a school. Their only source of information is through the principals. Principals will frequently keep information about existing vacancies from the central office and look for candidates on their own or place a substitute in a vacancy while an identified candidate finishes an undergraduate degree or a teacher preparation program. Principals can use the difference between the salary provided in their budget for a contracted teacher and that of a substitute for other projects…..

h) Principals have the authority to select emergency credentialed candidates even when fully credentialed candidates are available and interested in the positions (pp. 43-44).

Qualified new teacher candidates are often discouraged by the unprofessional treatment they receive and those who definitely want to teach typically feel they cannot wait until August or September for a job offer. Many who applied to work in urban school systems with slow and difficult hiring processes report that they had to take offers from other districts or private schools if they are to be guaranteed a job in the fall.

This results in the late hiring of much less-qualified candidates than the district's original pool of applicants. In addition, many districts will bypass well-qualified applicants with greater education and experience in order to hire untrained teachers who cost less. In hearings for the Assembly Select Committee on Low Performing Schools (2001), the committee learned that

> …there may be reverse incentives for school districts to hire emergency permit holders…. (I)n some situations districts hire emergency permit holders because emergency permit holders: 1) can be paid less; 2) need not initially be provided with benefits; 3) cannot be placed on a tenure track; 4) can be dismissed easily; 5) need not be provided with systematic support and assistance (except for pre-interns) (p. 5).

Finally, some districts do not value the expertise of the teachers they already employ or feel compelled by budget constraints to reduce the share of higher paid, experienced teachers they employ. Since 1990, several districts in California have used early retirement incentives to encourage retirement of thousands of qualified veteran teachers and have then hired unqualified teachers to replace them. In states with highly-qualified teaching forces, practices that lead to the unnecessary hiring of unqualified teachers are prevented by the state standards board or department of education. In California, the Commission on Teacher Credentialing (CCTC) has not had the authority or resources to investigate the hiring practices of individual school districts. Consequently, emergency hiring requests are approved in bulk without a close evaluation of their need or appropriateness.

9. Lack of accountability for ensuring the hiring of qualified teachers when they are available.

In contrast to other states that carefully monitor and enforce teacher certification laws when districts are hiring and assigning staff, California has had no procedures for ensuring that districts engage in efficient recruitment strategies, hire fully certified teachers when they are available, or maintain a well-functioning personnel system. The CCTC has not had authority or

resources allocated to enforce the state's certification laws with respect to district hiring. Examples from other states with few underqualified teachers and more rigorous accountability mechanisms stand in contrast to the procedures in California.

In Connecticut, for example, only 1% of teachers hold temporary credentials while they are serving as a long-term substitute, entering from another state, or switching fields. (The comprehensive policy system that Connecticut enacted to create an adequate teacher supply is described later in this paper.) Connecticut has reciprocity with 41 other states; teachers receive an interim credential while they pass the Praxis test if they haven't already done so previously in another state. There is also a small number of shortage area permits (for example in Spanish and mathematics) granted while candidates complete a preparation program. In all cases of temporary credentials, candidates must have a BA and at least 12 semester credits in the field they will teach. If a district wants to hire or assign a teacher in one of the temporary license categories, an application must be filed in writing for each individual applicant, demonstrating a shortage of qualified applicants. The application requires documentation of the number of interviews that were conducted and an explanation that no fully qualified candidate was available. If a properly certified candidate was rejected, the school district must provide a rationale for its hiring decision (e.g. bad references). The next year, the district must re-post the position and hire a fully qualified teacher or go through the same procedure again. Each year state agency staff file an annual compliance report.[53]

In Minnesota, about 4% of candidates hold temporary or limited credentials, which themselves reflect a relatively high standard of training. Entrants prepared out-of-state are reviewed individually and licenses can be granted to those with comparable training to Minnesota's requirements, or additional courses may be required as deemed necessary. Limited licenses can be granted only to secondary teachers with a BA and a major or minor in the field while they are completing preparation. Variances are granted to already prepared and certified teachers who are changing content areas while they complete content requirements. A small number of community experts can be hired in a few unique situations. To hire a candidate on a temporary credential, districts must demonstrate that the vacancy has been advertised statewide, diligent efforts have been made to recruit and interview candidates, and no qualified teachers were available. Each application is reviewed individually, and sometimes Board of Teaching staff counsel the district in attempts to advertise more widely or to locate qualified staff. As in Connecticut, districts must re-post each position every year. The agencies involved in approving temporary credentials conduct extensive compliance reporting on these teachers, checking mismatches of credentials and assignments through the State Automated Reporting System (STAR), filing annual reports, and following up with districts found to be out of compliance. In such cases, school districts must work to remedy the situation. In egregious cases, school funding can be withheld.[54]

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[53] Interview conducted with Abigail Hughes, Associate Commissioner, Director of Evaluation and Research, Connecticut State Department of Education. Spring, 2001. Information about the credentialing system was also obtained from http:// www.state.ct.us/sde/dtl/cert/index.htm

[54] Interview conducted with Mike Tillmann, Executive Director of the Minnesota Board of Teaching, Spring 2001. Information about the credentialing system was also obtained from http://cfl.state.mn.us/teachbrd/rd2873_toc.html.

No accountability system like this exists in California. Districts can obtain authorization to issue emergency permits in bulk – sometimes by the hundreds or even thousands.[55] In order to be approved, a district must attest to efforts to recruit personnel, and the CCTC relies on the attestations of the district when evaluating the requests. The CCTC does not review the districts' processing of applications, contending that such review is not a part of its jurisdiction (Swofford deposition, pp. 270-271), nor does the agency take any action to check on the veracity of district claims when a district requests a waiver of teachers' credentials; it relies on the district's representations (Swofford deposition, pp. 234-235). The director of the CCTC's Certification, Assignment and Waivers Division described the limitations on the agency as follows:

> In order for a district to employ an emergency permit teacher, the district's governing board must annually file a Declaration of Need for Fully Qualified Educators that verifies that the district is unable to recruit a sufficient number of fully trained educators who meet specific employment criteria. If a district submits this Declaration to the Commission, the Commission is *required* to issue emergency permits requested by the district. The employment of teachers, whether fully trained or holders of emergency permits, is a local issue and the Commission cannot intercede on a teacher's behalf (emphasis added).[56]

Although AB 471, signed into law in 1999, requires districts to hire the most qualified person for the position (in the following order: credentialed teacher, candidate nearing the completion of a preparation program, intern, emergency permit holder, waiver holder), there appears to be no well-understood enforcement mechanism in place for ensuring that this occurs. There is no formal system in place for determining when an investigation should be launched. There is no complaint form or other conduit for complaints (Swofford deposition, pp. 239-240). The CCTC may also ask for county assistance through obtaining access to its documents, but it has not called on counties to help investigate suspicions of failure to make a good-faith effort to recruit fully certified teachers before obtaining permission for emergency permitted teachers (Swofford deposition, pp. 245-256). Although the Education Code states that the CCTC shall establish reasonable sanctions for misassignment of teachers (Educ. Code, section 44258.9 (SAD-218), subsection (g)(1)), it is not clear that sanctions are administered (Swofford deposition, p. 338). The CCTC does monitor misassignments and works with school districts to correct these problems by offering advice and data. These efforts do not always result in substantial changes, however.[57] The Commission has developed proposals to strengthen its capacity to follow-up on complaints regarding misassignment and to review district hiring practices with the possibility of moving to deny emergency permits or waivers.[58]

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[55] For example, in one application, Los Angeles Unified School District requested more than 4500 emergency permits for multiple subject candidates and more than 1500 for single subject candidates in 1998-99, along with more than 10,000 CLAD and B-CLAD emergency permits. *LAUSD Declaration of need for fully qualified teachers, 1998-99.* (Submitted 4/30/98 to the CCTC.) The CCTC form notes that "this declaration must be revised by the employing agency when the number of emergency permits applied for exceeds the estimate by ten percent."

[56] Letter from Donald J. Currier, Director, Certification, Assignment and Waivers Division, CCTC, to Erika H. Mininni, March 8, 2000.

[57] See, for example, the CCTC's *Report on San Francisco Unified School District Monitoring, 2001 Revisit*, June 21, 2001. Report downloaded from http://www.ctc.ca.gov/aboutctc/agendas/july_2001/cca/cca2.html

[58] CCTC, *Accountability in teacher preparation, educator assignments and use of emergency permits: A proposal from the Commission on Teacher Credentialing*. Draft sent to author by Linda Bond on 2/15/00.

Additional Unintended Consequences of Current Policies

In addition to the conditions noted above, there are some unintended consequences of the policies California has adopted to address the declines in the public education system that bear on the quality of teachers available to the state's poorest children.

Class Size Reduction. The state's class size reduction initiative greatly expanded the hiring of teachers without preparation, especially in the districts with the largest numbers of disadvantaged students and the greatest educational needs (CSR Research Consortium, 2002). As a Los Angeles teacher explained:

> (O)ne of the sort of hidden aspects of class size reduction is that when class sizes were reduced under Governor Wilson, there was teacher flight from schools in low income communities and communities of color, the schools that have the toughest working conditions, because they've been neglected, overcrowded, etcetera. So you have teachers saying, oh, well, now that class sizes have been reduced, I can teach in Redondo Beach where there's a lot better conditions. Let me go ahead and teach 20 kids in Redondo Beach instead of … staying in South Central L.A. (Caputo-Pearl, v. 1, 110:21-111:8).

Recent evidence suggests that the reduction of teacher quality in low-income and high-minority schools may have undermined the potentially positive effects of class size reduction in these schools, especially in districts serving large numbers of students of color in the Los Angeles area, where the greatest hiring of inexperienced and underqualified teachers took place (Jepsen & Rivkin, 2002). As these analysts and the teacher below note, the outcomes of class size reduction would likely have been more productive if there were a plan in place to recruit and train an adequate supply of teachers:

> (W)hen the state reduced class size…, it was done without planning for the teacher training that needed to go into effect to have two teachers to teach 20 kids each instead of one teacher teaching 40 kids. (O)bviously, in my opinion, the remedy to that is put money into training teachers and actually recruit more teachers to do the job (Caputo-Pearl, v. 1, 110:9-20).

According to a PPIC report, some additional long term negative effects of this policy could be still unfolding:

> …CSR likely had a more profound effect on the teacher workforce than simply increasing the number of inexperienced and uncertified teachers. Thousands of additional teaching positions were created, but thousands of additional teachers were not. Therefore, much of the increase in teachers consists of individuals who would not have been hired as teachers in the absence of CSR, especially given the availability of jobs with better pay and working conditions. If these teachers continue to be of lower quality than other teachers even after they have acquired additional experience, certification, or education, then CSR has the potential to create a long-term reduction in teacher quality (Jepsen & Rivkin, 2002, p. x-xi).

The Underpreparation of a Growing Number of Teachers. One result of the teacher hiring trends in California over the last decade and the kinds of solutions used to fill classrooms in any way possible is that the state has developed a culture and a set of incentives that encourage entry into teaching without preparation. Because of the widespread hiring of under-prepared teachers, many candidates are advised that they can enter teaching without a credential and pick one up later if they decide to stay. Unfortunately, this encourages individuals to enter before they can be effective and decreases the likelihood that they will stay in teaching. It also undermines the likelihood that they will ever become adequately prepared. The most recent SRI report noted that:

> The availability of jobs and Intern and Pre-intern programs has weakened the incentives to earn a credential prior to employment. One result is that the number of classroom teachers without full credentials enrolled in teacher preparation programs is increasing. The increasing numbers of teachers of record in teacher preparation programs have altered both the focus and the structure of teacher preparation at many institutions in the state. (Shields et al., 2001, p. 37).

The report notes that the high concentration of participants in some teacher education programs who are already teachers of record appears to be negatively impacting program quality and rigor: Course requirements are reduced because students are overloaded with teaching responsibilities, and the focus of teacher education coursework sometimes changes from student learning to classroom control. As a faculty member quoted in the report summarized the situation:

> Emergency credential teachers want a lot of validation for what they are doing. They come in with ideas about what ought to happen in the classroom…. What they want is quiet. They ask me, "What do I do to keep them [students] under control?" I ask them how are they creating a learning environment, and they ask, "How do I keep them quiet?" (Shields et al, 2001, p. 51).

The report concludes: "The issue of quality is of paramount importance. The introduction of high standards and greater accountability for student learning makes it imperative that the state produce strong teachers. Concurrently, the need to produce more teachers more quickly raises questions about the capacity of institutions to maintain high quality standards" (Shields et al., 2001, p. 55).

A recent study of the preparedness of graduates of the California State University system reinforces the SRI study findings. The study found that 45% of graduates had completed their preparation as interns or on emergency credentials rather than in pre-service programs with student teaching. These graduates, who did not have the advantage of practice teaching in the classroom of an expert veteran, or of a tightly configured sequence of courses connected to such clinical experience, felt substantially less well prepared to teach reading and mathematics (and in several other areas, such as classroom management and communicating with parents) than those who completed a traditional teacher education program (California State University, 2002a, p. 25; CSU, 2002b, pp. 12-13). The evaluation concluded that:

> (I)nequalities in CSU program outcomes are smaller in magnitude than would be anticipated from the long history of "savage inequalities' in K-12 education…. Less promising, though, are findings that show less effectiveness in the preparation of interns and emergency teachers than student teachers. This result is particularly important because it reflects on recent policy shifts in the State rather than on demographic trends for which educators and policymakers have little control or responsibility (p. 13).

Below, we argue that a policy approach that reduces standards and truncates preparation in order to fill classrooms not only disadvantages the state's most educationally needy children, but it deflects attention away from the factors that need to be addressed in order to attract and keep an adequate supply of qualified teachers in California's schools: competitive and equitable salaries and working conditions, functional district hiring procedures and supports for teachers, adequate preparation and mentoring, sensible state licensing policies, and targeted incentives for recruiting teachers in shortage fields and locations.

The State's accountability system. Ironically, California's new testing and accountability system, which includes sanctions for schools that have low test scores and rewards for those with high or improving scores, may also contribute to the maldistribution of qualified teachers in schools serving disadvantaged students. A recent PPIC study raised this concern:

> Although we believe that it is important to hold schools accountable, a likely side-effect of the new drive for accountability will be a shortage of qualified teachers and principals in schools serving disadvantaged populations. The reason is simple: Because of possible sanctions, personnel will avoid working in the schools most likely to be identified as failing to meet state standards…. To reduce this risk, rewards and punishments must be based in part on a comparison of performance relative to other schools serving similar student populations. We would also encourage the state to base measures of performance on changes in student performance rather than just on the levels of achievement across schools…. The 1999 version of the accountability system partially implemented both of these suggestions. Nevertheless, the gap in achievement between low-SES and high-SES schools is so stark that most schools subject to sanctions are likely to be low-SES schools. Therefore, a dangerous side-effect of the accountability reforms could indeed be to dissuade principals and teachers from choosing to work in schools serving disadvantaged populations (Betts, Rueben, & Danenberg, 2000, p. xxvi).

This concern may be warranted. There is some evidence from other states that high-stakes testing systems can have unintended side-effects. For example, schemes that reward or sanction schools based on average student scores have created incentives for pushing low-scorers into special education where their scores do not count, holding them back in the grades so their scores appear artificially to be higher, and encouraging them to drop out so that schools' average scores will look better (Allington and McGill-Franzen, 1992; Figlio & Getzler, 2002; Haney, 2000; Shepard and Smith, 1986; Smith et al., 1986). These policies also appear to exacerbate existing incentives for the best-qualified staff to opt for school placements where students are easy to teach and school stability is high, leaving the least qualified to take jobs where many students have special needs and performance standards will be more difficult to attain. This

outcome was recently reported as a result of Florida's recent use of test scores for school rewards and sanctions. Qualified teachers left the schools rated D or F "in droves", to be replaced by teachers without experience and often without training (DeVise, 1999). It remains to be seen whether California's similar accountability system will produce the same unintended consequences.

The State's Definition of "Qualified Teachers". As pressure for improving the circumstances of poor and minority students in California has grown, the state has undertaken a number of efforts to ensure more preparation for the most grossly underprepared teachers. One such effort has been the creation of the "pre-intern credential" which places teachers who have not met the state's subject matter requirements into a program to gain subject matter knowledge and eventually to enter a teacher education program to gain teaching knowledge. Pre-interns are emergency permit teachers who have not yet satisfied the subject matter competence requirement for entry into an internship program and who have agreed to work toward subject matter competence while they are teaching as teachers of record. They also have not generally begun studying toward the professional preparation requirements. They must "demonstrate intent" to take the state's subject matter examinations for teachers and take content courses in a university while they hold the certificate (CCTC, 2001b, p. 379).

In large part as a consequence of efforts to move emergency permit teachers to pre-intern status, the number of emergency permits awarded in California in 2001-02 was somewhat reduced over the previous year, a fact that was noted by the CCTC as a sign of progress in its 2001 Annual Report (CCTC, 2001a, p. 19). However, pre-intern credentials issued during that year increased by an even larger number, leaving even more children taught by under-qualified teachers.[59] While the intent of creating a more structured pathway toward qualifications is salutary, pre-interns are essentially emergency permit teachers who have promised to take content courses they lack. They are not qualified teachers. Changing the categories by which under-qualified teachers are counted – and ignoring those categories in evaluating the state's progress toward meeting the needs of its under-served children – will neither magically make those teachers equivalent to fully qualified teachers nor eliminate the disservice done to the children whom they teach.

Similarly, the State seems to be seeking to sweep the problem of under-qualified teachers under the rug in its response to recent federal legislation calling for all students under the Elementary and Secondary Education Act (ESEA) to be served by fully certified teachers. Because of national concerns about the extent to which low-income children, English language learners, special education students and others are denied access to qualified teachers, the federal Congress included a new provision in its reauthorization of the ESEA, popularly known as the "No Child Left Behind" Act. The new law requires that states provide children served under the act with teachers who are "highly qualified" in the subjects they teach. This requirement is to be fulfilled by the end of the 2005-06 school year. The law defines a "highly qualified" teacher as one who has:

[59] The 2001 Annual Report notes that the number of emergency permits decreased from 34.309 to 32, 573 (a total of 1,736) from 1999-00 to 2000-01 and the number of waivers decreased from 2,724 to 2,265 (a decrease of 459) (p. 19). While these categories decreased by about 2,195 altogether, the number of pre-intern credentials issued in that year almost doubled from the year before, increasing from 4,142 to 8,092, an increase of 3,950 (p. 16).

- Has obtained full State certification as a teacher or passed the State teacher licensing examination and holds a license to teach in the State, *and does not have certification or licensure requirements waived on an emergency, temporary, or provisional basis*;
- Holds a minimum of a bachelor's degree; and
- Has demonstrated subject area competence in each of the academic subjects in which the teacher teaches, in a manner determined by the State and in compliance with section 9101(23) of ESEA [Title IX, Section 9101(11)].

The law clearly aims to ensure that children have teachers who know the subjects they teach and how to teach those subjects and to ensure that high-need students are not taught by teachers hired on emergency permits or waivers. However, California's suggested definition of Highly Qualified Teacher, approved by the California State Board of Education on May 30, 2002 as part of its application for a Federal Title II grant, turns the notion of a highly qualified teacher on its head. California would like to define a highly qualified teacher as one who has passed only the state basic skills test and met only a portion of its standard subject matter requirements (18 credits, which is equivalent to only a fraction of the coursework required in state-approved subject matter programs as prerequisites to entering a teacher education program). The proposed California definition ignores all of the state's extensive requirements for knowledge about teaching. There is no expectation that a highly qualified teacher would meet any of the requirements for knowledge about teaching subject matter, reading, English language learners, special needs students, or organizing and managing a classroom. [60] Additional professional development is encouraged but not required. Individuals currently working on emergency permits and intern credentials would automatically qualify as "highly qualified" under this definition, as would many who are working on pre-intern credentials and waivers.

As of this writing, the U.S. Department of Education has signaled that it will not accept this definition, which would require the state to submit a new proposal. Meanwhile, it is critically important that the people of California recognize that the students served by teachers who have not met the state's full subject matter and teaching standards are not being served by fully qualified teachers. These students do not have the benefit of the content and teaching

[60] The State Board application defines a "highly qualified teacher" in California as requiring:
• Possession of a Baccalaureate Degree from a regionally accredited institution of higher education;
• Successful passage of California's state test of reading, writing and mathematics, unless otherwise specified in the California Education Code;
• Demonstrated competence of the subject or subjects to be taught, as measured by successful passage of the state-approved subject matter examination(s) aligned with the State Board of Education approved student content standards or successful completion of 18 units of university coursework (or the equivalent) in the subject or subjects to be taught, that has met state standards adopted by the California Commission on Teacher Credentialing and that is aligned with the State Board of Education approved student content standards, or teachers serving on teaching assignment options specified in the California Education Code; and
• Orientation to the subject(s) and grade levels to be taught. Recommendation for advanced study: In addition to meeting the above requirements, participation in intensive additional study in the teaching of reading, mathematics, and science via the Professional Development Institutes administered by the University of California, and reading development programs that meet the requirements of AB 466 (Chapter 623, Statutes of 1999, K-3 Reading) is strongly encouraged for teachers in schools identified for Program Improvement or Intermediate Intervention/Under-performing School Program (II/USP), and recommended for all teachers in their respective subject areas and grade spans.

knowledge they deserve and are not receiving equivalent treatment under the law. The problem of inadequate teaching cannot be defined away by semantics. Pretending that teachers lacking critical knowledge required by the state's credentialing system are now "highly qualified" will not make it so. The State can and should pursue better alternatives that result in real solutions to these problems.

VII. Recommendations

In recent years, elected officials and state agencies have begun to respond to the needs for more, better trained, and more equitably distributed teachers with an array of initiatives. The California Commission on Teacher Credentialing (CCTC) has laid the groundwork for a coherent standards-based system of entry and continuation in teaching based on standards that reflect the necessary foundations for good teaching and that are linked to the California standards for student learning. The California State Department of Education is implementing, in partnership with the CCTC, a program of mentoring for beginning teachers. California's governor and legislature have made recent investments in teachers' salaries and preparation. Loans and grants for individuals preparing to teach in California have been introduced, and the CCTC is working to expand inter-state reciprocity for teachers prepared in other states. The California State University system pledged to expand its production of teacher education graduates to 15,000 annually (up from about 12,000 in 1997) and the University of California system has committed to increase its graduates to 2,500 (from about 800 per year in 1997). These initiatives have begun to make a difference in some communities.

Yet, over the last three years, the number of emergency credentials and waivers has steadily increased[61] and the extent of inequality in the system has grown. This suggests that the current policy framework is not yet adequate and does not take account of the equity dimensions of the problem. In some cases, the strategies launched are appropriate but not sufficient in scale. The prescription is right, but the dose is too small. In other cases, key issues still await attention. And in a few instances, existing policies are counterproductive to the goals of staffing California's schools and require revision. A comprehensive policy solution that takes into account the specific nature of California's funding and management problems will be required. As the Public Policy Institute analysis noted:

> The evidence that teacher experience, certification, and teacher education are linked to student achievement suggests that expanding the supply of highly trained and fully certified teachers in California is in order. However, additional, more subtle reforms are required. Shortages of qualified teachers are highly concentrated geographically and in addition are concentrated in schools serving the most disadvantaged populations. Simply expanding the supply of teachers cannot eliminate either of these inequalities (Betts, Rueben, & Danenberg, 2000, p. xxiv).

Outlines of a Comprehensive Remedy

[61] As noted earlier, pre-intern credentials are now part of the count of under-qualified teachers that offset the numbers of emergency credentials, but do not offset the real numbers of individuals working as teachers who have not met the state's standards.

An adequate remedy would address the problems outlined here, would build on the efforts the state has made in the last three years, and would ultimately ensure that all teachers will be prepared to teach to its new student learning standards and that all students will have access to fully qualified teachers who can provide them with the opportunity to learn. Based on the analysis offered in this paper, a comprehensive remedy should seek to:

1) Increase the supply of qualified teachers for high-need fields and locations,
2) Reduce high turnover and unwanted attrition of teachers, especially in heavily impacted schools that are currently hard-to-staff,
3) Ensure that all teachers have the preparation they need to teach to the state standards,
4) Monitor the provision of qualified teachers to all schools and students,
5) Create incentives that enable and require all districts to hire well-qualified teachers.

This discussion includes three components of a remedy:

- Benchmarks: What baseline standard(s) should be met?
- Processes for Procedural Accountability/State Monitoring: How should the State know when schools are out of compliance? What should the State do to respond to non-compliance in each area?
- Policy Strategies and Incentives: What would a comprehensive remedy that addresses the problems include? What policy options can the state pursue?

Standards and Benchmarks

Ultimately, the constitutional standard requires that every student have full and equal access to qualified teachers who can enable students to learn the curriculum and standards required of them by the state. The standard of full and equal access to qualified teachers has also recently been enacted in federal Elementary and Secondary Education Act requirements requiring that all students served under the law be taught by qualified teachers. As noted above, the federal law defines a highly qualified teachers as one who has obtained " full state certification as a teacher or passed the State teacher licensing examination and holds a license to teach in the State, and does not have certification or licensure requirements waived on an emergency, temporary, or provisional basis."[62]

The state of California measures qualifications through a rational system of certification that is based on knowledge about teaching and learning and grounded in teaching standards as well as the state's standards for student learning. This system of certification provides the legal minimum measure of qualifications. The state has created a system to require qualified teachers: All students should receive them.

Californians overwhelmingly concur with the propositions that qualified teachers matter for educational quality and that all students should have access to them. In a recent poll of California citizens sponsored by Center for the Future of Teaching and Learning, 87% cited

[62] U.S. Department of Education. "Improving Teacher Quality State Grants Non-Regulatory Draft Guidance," C-1, June 6, 2002.

well-qualified teachers as the key to raising student achievement. Eight out of ten strongly agreed that, "we should ensure that all children, including those that are economically disadvantaged, have teachers who are fully qualified, even if that means spending more money to achieve that goal," and a comparable share opposed "lowering state requirements for the training needed to become a licensed teacher" (Recruiting New Teachers, 2001). When asked to define the qualities of a good teacher, respondents cited:

- Knowing how to manage a classroom.
- Being well-trained and knowledgeable about how to teach effectively.
- Understanding how children learn.
- Being thoroughly educated in the subjects to be taught.
- Knowing how to monitor and assess real student progress in learning.
- Basic sensitivity to each child as an individual.

Recent reports in California have asserted the appropriateness and necessity of this standard and proposed plans to reach it. The Center for the Future of Teaching and Learning recommended that the legislature sunset existing California Education Code provisions for first-time emergency permits by 2006-07. (Shields et al., 2001, p. 90). The California Professional Development Task Force report (2001) included a similar recommendation: "Develop an action plan to eliminate emergency permits and waivers within five years. Evaluate labor market conditions and identify the resources, incentives, and supports needed to enable all districts to recruit and hire qualified teachers." The report proposed a comprehensive plan to eliminate the need for emergency permits. (See recommendations below).

While there are a number of challenges to staffing California's schools, the analysis included in this paper demonstrates that the problem is susceptible to policy solutions. To make progress, the state should:

1. Establish a standard below which no school can fall and maintain a monitoring system that identifies schools falling below the standard and ensures those schools and their districts receive close scrutiny and oversight.

Over the short-run, while a comprehensive remedy is being implemented, the following benchmarks should be established, effective immediately:

- No school (or track in schools with year-round, multi-track schedules) should be allowed to have more than 20% of its teachers lacking full preliminary or clear certification. This is far from a constitutional standard – which would require all students in public schools to have full access to teachers who meet the state's standards for professional teaching credentials – but is proposed as a minimal standard for a school that can function at even a rudimentary level of professional responsibility for planning and oversight of practice.

- Low-performing schools should be prohibited from having more than the state average proportion of teachers without preliminary or clear credentials. (The California Professional Development Task Force (2001) recommended that this requirement apply to schools that are in the bottom quartile of achievement on the API.) As in New York

State, which recently prohibited the assignment of *any* uncredentialed teachers to its lowest performing schools, this measure should stimulate more aggressive recruitment, earlier hiring, stronger supports for teachers, and new teaching incentives to change the mix of teacher qualifications in schools that allocate the least prepared teachers to the students with the greatest needs."

- Require evidence of annual progress: To guide progress and target assistance, California should develop an annual Teacher Qualifications Index (Futernick, 2001) that is published alongside the Academic Performance Index (API). The Teacher Qualifications Index should provide school-level and district information about the number of emergency permits, waivers, intern, pre-intern, clear credentialed, and National Board Certified teachers (see also, Shields et al., p. 90).

State Monitoring and Accountability

Benchmarks will be of little value if there is no support or enforcement of changes in practice. The legislature should set a goal of phasing out the approval of waivers and emergency permits over the next 5 years, allowing waiver of credential requirements by CTC only in exceptional cases where specialized individual skill and talent or eminence is involved.[63] As part of the plan associated with this goal, the state system should:

2. Develop an effective system for monitoring and enforcing its teacher credentialing laws, evaluating problems, and improving school hiring.

- Expand investigatory power and capacity of appropriate state agencies to enforce the state's credentialing standards and prevent the hiring of uncredentialed teachers where qualified, credentialed teachers are available.

- As other states do, require all districts applying for emergency permits and waivers to demonstrate that 1) an adequate search has been conducted, 2) there are no suitable, qualified individuals who have applied for the position, and 3) there are no certified individuals in this field currently holding non-teaching positions in the district who could be reassigned in lieu of hiring an uncredentialed teacher.

- Monitor the annual Teacher Qualifications Index (see above). For schools and districts that exceed the maximum aggregate level of underqualified teachers, the State should impose closer scrutiny, including independent verification of facts regarding reasons for the unavailability of credentialed teachers, before approving any emergency permits, waivers, or pre-internships.

- Conduct a full and complete state audit of school hiring needs and district hiring policies in schools or districts that repeatedly hire large numbers of underqualified teachers. Require overhaul of non-functioning recruitment and hiring systems. (Currently, although FCMAT has been charged with conducting such reviews, FCMAT has no

[63] Fully-prepared out-of-state teachers should be eligible for licensure through reciprocity, rather than being placed on emergency permits.

authority to order changes, and there is no followup mechanism and no coordination with the CCTC.)[64]

- Provide incentives to districts for updating and streamlining hiring processes, for timely hiring of fully qualified teachers, and for priority placement of fully qualified teachers and administrators in hard-to-staff schools. The CA Professional Development Task Force Report (2001) suggested that, "A state challenge fund should be created to support high-need districts in upgrading their personnel departments (including technology infusions), expanding their recruitment capacity, and streamlining their hiring processes."

Policy Strategies for a Comprehensive Remedy

The problem of emergency hiring cannot be cured only by better enforcement. Ensuring that all students are taught by well-prepared teachers will require a set of purposeful strategies for managing the teacher labor force in California and efforts to make teaching in hard-to-staff schools more attractive by offering better salaries, working conditions, and mentoring. Other states that have ended the practice of emergency credentialing have pursued a multi-pronged approach: raising and equalizing salaries across districts; creating salary aid that rewards candidates for becoming well-prepared and districts for hiring well-prepared candidates; increasing subsidies to candidates and colleges for training in shortage fields; expanding reciprocity; improving retention through better preparation, mentoring, and working conditions; and enforcing certification laws while assisting districts in recruiting more effectively. (See Appendix B for a description of successful strategies in other states.) California has begun to enact some of these strategies, though not yet at a scale and in a combination sufficient to solve the problem. As described below, policies that will help attract and retain qualified and competent teachers for every child should:

Expand the pool through

- More equalized and market sensitive salaries for fully qualified teachers and increased incentives for hiring qualified teachers.

- Expanded subsidies for the preparation of prospective teachers, especially for shortage fields and locations.

- Enhanced reciprocity with other states and streamlined credentialing procedures.

Improve distribution, retention, and effectiveness through

- Targeted incentives for improving working conditions in hard-to-staff schools.

- Improved teacher education and mentoring.

Expand the Pool

[64] The CTC does not receive FCMAT audit reports and there is no coordination between the two agencies. CTC director, Sam Swofford has stated that he is unfamiliar with FCMAT's responsibilities. (Swofford deposition, 273).

3. Create a finance system that ensures more market sensitive and equalized salaries across districts. Incorporate incentives for hiring fully qualified teachers.

A number of reports have noted, first, that key disparities in California include access to qualified teachers and the quality curriculum they can provide, and, second, that the problems of recruiting teachers are affected by salaries and must take into account the different labor markets across the state, including different costs of living and levels of pupil need. For example the Public Policy Institute (PPIC) Report observed that,

> Equalization policies should do more than alter growth in overall budget levels. We believe they should target the area of greatest inequality: teacher preparation…. Traditional redistributive policies aimed at reducing variations in revenues per pupil across districts are unlikely to equalize student achievement across all schools…. (R)esource inequality is restricted primarily to teacher training and curriculum, so that redistribution must focus on these specific characteristics of schools rather than on revenues per pupil alone" (Betts, Rueben, & Danenberg, 2000, pp. xxix- xxx).

This suggests a strategy that targets resources to the provision of well-qualified teachers and that takes into account the factors that affect their distribution, including the purchasing power of salaries. The PPIC report notes that teacher shortages in the most heavily affected areas might be partially reduced through differential cost-of-living adjustments across school districts (p. xxiv), a reform also discussed in a recent report by the Legislative Analyst's Office (LAO, 1999). Pogodzinski's (2000) analysis and recommendations for reducing the hiring of underqualified teachers also discuss the advisability of targeted salary adjustments that take regional cost-of-living differences into account.

The other source of differential costs is the cost of education for students with different needs, for example, those with special education needs, Limited English proficiency, and those who live in poverty who are more heavily concentrated in low-income school districts. Taking these costs into account can be accomplished through a weighted per pupil formula that equalizes overall funding and applies weights for high-need students as well as for regional cost differentials.

An even more targeted approach that addresses the importance of teachers as a key educational resource is one that allocates a substantial portion of state aid directly to teachers' salaries. Some states do this through minimum statewide salary schedules (e.g. North Carolina and others in the South); others use state salary incentives that are subject to collective bargaining (e.g. Connecticut and some other Northern states). Appendix B outlines the success of reforms in North Carolina and Connecticut that targeted the creation of a highly skilled teaching force and resulted in some of the steepest achievement gains for students in the country throughout the 1990s.

The Connecticut strategy, which relied on incentives for local districts to raise salaries, is perhaps most applicable in a state like California with strong traditions of local control and collective bargaining. This strategy would establish a target minimum beginning teacher salary

that is competitive in the labor market and provide salary subsidies to districts to reach this target minimum salary. The subsidies would be provided based on an equalizing formula that provides different levels of funding to districts depending on their wealth, cost of living, and pupil needs. This could be done either through a weighted formula approach that includes cost of living and pupil needs in the formula, or through a categorical aid system for districts with high priority needs. To achieve the goal of equalizing access and acknowledging real educational costs, formula weightings or categorical aid eligibility would need to include language status, income, and exceptionalities, not just test scores. (In Connecticut, the salary schedule remained subject to district-level collective bargaining.)

To create incentives for hiring fully qualified teachers, the Connecticut reform allocated state incentive funds to districts on the basis of numbers of fully certified teachers they hired. Tying these subsidies to salaries for qualified teachers created incentives for candidates to become prepared and for districts to hire prepared candidates. Coupled with subsidies to support candidates during teacher preparation and mentoring for all beginning teachers, Connecticut was able to change its teacher labor market from shortages in its cities to statewide surpluses within 3 years and to maintain surpluses for more than a decade thereafter. During that decade, its increasingly diverse student population climbed to one of the top states in the nation on National Assessments of reading, writing, mathematics, and science.

A strategy like this one would put more of California's resources into teachers salaries (California ranks 32nd nationally in the share of the education budget spent on teachers -- only 39% of the total budget), create incentives and capacity for hiring qualified teachers, and create a level playing field among districts in gaining access to qualified teachers.[65]

4. Expand subsidies for the preparation of prospective teachers, especially for shortage fields and locations.

If an adequate ongoing supply of teachers is to be available for California schools, it is critical that well-prepared teachers be recruited into shortage fields (e.g. mathematics, science, computer science, special education, foreign languages, English Language Development) and into shortage locations, especially urban and poor rural schools. As this paper has documented, filling vacancies with underprepared teachers contributes to a revolving door of teachers in high-need schools, exacerbating rather than alleviating the long-term teacher supply problem.

The reforms in Connecticut and North Carolina have been supported by scholarships and forgivable loans subsidizing teacher education for candidates who prepare and teach in shortage fields or shortage locations. The subsidies for preparation, offered in exchange for several years of public school teaching in the state, have brought strong candidates into teaching and kept them there. The highly selective North Carolina Teaching Fellows Program, for example, recruited thousands of high-ability candidates into teaching in North Carolina through an enhanced and fully funded teacher preparation experience and produced retention rates in teaching of more

[65] An average increase of $5,000 in teacher salaries for new hires would cost the state about $125 million annually. The state could provide 50% of the support for an equivalent raise for all teachers for only $600 million a year, a relatively small proportion of its current budget. Ongoing salary incentives for National Board Certified teachers (some other states now offer 10-12% salary increases) could also be incorporated in a salary formula.

than 75% after its first seven years of operation. Many of the remaining candidates had moved into educational leadership positions in the public schools (NCTAF, 1996).

California has enacted some similar initiatives and should expand these incentives for recruiting undergraduate and graduate students into teaching, with particular emphasis on increasing service scholarships and loan programs for teacher preparation for those who make a commitment to teach in hard-to-staff schools. Current programs – APLE loans, CAL T Grants, and Governors Fellowships – should be expanded by increasing their size and number,[66] making them more widely available to in-state candidates and also to out-of-state candidates who come to prepare and teach in California. Incentives such as increased subsidies or reduced payback periods for those preparing to teach in shortage fields (e.g. math, science) or who will work in high-need locations (including low-income, high-need, or hard-to-staff schools) can direct candidates to the fields and locations where they are needed.[67]

To ensure that candidates receive the kind of high-quality preparation that will allow them to become competent and to stay in teaching, these subsidies should target programs that provide a coherent preparation including student teaching. Another useful strategy would be to provide stipends for student teaching and financial support for cooperating teachers in low-income, high-need schools to allow candidates to learn to teach in these schools and to complete their preparation prior to becoming the teacher of record.

Finally, a high yield source of candidates for hard-to-staff schools is the paraprofessional work force. To meet the need for teachers, recruitment incentives should also support expanded pathways into teaching for paraprofessionals and other students via community college to college teacher preparation program articulation and student supports.

5. **Enhance reciprocity with other states and streamline credentialing procedures.**

Since there is a substantial surplus of teachers in many other states, reciprocity coupled with aggressive recruitment could make an important contribution to California's need for well-qualified teachers. Whereas California enrollments are projected to increase by more than 20% by 2007, enrollment declines are anticipated in most parts of the Northeast and Midwest, and other states will have stable enrollments (NCES, 1998). Many of these states have a large number of teacher education institutions and regularly produce more teachers than they can hire. Elementary education has been a field of national surplus for a number of years, along with fields like English, social studies, art, business education, health education, physical education, and social studies.

[66] The current funding level for these programs combined is about $25 million. The state spent about $50 million on programs for uncertified teachers in 1999-2000. At 12,000 awards annually and $10,000 average award, the costs of an expanded set of subsidies for preparation, sufficient to fill all hard-to-staff vacancies with fully prepared teachers, would be $120 million annually.

[67] It is preferable to use measures of pupil income and other measures of pupil need, such as ELL status, for designating incentives to schools for recruiting and retaining fully qualified teachers, rather than low-performing school status. These measures are closer proxies for the actual needs of schools in California and using them would not create disincentives for improved performance in high-need schools.

Although the CCTC should be applauded for moving to acknowledge equivalence in specific requirements for specific areas across other states, the conditions continue to be more restrictive than full reciprocity and may still constitute a barrier to the entry of fully qualified teachers. The numbers of out-of-state entrants increased somewhat between 1999-2000 and 2000-01 when these new rules began to take wider effect, but have not yet returned to the level of 1997-98 (CCTC, 2001a; Shields et al., 2001). The state should continue to work to establish even more complete reciprocity with other states, while also reducing duplicative testing requirements for both in- and out-of-state candidates. For example, whereas California requires all candidates to take the CBEST, many states allow those who have passed a more difficult test like the Praxis, who have attained a minimum score on the SAT, or who have passed a comparable test in another state to waive the basic skills test, since they have already met a higher standard. Furthermore, no other state requires two separate tests of subject matter knowledge as California does. Under current requirements, entrants to teaching in California may take as many as five tests on top of the college admissions testing before they are fully certified,[68] which pose time, money, and transaction costs beyond those any other state requires.

Even more aggressive efforts to ease entry for teachers from across the country will be needed to solve California's teacher supply problems. Regulatory action could take care of many of these issues. Legislative action would be needed to remove add-on requirements like the CBEST and health education. More generous means of evaluating comparability (e.g. accepting more rigorous subject matter tests in lieu of basic skills tests and moving toward full reciprocity in lieu of equivalencies) would help to increase the number of states from which California could recruit.

Improve Conditions and Support

6. Expand incentives for local school districts to improve working conditions in schools that serve high-need students and in hard-to-staff schools.

In the long run, more equalized funding in California that takes account of differences in the costs of education would allow schools to improve other aspects of their operations that influence the recruitment and retention of well-qualified teachers, such as facilities, availability of materials and supplies, and class size.

In the immediate run, categorical aid to improve working conditions and teaching conditions in hard-to-staff schools may be necessary to stem the flood of attrition in these schools. For example smaller classes, greater access to materials, time for co-planning and professional development, and high-quality mentoring would greatly impact the ability of disadvantaged schools to get, keep, and support new teachers.

The California Professional Development Task Force recommended that, "California should expand the Teachers as a Priority (TAP) Block Grant program that provides funding for

[68] A secondary candidate who has not completed a subject matter waiver in CA must take the CBEST, the SSAT, the Praxis II, a new Teacher Performance Assessment during teacher education, and another teaching assessment (currently the CFASST) during the initial year of teaching. An elementary candidate would take the CBEST, the MSAT, the RICA, and the two new Teacher Performance Assessments (one during college and one after).

incentives to attract and retain fully credentialed teachers in low-performing schools." To be effective, this program would need to be funded at a much higher level (it is currently only about $44 per student) and available to schools that have large numbers of high-need students as well as in low-performing schools.

Improve Preparation and Mentoring

7. Expand supports for high-quality teacher preparation and mentoring.

The opportunity to develop more high-quality preparation in California has been increased by the recent removal of the long-time state proscription against undergraduate involvement in teacher education. This separation of subject matter studies from the study of education had created a system of mostly 9-month post-baccalaureate credential programs that were disconnected from the undergraduate curriculum. This made it difficult to integrate arts and sciences coursework with preparation in content pedagogy. It also made it difficult for prospective teachers to begin earlier coursework that would enhance their knowledge about and familiarity with teaching and to receive appropriate advisement regarding both their subject matter and educational studies. The recent regulatory changes create new opportunities for California colleges and universities to combine undergraduate and graduate studies, to connect content and pedagogy, and to create more extended clinical practice experiences. These changes could enable campuses to create the more powerful integrated models like the 5-year programs that have proven successful elsewhere in the country.

Many California campuses have begun to move affirmatively toward the creation of these more powerful programs. In addition, California campuses pioneered the development of post-baccalaureate models of preparation that develop sophisticated forms of student-centered practice by tightly linking theory and pedagogical coursework to extensive and intensively supervised clinical practice in both "traditional" and carefully designed "internship" models of training. However, the overall quality of teacher preparation in California has been threatened in the last few years by the widespread hiring of unprepared teachers and by increasing pressures to reduce the amount and quality of preparation in response to high teacher demand. The supply situation and the State's approach to managing it are profoundly influencing the nature and availability of productive learning opportunities for teachers. The state needs more sustained and purposeful incentives for the continuation and expansion of high-quality models of preparation, including funding that ensures that colleges in high-demand areas can accept qualified applicants and guidance that ensures that both preparation and induction models use strategies that have been shown to be effective in developing effective teachers who stay in the profession. To build a strong system California should:

- Provide incentives for the establishment of more extended teacher education programs, including programs that start in the undergraduate years, sufficient to ensure the teacher education pipeline is aligned with the need for credentialed teachers.

- Support professional development school partnerships between schools and universities in high-need communities that allow new teachers to learn under the guidance of expert

veterans in schools with concentrations of low-income and minority students where they will be needed.

- Ensure that formulas for the support of teacher education provide incentives for the expansion of high-quality programs and adequately support the growing number of students served, especially in high-demand, high-need regions of the state.

- Increase technical support for effective mentoring and induction programs for new teachers under BTSA and PAR and in all internship programs. Ensure that funding for these programs is spent on supplying mentors who have released time to coach beginning teachers in the classroom.

- Develop and fund high-quality mentor training and provide incentives to attract, hire, and reward mentors in high-need schools.

The Need for a Comprehensive Approach

Research and experience in California and elsewhere suggest the likely success of these strategies, particularly if they are enacted in a coherent, comprehensive system aimed at ensuring that every child has access to qualified teachers. In addition to states that have created policy systems that provide well-qualified teachers to their students, some urban districts in California and elsewhere have demonstrated that using a focused and comprehensive approach can make a major difference in teacher quality.

The recent experience of New York City is instructive. A state mandate that uncertified teachers could no longer be placed in low-performing schools plus the requirements of the new federal law led to improvements in hiring practices focused on recruiting and hiring qualified teachers and an average 16% increase in teachers' salaries (over 20% for beginning teachers) to make them more comparable to the surrounding suburbs. Vacancies for 2002-03 were filled by July, and 90% of the new hires were fully certified, in contrast to only 60% the year before. The remaining 10% will be certified by the end of the school year (Hays & Gendar, 2002).

California districts with purposeful approaches have achieved comparable successes. Recent headlines trumpeted the fact that Anaheim City Schools opened the 2001 school year with all of its newly hired teachers fully credentialed for the first time in five years (Tapia, 2001). This urban district of 22,200 has a majority of English language learners, the county's highest poverty rate, and year-round schools due to overcrowding, but was able to improve the quality of its teaching staff through focused efforts at recruitment and support, many of them supported by recent state policies, such as the Teachers as a Priority program. These efforts included bonuses for newly hired teachers and for current employees who refer teachers, relocation loans, moving discounts, and use of the loan forgiveness for prepared teachers who work in high-need areas.

The National Commission on Teaching and America's Future has highlighted the successes of New Haven Unified School District, a district of 14,000 just south of Oakland that serves mostly low-income students and students of color, in creating a strong system for ensuring

teacher quality (Snyder, 1999). When school districts across California scrambled in recent years to hire qualified teachers, often failing to do so, New Haven had in place an aggressive recruitment system and a high quality training program with local universities that allowed it to continue its long-term habit of hiring universally well-prepared, committed, and diverse teachers to staff its schools. In 2001, 10 of its 11 schools had *no* teachers lacking full credentials, and the district average was 0.1% (Futernick, 2001). One factor in this success is that, although not a top-spending district, New Haven invests its resources in good classroom teaching conditions and teachers' salaries. (In 1998, for example, New Haven's salaries were more than 30% higher than nearby Oakland's, where large numbers of unqualified teachers have been hired.) New Haven's personnel office uses advanced technology and a wide range of teacher supports to recruit from a national pool of exceptional teachers and hire them quickly. The district was one of the first in the state to implement a Beginning Teacher Support and Assessment Program that provides support for teachers in their first two years in the classroom. All beginning teachers receive such support from a trained mentor who has release time for this purpose. In addition, with the support of California State University, Hayward, the district designed an innovative teacher education program that combines college coursework and an intensive internship, including student teaching, conducted under the close supervision of school-based educators. Because of these initiatives, the district has surpluses of qualified teachers.

Using very similar strategies, San Diego City Schools has recently overhauled its teacher recruitment and retention system, aggressively recruiting well-trained teachers, collaborating with universities on new training programs in high-need fields and creating smooth pathways with local schools of education, offering contracts to well-prepared teachers as early as possible (as much as a year in advance of hiring), and reaching out to teachers in other states. In addition, the district streamlined the hiring process, put the entire system on-line, and improved the system's capacity to expeditiously manage data, interviews, and other components of the selection system that had slowed the process and caused many candidates to give up on the system and go elsewhere. By fall of 2001, while districts like San Francisco and Los Angeles hired hundreds of uncredentialed teachers and the state as a whole hired more than 50% of beginners without full credentials, San Diego filled almost all of its 1081 vacancies with credentialed teachers, eliminating all but 11 emergency permits (Darling-Hammond et al., 2002).

While the policy challenge in California is not trivial, especially after years of neglect, it is also clearly not insurmountable. With determination and will, California can and must make good on its constitutional obligation to provide each child the right to be taught that is a foundation for the right to learn. Anything less is a violation of the constitutional requirement that all students receive a basic education with equal protection under the law.

Appendix A

Evidence concerning the Effectiveness of Certified and Uncertified Teachers

In the debates about the importance of teacher education and certification, those who suggest that preparation does not matter have had difficulty finding research that would accurately support their contention. For example, in her critique of teacher certification, Walsh (2001) asserts that, "New teachers who are certified do not produce greater student gains than new teachers who are not certified." For this proposition, Walsh cites seven studies, six of which do not provide any support for this proposition, and five of which actually provide contradictory evidence to her claim. Three of the studies (Bliss, 1992; Stoddart, 1992; Lutz & Hutton, 1989) include no data on student achievement at all and do not measure student gains. (Elsewhere, Walsh dismisses all other studies that do not use student achievement data as the dependent variable.) Five of the studies actually deal with alternatively certified rather than uncertified teachers – that is, teachers who had undertaken teacher education at the post-baccalaureate level in university- or school district-based programs that rearrange the way teacher education is delivered. The findings across the studies are mixed, but none of them shows that uncertified teachers do as well as certified teachers, and one of them shows that this is clearly not true. Several of the studies point to the value of teacher education: The more positive findings are found for the alternatives that provide more complete preparation.

1. Bliss (1992) wrote about the Connecticut alternative certification program, a two-year training model which the author notes features "a significantly longer period of training than in any other alternate route program" in existence at that time (p. 52). This report does not examine uncertified teachers, nor does it meet Walsh's criteria for inclusion in a review of literature, because it includes no data about teacher effectiveness as gauged by student achievement measures. Bliss notes that most recruits reported their initial training to be helpful, and she briefly mentions results from another researcher's survey of recruits' supervisors which suggested mixed reviews of their performance: 33 percent of supervisors said that the alternate route teachers were weaker than others in classroom management (presumably, then, 67 percent said they were not weaker than others in this area), while 38 percent said they were stronger than others in teaching skills (and 62 percent presumably said they were not stronger than others in this area).

2. Stoddart (1992) reports on the subject matter qualifications and attrition rates of recruits to the Los Angeles Teacher Trainee Program, also a two-year training model. She found that content qualifications were comparable to those of traditionally trained recruits, except for math recruits, who had lower GPAs than traditionally trained teachers, and that attrition rates for those who entered were relatively low in the first two years but higher than national rates after 5 years.[69] Results cited by Stoddart from other studies about the observed practices of these

[69] Another study by the California Commission on Teacher Credentialing found the attrition rates of Los Angeles Teacher Trainees who dropped out before they entered teaching, found in a report by the California Commission on Teacher Credentialing to be extremely high. Of the first cohort, 80.3% completed the first year of training and only

teachers in comparison with university-trained teachers produced mixed results: university-trained English teachers appeared more skillful than alternate route teachers, but the levels of skill appeared lower for mathematics teachers from both groups.

3. Lutz and Hutton (1989) compared the demographic characteristics, attitudes, certification test scores, and opinions of Dallas Public Schools' alternative certification (AC) recruits with other first year teachers in the district. Like the other studies noted above, this study did not examine student achievement gains of the recruits' students. The program provides summer training to recruits and then places them in mentored internships during the school year while they are completing other coursework. The study found many similarities but some differences between AC recruits and other first year teachers, including significantly lower rates of expected long-term continuation in teaching for the AC recruits (40% vs. 72% for other first year teachers). They also examined supervisors' perceptions of recruits – a measure that Walsh argues should eliminate other studies from consideration. These were positive for the 54% of the pool (59 out of 110) defined as "successful" interns in the study – those who completed the intern year without dropping out (10%) or being held back for another year or more due to 'deficiencies' in one or more areas of performance (36%). The study also reported data from another evaluation of the program by the Texas Education Agency (Mitchell, 1987), which surveyed principals, finding, according to Lutz & Hutton, that:

> The principals rated the (traditionally trained) beginning teachers as more knowledgeable than the AC interns on the eight program variables: reading, discipline management, classroom organization, planning, essential elements, ESL methodology, instructional techniques, and instructional models. The ratings of the AC interns on nine other areas of knowledge typically included in teacher preparation programs were slightly below average in seven areas compared with those of beginning teachers. It might therefore be assumed that pre-service teacher education programs are doing something right! (p. 250).

In the paragraph cited above, Lutz and Hutton wax enthusiastic about preservice teacher education programs that seemed to outperform the alternative route. Later they wax enthusiastic about the alternative route, given results from another survey of principals, most of whom felt that alternative credential candidates who made through the program were comparable to other beginning teachers. At the end of the piece, they note that the high attrition rates and difficulty maintaining the program suggest the alternate route will not likely be a long-term solution to teacher supply problems. Although Walsh cites Lutz and Hutton's enthusiastic feelings about the AC program, she does not accurately report the complete data from the study, including the low rates of successful program completion, the low rates of planned retention in teaching, and the mixed reviews of their performance. In her appendix, she includes this study with the following "review:" "Darling-Hammond ignores the unqualified authors' *(sic)* endorsement of

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64.6% completed the second year and received a clear credential the year after (Wright, McKibbon, and Walton, 1987).

the merits of alternative route to teaching…." One presumes that she means to reference the authors' "unqualified endorsement" rather than to call the authors themselves unqualified. Yet as the above excerpts make clear, the study does not provide an unqualified endorsement of the program.

Two other studies Walsh cites do include student achievement data, but they do not, as she states, compare certified with uncertified teachers. Both deal with alternatively certified teachers who receive a substantial amount of education coursework while they are undertaking mentored teaching supervised by both university supervisors and classroom mentors.

4. Miller, McKenna, & McKenna (1998) is a matched comparison study of what the study's authors call a "carefully constructed" university-based alternate route program for middle school teachers. Reflecting the characteristics of alternative routes endorsed by the National Commission on Teaching (1996), this program offered 15 to 25 credit hours of coursework before interns entered classrooms where they were intensively supervised and assisted by both university supervisors and school-based mentors while they completed additional coursework needed to meet full standard state certification requirements. Forty-one of these teachers were compared to a group of traditionally certified teachers matched for years of experience. Although the sample size is too small to meet Walsh's criteria[70] for studies worth considering (a point she seems to have forgotten here), and data are not provided on student pre-test scores, the study appears reasonably well-conducted.

The traditionally trained teachers in this study felt somewhat more confident in their practice and scored slightly higher on the two sub-scales of an observation instrument used by trained observers to rate their teaching. However, these differences were not significant, and the authors report, without including the actual data analyses, that there were no significant differences in the two groups' student achievement by the 3rd year of practice after both had completed all of their education coursework. (The authors did not control for prior achievement levels of students; however, they stated that the initial differences in student achievement across groups were not significant.)

Because the design of this program was so different from many quick-entry alternative routes, Miller, McKenna, and McKenna note that their studies "provide no solace for those who

[70] In her Education Next article Walsh (2002) lists a set of studies with sample sizes of up to 55 teachers as "too small to produce results that are reliable or that can be generalized to the larger population," (on-line version, p. 9). However, in her reply to me (Walsh and Podgursky, 2001, p. 14), she states that because Miller, McKenna, & McKenna's study was a matched pair study, a "gold standard of research," its small numbers (18 teachers for examining student achievement effects) are justified. Yet just pages earlier in the same document (p. 8), she and Podgursky criticize another matched pair study (Hawk, Coble, & Swanson, 1985) which has a larger sample (36 teachers) and stronger design for evaluating student achievement (Miller et al. drop most of their teachers and the matched comparison design when they evaluate student test scores) as lacking statistical controls (also missing in the Miller et al. study) and failing to adjust for pre-test scores of students (Miller, McKenna and McKenna do not even present the pre-test scores of students). The Hawk et al. study, which Walsh originally cited approvingly as an argument for content knowledge is now dismissed by Podgursky as "small and not well-controlled" to avoid having to acknowledge its results, which find positive effects of teacher certification on student achievement.

believe that anyone with a bachelor's degree can be placed in a classroom and expect to be equally successful as those having completed traditional education programs…. The three studies reported here support carefully constructed AC programs with extensive mentoring components, post-graduation training, regular in-service classes, and ongoing university supervision" (p. 174). This finding does not support Walsh's contentions throughout her paper that only general intelligence and subject matter knowledge make a difference for teacher effectiveness, or her claim that there is no support for teacher education and certification.

5. The other study on alternative certification cited favorably by Walsh (**Bradshaw & Hawk, 1996**) was not published as a peer-reviewed article or research report – one of Walsh's criteria for rejecting the results of other reports. It is actually not an empirical study but a literature review that, like other reviews Walsh criticizes, is based on a mixture of unpublished papers and on studies that, for the most part do not examine student achievement. Some of the papers cited do not include empirical evidence at all. Walsh characterizes the report's findings as providing "mixed, inconclusive" evidence. This is certainly true. Studies examining measures of knowledge, teacher beliefs and attitudes, teacher ratings, and student views report no differences on some measures and differences, typically favoring traditionally prepared teachers, on others, especially measures of professional knowledge and performance.

With respect to student achievement, Bradshaw and Hawk list five studies that examine outcomes for differently trained teachers. The first, an unpublished paper by Barnes, Salmon, and Wale (1989) does not present any empirical data or discussion of specific studies, but it includes a statement that two districts in Texas reportedly found equivalent outcomes for alternative and traditional program teachers. While it does not mention what programs might have been compared, it does include a table listing teacher education programs designated as alternatives. This list includes one- and two-year university-based master's programs (which are called "alternative" in Texas because they are not undergraduate models) along with district alternative programs that generally offer only a few weeks of summer training before teachers are assigned to classrooms. Thus, the "alternative" group included programs providing extensive graduate level training of the sort that many states would call 'traditional," along with programs that provide little formal preparation. Aside from the unanswered question of what analyses some unnamed parties might have been done to support this assertion, the wide range of program models included as "alternative" provides little opportunity to examine the effects of preparation on teacher effectiveness.

A second study, by Denton & Peters (1988) provides another example of the definitional problems associated with the terms "alternative" and "traditional". This paper actually studied two versions of a university's college-based teacher education program. The one called "alternative" in their paper was in fact an expansion of the regular teacher education program, rather than a reduction in coursework. Graduates of this more extensive curriculum had students who had stronger performance in earth and physical sciences, while scores in mathematics were stronger for students of the regular teacher education program

Of the remaining studies, two found that student achievement gains were higher for the students of traditionally prepared teachers in language arts (Gomez & Grobe, 1990, in a comparison with alternatively certified teachers) and mathematics (Hawk, Coble, & Swanson, 1985, in a comparison with uncertified mathematics teachers). The last (Stafford & Barrow, 1994) provided no empirical analysis or results, but mentioned a study that was said to have found differences associated primarily with teaching experience between the performance of alternative program teachers, other first-year teachers, and experienced teachers.

In combination, these studies do not provide any support for the statement that uncertified teachers are as effective as certified teachers. In addition to its other inaccuracies, Walsh's review confuses alternative certification – a strategy that provides candidates with preparation that is differently packaged from what various states deem "traditional" training (usually the difference is that training is post-baccalaureate rather than undergraduate and is streamlined into about a year rather than spread across four years of college) -- with lack of certification – which generally indicates a lack of preparation. Having already missed this critical distinction, Walsh does not begin to attempt to sort out the effects of the differences in preparation experiences and outcomes associated with different models of teacher education. Thus, she does not note that program designs that include a comprehensive and coherent program of coursework and intensive mentoring (e.g. Miller, McKenna, & McKenna, 1998) have been found to produce more positive evaluations of candidate performance than models that forego most of this coursework and supervised support.

For example, a comparative study of more than 200 alternative certification candidates in New Hampshire, who are certified via three years of on-the-job training in lieu of formal preparation, found they were rated by their principals significantly lower than university-prepared teachers on instructional skills and instructional planning, and they rated their own preparation significantly lower than did the university candidates (Jelmberg, 1995). To understand the outcomes of different approaches, studies of alternatives need to acknowledge the differences in program models.

Finally, Walsh cites two additional studies that include uncertified teachers, but she gets the findings wrong. Neither study shows that uncertified teachers do as well as certified teachers. One shows that the reverse is true.

6. In one study (Goldhaber & Brewer, 2000), the authors found that high school students who had a certified teacher in mathematics did significantly ***better***, after controlling for initial achievement and student demographic factors, than those who had uncertified teachers. The same trends were true in science, but the influences were somewhat smaller. In this sample, students of a small number of science teachers who held emergency or temporary certification (24 out of the 3,469 teachers in the overall sample) did no worse than the students of certified teachers, although they, too, did better than the students of uncertified teachers. Another analysis of these data (Darling-Hammond, Berry, & Thoreson, 2001) showed that in this sample most of the teachers on temporary / emergency certificates were experienced and most had education training comparable to that of the certified teachers. Most appeared to be already licensed

teachers from out-of-state who were in the transition period to securing a new state license or experienced teachers teaching out of their main field. Only a third were new entrants whose characteristics may have suggested a content background with little education training. The students of this sub-sample of teachers had lower achievement gains in an analysis of co-variance that controlled for pre-test scores, content degrees, and experience than those of the more experienced and traditionally trained teachers.

7. In addition, Walsh cites a recently released study of Teach for America (TFA) by Raymond et al. (2001). However, the study did not compare certified to uncertified teachers, as Walsh claims. Although they had the data to do so, the authors chose not to report how TFA teachers performed in comparison to trained or certified teachers. The study examined the influences of TFA teachers on student achievement scores, using regression methods that controlled for teacher experience and school demographics; thus, the comparison was between TFA recruits and other inexperienced teachers in high-minority schools in Houston -- where most underqualified teachers are placed. Since about 50% of Houston's new hires are uncertified and, according to this study, about 35% lacked a bachelors degree in the most recent year of the study (and these proportions are even higher in high-minority schools), TFA recruits were compared to an extraordinarily underprepared set of teachers. In this comparison, students of TFA teachers did about as well as those of other inexperienced, largely untrained teachers, many of them without bachelors degrees. Had the report compared TFA recruits to other BA holders and to prepared or certified teachers, based on the statistics shown, it is not clear that the results of these comparisons would be favorable to TFA. The Raymond report also indicated that minority students in Houston, who are disproportionately taught by these underprepared teachers, lose ground academically each year. In addition, fewer than 50% of African American and Latino 9th graders in Houston graduate from high school four years later (Haney, 2000; NCES, 2000). It would be hard to argue that the assignment of so many underprepared teachers to these students has nothing to do with these outcomes.

The report found that students of experienced teachers performed significantly better than students of inexperienced teachers, including TFA teachers. This, along with the report's finding that, over a three-year period, between 60% and 100% of TFA candidates had left after their second year of teaching, raises questions about Teach for America's contribution to the education of Houston students. Earlier data from the Maryland Department of Education showed that TFA recruits in Baltimore had similar attrition rates, with 62 % gone by the third year of teaching (Darling-Hammond, 2000a).

These high attrition rates resemble those found in some other studies of short-term alternative routes (Darling-Hammond, 2000a) and suggest another important outcome of teacher preparation policies. Both the Houston study and Walsh's own review indicate that experienced teachers are more effective than inexperienced teachers (Walsh, pp. 5-6). Other research indicates that those who complete 5-year teacher education programs enter and stay in teaching at much higher rates than 4-year teacher education graduates, who stay in teaching at higher rates than teachers hired through alternatives offering only short-term training (Andrew & Schwab, 1995; Darling-Hammond, 2000a), raising questions about the cost-effectiveness of a recruitment strategy that relies on teachers with little preparation who are likely to leave the profession before they can learn to become effective with children. Meanwhile, the children they have

taught – almost always the most disadvantaged students in the most disadvantaged schools – have not had the benefit a teacher with either professional knowledge or experience – two sources of greater teaching skill.

8. Finally, one of the studies misrepresented by Walsh (Hawk, Coble, & Swanson, 1985) found – in contradiction to Walsh's claims – that teachers' certification in mathematics has a large and statistically significant effect on student achievement gains in both general mathematics and, even more profoundly, in algebra. It compared pre- and post-test scores of students whose teachers who were certified in mathematics as compared to those of teachers with similar levels of experience who were uncertified in mathematics. This study is dismissed in one part of Walsh's review as too small (p. 34), so that its findings can be discounted with respect to certification. However, the size of the study does not appear to matter to Walsh when she chooses to cite it as a basis for arguing that only subject matter makes a difference to teaching effectiveness (p. 65). This double standard about the use of research permeates the report. A study is declared inadequate when it finds any contribution of teacher education or certification to any measure of teacher effectiveness but a study of comparable size or methodology – sometimes the same study – is used to support a different argument elsewhere.

While the study does have a small sample size of teachers (it examined 36 teachers, paired by school, course, and ability level of students being taught), it includes pre- and post-test data on a sample of more than 800 students. Furthermore, it is a well-controlled quasi-experimental design. The study does support the idea that subject matter knowledge matters to teaching. However, Walsh misrepresents the study as suggesting that <u>only</u> subject matter knowledge matters. The study did not directly examine the isolated effects of subject matter knowledge but the combined effects of subject matter knowledge and educational knowledge – including methods courses in the teaching of the content area – that are part of the certification requirements for an in-field credential. Authors Hawk, Coble, and Swanson concluded:

> The results of this study lend support to maintaining certification requirements as a mechanism to assure the public of qualified classroom teachers… " (p. 15).

As this and other studies reviewed here suggest, content knowledge in combination with content pedagogical knowledge – that is, knowledge about how to teach the content – which together constitute the major components of certification appear to make contributions to student learning that exceed the contributions of either component individually. An important policy point from this and other studies of certification is the fact that teachers would not have been guided or encouraged to acquire the content knowledge and content pedagogical knowledge represented by in-field certification unless there was a certification system encouraging them to do so.

Appendix B
Studies of Other States[71]

During the late 1980s and 1990s, Connecticut and North Carolina enacted some of the most ambitious teacher legislation of any states. Both of these states, which serve relatively large low-income and minority student populations,[72] coupled major statewide increases in teacher salaries and improvements in teacher salary equity with intensive recruitment efforts and initiatives to improve preservice teacher education, licensing, beginning teacher mentoring, and ongoing professional development. Since then, North Carolina has posted the largest student achievement gains in mathematics and reading of any state in the nation, now scoring well above the national average in 4th grade reading and mathematics, although it entered the 1990s near the bottom of the state rankings. The National Education Goals Panel also identified North Carolina as the state that has been most successful at closing the achievement gap between white and minority students during the 1990s (NEGP, 1999).

Connecticut also posted significant gains, becoming the highest achieving state in the nation, despite an increase in the proportion of low-income and limited English proficient students during that time. By 1998, Connecticut's 4th grade students ranked first in the nation in reading and mathematics on the National Assessment of Educational Progress, despite increased student poverty and language diversity in the state's public schools during that decade (NEGP, 1999). In addition, the proportion of Connecticut 8th graders scoring at or above proficient in reading was first in the nation; Connecticut was also the top performing state in writing, and the only one to perform significantly better than the U.S. average. A 1998 study linking the NAEP and the Third International Math and Science Study found that, in the world, only top-ranked Singapore would outscore Connecticut students in science (Baron, 1999). While there remains an achievement gap between white students and the large and growing minority student population in Connecticut, the more than 25% of Connecticut's students who are black or Hispanic substantially outperform their counterparts nationally as well (Baron, 1999).

North Carolina's reforms, launched with omnibus legislation in 1983, did many things simultaneously: (a) boosted salaries in the mid-1980s and again in the 1990s, (b) created a career development program that rewarded teachers for greater education and for achieving National Board Certification, (c) launched an aggressive fellowship program to recruit hundreds of able high school students into teacher preparation each year by entirely subsidizing their college education, (d) required schools of education to become professionally accredited by the National Council for the Accreditation of Teacher Education (NCATE), (e) increased licensing requirements for teachers and principals, (f) invested in improvements in teacher education curriculum, (g) created professional development academies and a North Carolina Center for the Advancement of Teaching, (h) developed teacher development networks like the National

[71] This appendix is drawn from Darling-Hammond, 2000(b) and Wilson, Darling-Hammond, & Berry (2001).
[72] In fall 1999, 30% of Connecticut's public school students were students of color (including the 12th largest enrollment of Hispanic students in the nation) and, in 2002, 36% attended Title I schools. In the same years, 38% of North Carolina's public school students were students of color (including the 8th largest enrollment of African American students), and 38% attended Title I schools (NCES, 2001, table 42; NAEP State Data, 2002, retrieved from http://nces.ed.gov/nationsreportcard/statedata.

Writing Project and an analogous set of professional development initiatives in mathematics, (i) launched a beginning teacher mentoring program, and (j) introduced the most wide-ranging set of incentives in the nation for teachers to pursue National Board certification. North Carolina now boasts more Board-certified teachers than any other state. The state was recognized in the recent National Education Goals Panel report (NEGP, 1998) for having made among the greatest gains in mentoring for beginning teachers as well as the greatest achievement gains for students.

These extensive investments in teaching occurred alongside sizable investments in early childhood education and general K-12 spending increases that lowered pupil/teacher ratios slightly. In the early 1990s, new curriculum standards were introduced and accompanied by an extensive program of professional development for teachers statewide. In 1993, the state enacted an assessment system linked to the curriculum standards and substantially aligned to the NAEP tests. A recent analysis of student achievement gains on the National Assessment of Educational Progress (Grissmer & Flanagan, 1998) noted the state's large-scale investments during the 1980s in early childhood education, reduced class sizes, teacher salary increases, teacher education upgrades, and extensive professional development.[73] North Carolina's 1997 Educational Excellence Act furthered efforts to upgrade the quality of teacher preparation and teaching quality, pouring hundreds of millions of dollars into a new set of reforms. The Act required that all colleges of education create professional development school partnerships to provide the sites for year-long student teaching practicums. It also funded a more intensive beginning teacher mentoring program, further upgraded licensing standards, created pay incentives for teachers who pursue master's degrees and National Board certification, and authorized funds to raise teacher salaries to the national average.

Connecticut's strategies were similar. The state's 1986 Educational Enhancement Act spent over $300 million to boost minimum beginning teacher salaries in an equalizing fashion that made it possible for low-wealth districts to compete in the market for qualified teachers. The Education Enhancement Act and its companion legislation:

- raised and equalized teacher salaries across districts (providing state salary aid to reach a target minimum for the salaries of fully certified teachers),

- increased licensing standards by requiring more teacher preparation at entry, including a major in the content area to be taught, the passage of basic skills and content tests, increased content pedagogical training, and preparation to teach reading and special needs learners,

- eliminated emergency licensing and toughened requirements for temporary licenses (granted only to trained teachers entering the state or changing fields),

[73] The study also attributed some of the NAEP score increase in North Carolina between 1990 and 1996 to the state's test-based accountability system. However, the new standards and assessments were not on-line until 1995, and the rewards and sanctions component of the accountability system was not enacted until 1997, so it could not have accounted for the trends through 1996.

- enacted scholarships and forgivable loans to attract high-ability candidates into teacher education at the graduate and undergraduate levels and to encourage candidates to teach in priority schools and shortage fields,

- facilitated entrance of well-trained teachers from out-of-state,

- created a staged licensing process that included a beginning teacher program with individual trained mentors for all new teachers and student teachers,

- required ongoing professional development, including a masters degree for a professional license and continuing education for license renewal,

- required districts to develop professional development plans, career incentive plans, and teacher evaluation systems, and then partially funded implementation of the plans, plus evaluation and dissemination of the most effective models.

Teacher salaries were raised in local negotiations through "teacher salary grants" that provided state aid to local school districts. The average teacher's salary increased from a 1986 average of $29,437 to a 1991 average of $47, 823. At the same time, the state raised licensing and preparation standards and eliminated emergency hiring so that it was hiring better qualified teachers. An analysis of the outcomes of this initiative found that it eliminated teacher shortages and emergency hiring, even in the cities, and created surpluses of teachers within three years of its passage (Connecticut State Department of Education, 1990). By 1990, nearly one-third of the new teachers hired had graduated from colleges rated "very selective" or better in Barron's Index of College Majors and 75% of them had undergraduate grade point averages of B or better (Connecticut State Board of Education, 1992, p. 3). Even as demand has increased in recent years, the pool of qualified applicants has remained impressive. A report for the National Education Goals Panel (Baron, 1999) found that in districts with sharply improved achievement, educators cited the high and steadily increasing quality of teachers and administrators as a critical reason for their gains and noted that "when there is a teaching opening in a Connecticut elementary school, there are often several hundred applicants" (p. 28). In another National Education Goals Panel (1998) report highlighting Connecticut's strong performance and large gains in mathematics, state officials pointed to the salary increases and teacher education investments as central to their progress.

The state has more recently invested in new curriculum frameworks and a statewide student testing system using performance assessments intended to measure higher order thinking and performance skills. Launched in 1995, this system, which is tied to statewide reporting of scores and substantial new professional development, is used to diagnose problems and improve curriculum and teacher development. However, in line with the Standards for Psychological Testing issued by the American Psychological Association and American Educational Research Association, the tests may not be used for holding students back or denying them diplomas, nor is it used to allocate rewards and sanctions to schools.

The Connecticut and North Carolina reforms both featured substantial investments in preservice and inservice education for teachers linked to standards that incorporate much of the

current knowledge base about teaching and learning. Both states sought to increase not only salaries and the quality of preparation for teachers, but also the consistency with which they enforced their standards, sharply reducing the hiring of unlicensed and under-prepared staff. In the long run, students benefited from these focused policy initiatives to improve the quality of their teachers.

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