Addressing California's Emerging Teacher Shortage:

An Analysis of Sources and Solutions

Linda Darling-Hammond, Roberta Furger, Patrick M. Shields, and Leib Sutcher

LEARNING POLICY INSTITUTE

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Executive Summary

After many years of teacher layoffs in California, school districts around the state are hiring again. With the influx of new K–12 funding, districts are looking to lower student-teacher ratios and reinstate classes and programs that were reduced or eliminated during the Great Recession. However, mounting evidence indicates that teacher supply has not kept pace with the increased demand. This report examines indicators of current shortages, discusses their impact on students, analyzes factors that influence teacher supply and demand in California and nationally, and recommends policies to ensure an adequate supply of fully prepared teachers for the fields and locations where they are needed.

Findings

Increased demand for K–12 teachers in California comes at a time when the supply of new teachers is at a 12-year low. Enrollment in educator preparation programs has dropped by more than 70 percent over the last decade, and has fallen below the number of estimated hires by school districts around the state. Many signs point to shortages:

- In mid-October, two months after the school year started, EdJoin, the statewide educator job portal, still listed more than 3,900 open teaching positions—double the number listed at that time in 2013.
- In 2014-15, provisional and short-term permits (issued to fill "immediate and acute" staffing needs when a fully credentialed teacher can't be found) nearly tripled from the number issued two years earlier, growing from about 850 to more than 2,400.
- In all, the number of teachers hired on substandard permits and credentials nearly doubled in the last two years, to more than 7,700, comprising a third of all the new credentials issued in 2014-15.
- Estimated teacher hires for the 2015-16 school year increased by 25 percent from the previous year, while preliminary credentials issued to fully prepared new teachers increased by less than 1 percent from the previous year, and enrollment in teacher education programs increased by only about 2 percent.

Although shortages are occurring across a range of subject areas, the problem is most acute in mathematics, science, and special education. Each of these high-need fields has been marked by a drop in the number of preliminary credentials issued to new teachers and a significant increase in the number of temporary permits, waivers, and intern credentials.

- In mathematics and science, the number of preliminary credentials awarded to new, fully prepared teachers dropped by 32 percent and 14 percent, respectively, over the last four years.
- In that same time, the numbers of underprepared mathematics and science teachers (those with temporary permits and waivers and intern credentials) have increased by 23 percent and 51 percent, respectively.

- In special education, the number of credentials issued dropped by 21 percent between 2011–12 and 2013–14, while substandard permits and credentials increased by 10 percent. Nearly half (48 percent) of the special education teachers licensed in California in 2013–14 lacked full preparation for teaching.
- To get a sense of the growing disparity between demand and supply, while districts estimated their hiring needs at roughly 4,500 special education teachers in 2014–15, only about 2,200 fully prepared new special education teachers emerged from California's universities in that year.
- As in previous years when California has experienced a shortage of qualified teachers, low-income students of color and students with special needs are disproportionately impacted by the shortage. According to California's educator equity plan, in 2013–14, nearly twice as many students in high-minority as in low-minority schools were being taught by a teacher on a waiver or permit (a teacher not yet even enrolled in a preparation program). Similar disparities existed between students in high- and low-poverty schools. In the 2000–01 school year, during the last round of acute shortages, 40,000 California teachers were working on emergency credentials, the vast majority of them in high-minority and high-poverty schools. At that time, one in four students in these schools was taught by an underprepared teacher in any given year, placing at greater risk the quality of education these students received.

Prognosis for the Future

Among the factors contributing to the increased demand for teachers, districts' efforts to return student-teacher ratios to pre-Recession levels is one of the most significant. California has the highest student-teacher ratio in the nation (24:1, as compared to the national average of 16:1 in 2013), and the disparity grew even greater during the extended period of budget cuts. For California to bring student-teacher ratios back to pre-Recession levels, districts would need to hire 60,000 new teachers beyond their other hiring needs. If California were to reduce student-teacher ratios to the national average, districts would have to hire 135,000 additional teachers.

Although enrollments are expected to be largely stable statewide, in some counties, enrollment growth will play a critical role in determining hiring needs. In 11 counties, enrollments are expected to grow by more than 5 percent in the coming decade; in Kern and Imperial counties, enrollments are expected to grow by more than 10 percent.

Attrition from retirement will also vary by district and county. With 34 percent of teachers statewide age 50 and older, and nearly 10 percent age 60 and older, retirements will continue to be a factor in many locations over the next five to 10 years.

Non-retirement attrition is an even larger factor, typically accounting for two-thirds of teachers who leave. Research shows that salary levels and other aspects of compensation matter (such as college debt levels and housing costs), as do working conditions, especially having a supportive administrator and a collegial work environment. Turnover for beginners—who leave at much higher rates than other teachers—is influenced by how well novices are prepared prior to entry and how well they are mentored in the first years on the job.

Each time a teacher leaves the profession, it not only increases demand, it also imposes costs on districts. Replacement costs for teachers have been found to be about $18,000 per teacher who leaves, which adds up to a national price tag of more than $7 billion a year. High turnover also negatively affects the achievement of all students in a school. A comprehensive approach to reducing attrition would reduce the demand for new teachers and save money that could be better spent on mentoring and other approaches to supporting teacher development and advancing student achievement.

On the supply side, overall desirability of teaching as a profession is the most important factor; others include ease of entry, competitiveness of salaries, and teaching conditions. Highly publicized teacher layoffs during the budget downturn left a mark on the public psyche, including that of individuals who might have been considering a teaching career. In addition, salaries were frozen and working conditions suffered during the era of cutbacks, as resource limitations led to increased class sizes, along with fewer materials and instructional supports. One sign of the impact is that only 5 percent of the students in a recent survey of college-bound students were interested in pursuing a career in education, a decrease of 16 percent between 2010 and 2014.

These factors suggest that California must take purposeful steps now if the state is to avoid more acute, widespread shortages of teachers. Earlier state policy initiatives were greatly reduced or terminated during the era of state budget cuts. Reinstating incentives for teacher recruitment and retention will be a critical component of a thoughtful strategy to address the emerging teacher shortage.

Policy Recommendations

Based upon this analysis and prior research, the authors offer the following policy recommendations for consideration:

1. **Reinstate the CalTeach program,** which helped recruit teachers from colleges, other careers, and other states; provided them information about how to become credentialed; and directed them to preparation programs and districts so that entry into the profession was made simpler and more supported.

2. **Create incentives to attract diverse, talented individuals to teach in high-need locations and fields** by funding candidates who prepare and teach in such schools and subject areas, as did two highly successful California programs: the Governor's Teaching Fellowship and the Assumption Program of Loans for Education (APLE).

3. **Create innovative pipelines into teaching,** such as high school career pathways and Grow-Your-Own teacher preparation models, which encourage and support young people and others to go into teaching in their own communities. These strategies are aligned with the research findings that many young people can be attracted to teaching early in life, and teachers prefer to teach near where they grew up and attended high school.

4. **Increase access to high-quality preparation programs that support teacher success in high-need districts and fields.** California needs new approaches to training and recruitment to solve shortages in communities and fields that have longstanding challenges with both adequate preparation and adequate supply. In particular, innovation is needed to develop new

model programs for training urban and rural teachers, such as teacher residencies and new models of special education preparation.

5. **Ensure that all beginning teachers have access to a high-quality support and mentoring program** that can reduce early attrition and enhance competence, such as is available through well-designed Beginning Teacher Support and Assessment (BTSA) programs.

6. **Provide incentives that support teachers' ability to stay in or re-enter the profession** through strategies like mortgage guarantees for housing, ease of credential renewal, streamlined reciprocity with other states, and opportunities to continue teaching and mentoring after retirement.

7. **Improve teaching conditions by supporting administrator training** that enables principals to create productive teaching and learning environments.

Addressing California's Emerging Teacher Shortage:

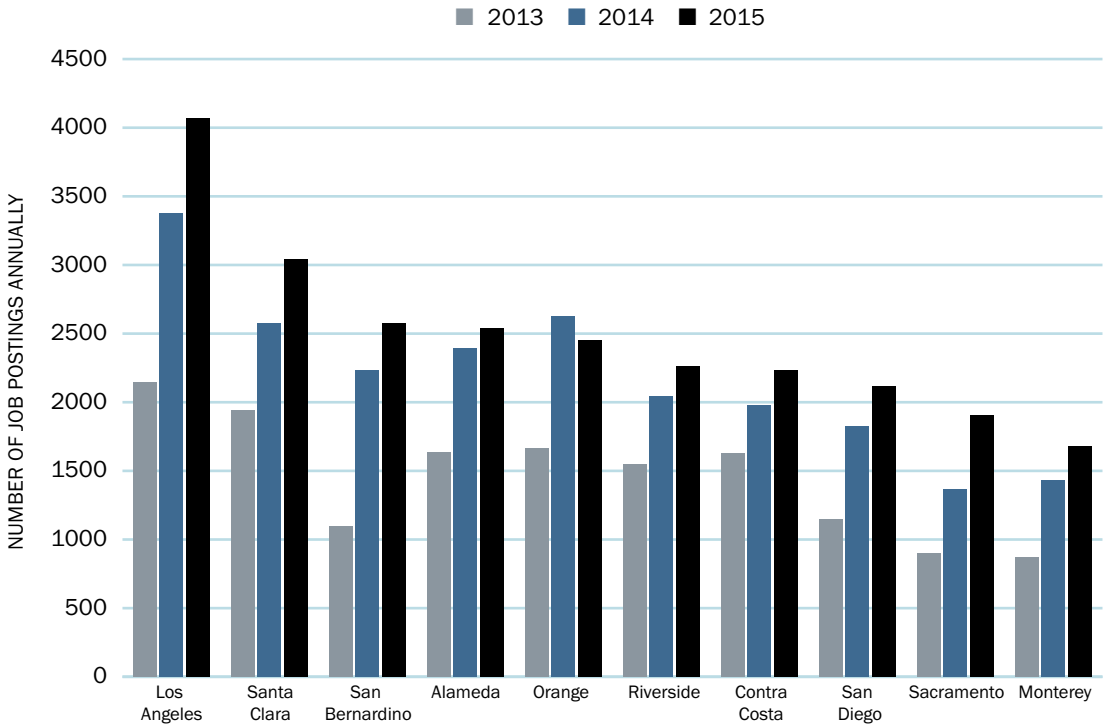
An Analysis of Sources and Solutions

Introduction

In September 2015, with just one week to go before the first day of school, the San Diego Unified School District still had nearly 60 teaching positions to fill.[1] District officials had already filled nearly 500 slots and were hoping an 11th-hour job fair and media push would produce the remaining teachers needed to begin the school year fully staffed. The district's last-minute push was a preview of potentially bigger hiring challenges ahead: One thousand teachers, or nearly one-sixth of the district's certificated staff, will be eligible for retirement at the end of the school year.[2]

San Diego was not alone. Around the state, districts found themselves scrambling throughout the summer and into September to find enough qualified candidates to fill open teaching positions. From the San Francisco Bay Area to the Central Coast and Inland Empire, annual back-to-school news stories were focused on a central question: Would there be a qualified teacher in every classroom on

Figure 1: **Demand for Teachers Is Growing**



Note: Numbers reflect open teaching positions advertised on EdJoin over 12-month period, beginning October 16 and ending October 15.

Source: EdJoin data on postings for 12-month period, provided to LPI.

the first day of school?[3] As we discovered in this study, the answer was "no." On the first day of classes and well into October, more and more districts were forced to hire teachers who are not fully prepared for the subjects, grade levels, or students they are assigned to teach.

In the first week of September, after most schools had already been open for two weeks, EdJoin, the statewide education job search portal, still listed 5,116 open teaching positions in school districts and county offices of education around the state.[4] These included most subject areas, with the greatest need for teachers in mathematics, science, and special education.[5] These positions appear increasingly difficult to fill. By mid-October, the EdJoin site still advertised 3,910 listings for classroom teachers, more than double the number posted at the same time in 2013. As Figure 1 shows, among the largest counties, the growth rate in demand for teachers appeared highest in the southern end of the state (e.g., Los Angeles, San Bernardino, San Diego), but northern counties also posted significantly more vacancies than in recent history. (For all counties, see Appendix A.)

News reports and job postings are just a few of the indications that teacher supply has not kept pace with current demand. After steady reductions in the number of underprepared teachers in California schools, the trend has reversed. A sharp uptick in the number of temporary permits, waivers, and intern credentials issued by the California Commission on Teacher Credentialing (CTC) means that more students are being taught by individuals who have not completed, or sometimes even begun, their preparation for teaching.

Box 1: **Teacher Preparation and Credentialing: Understanding the Terms**

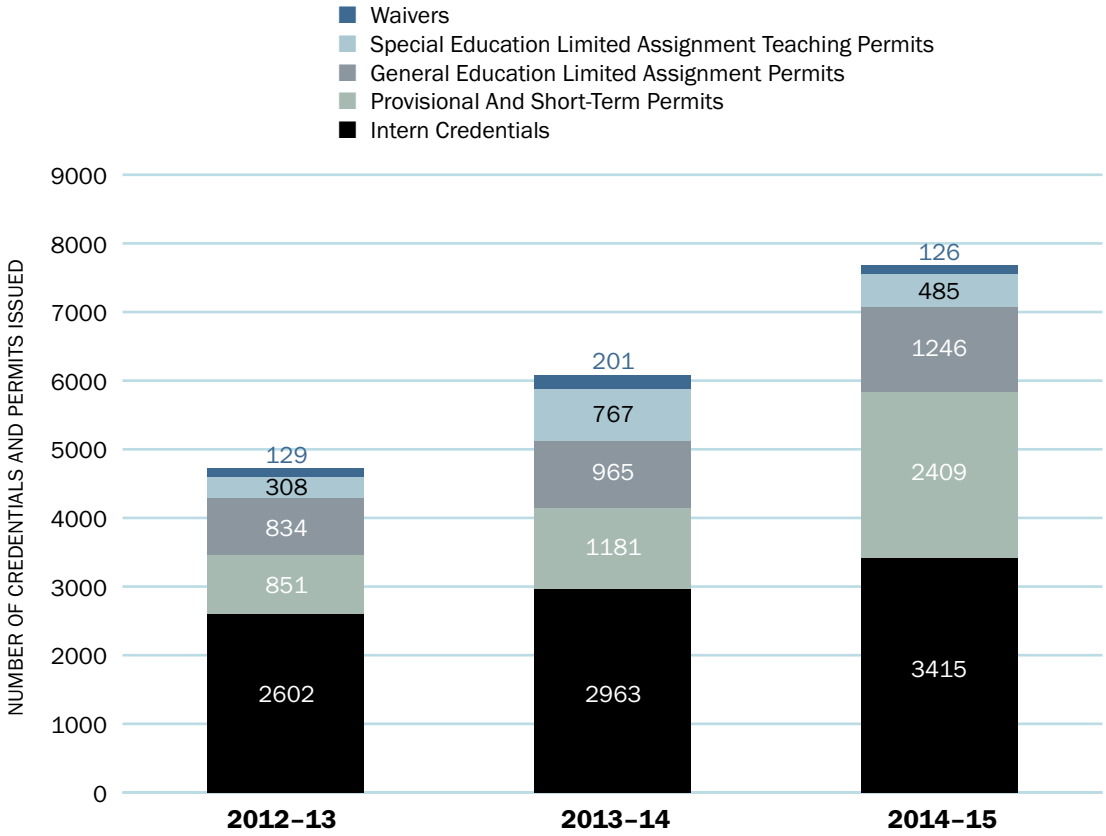
Term	Credential Types	Definition
Fully Prepared Teachers	Preliminary Credential	Awarded to individuals who have successfully completed a teacher preparation program and the state assessments required for a license; preliminary credentials are valid for five years.
	Clear Credential	Awarded to preliminary credential holders once they have successfully completed an induction program; clear credentials are renewable every five years.
Underprepared Teachers	Provisional Intern Permits, Short Term Staff Permits and Waivers	Used to fill "immediate and acute" staffing needs, these one-year permits allow individuals who lack the appropriate training or subject-matter competency to teach a particular grade or course for a maximum of one year.
	Limited Assignment Teaching Permits	These authorizations allow credentialed teachers to teach outside of their subject area, to fill a "staffing vacancy or need."
	Intern Credentials	Awarded to teachers-in-training who have an undergraduate degree and subject-matter competency but have not completed preparation or met the performance assessments for a license. Interns take courses and receive mentoring while teaching.

Source: California Commission on Teacher Credentialing, CTC Glossary: http://cig.ctc.ca.gov/cig/CIG_glossary/all.php. See also http://www.ctc.ca.gov/credentials/leaflets/cl858.pdf; http://www.ctc.ca.gov/credentials/leaflets/cl856.pdf; http://www.ctc.ca.gov/credentials/leaflets/cl402a.pdf.

In 2014–15, for example, provisional and short-term permits (issued to fill "immediate and acute" staffing needs when a fully credentialed teacher can't be found) nearly tripled from the number issued two years earlier, growing from about 850 to more than 2,400. (See Figure 2.) Limited assignment permits for teachers asked to teach outside their area of training also grew, as did

internship credentials issued to teachers taking classes while they are still in training. These kinds of permits and credentials are signs of shortages, as they are not to be granted when fully prepared teachers are available. Overall, these substandard credentials and permits grew from approximately 4,700 in 2012–13 to nearly 7,700 in 2014–15, an increase of 63 percent, comprising more than one-third of all new credentials issued. Meanwhile, the number of credentials issued to fully prepared new teachers increased by less than 1 percent, after a large, decade-long decline. (See Figure 6 and Appendix B.)

Figure 2: **Substandard Permits and Credentials Are Increasing, 2012-13 to 2014-15**



Note: Number of credentials issued between July 1st of each year and June 30 of the following year. (See Appendix B.)

Source: Data provided by the California Commission on Teacher Credentialing through a special request.

These trends in California are occurring as teacher shortages are emerging across the country, with increased demand confronting declining numbers of teaching entrants. Nationally, there has been a 40 percent decrease over the past 30 years in education degrees. This decline is contributing to thousands of emergency teachers being hired in a number of states.[6] Like California, other states find that shortages of mathematics, science, and special education teachers are among the most pronounced. Some of these states are recruiting heavily in California, seeking to lure candidates

to their districts with recruiting bonuses and the promise of lower housing costs. This adds to California's challenges in developing an adequate pipeline of teachers to meet statewide needs.

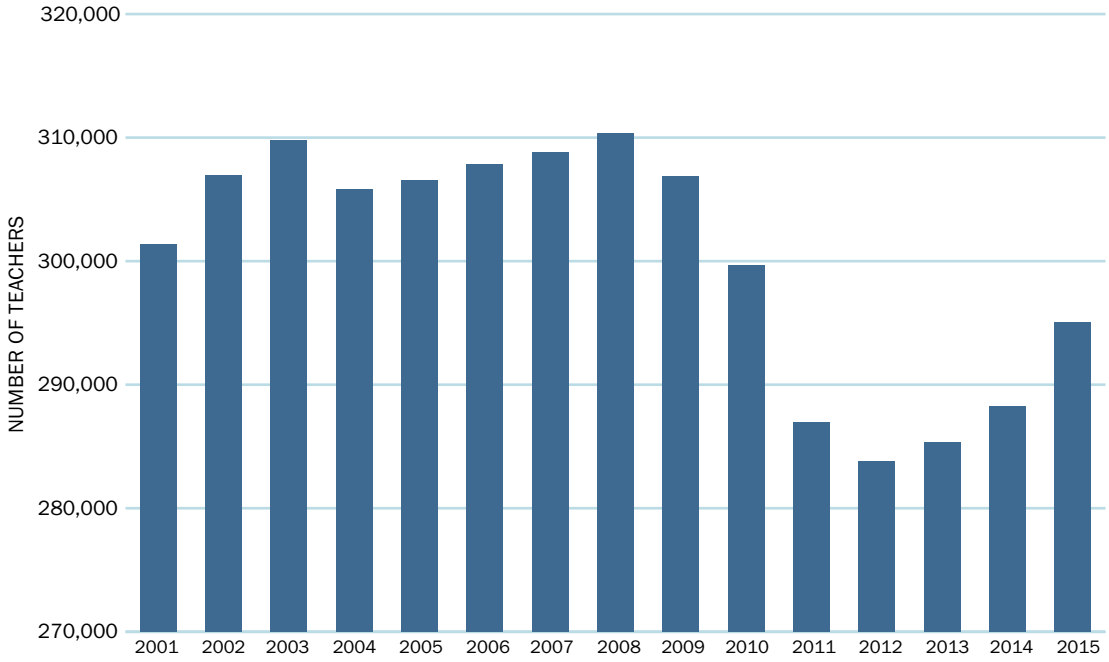
Fifteen years ago, in an earlier era of shortages, California had more than 40,000 teachers working on emergency permits or temporary credentials, most of them in schools serving low-income students of color.[7] Is another such crisis looming? To answer this critical question, we examined data on teacher supply and demand to assess current and future trends and to better understand how the state might respond, so it can avoid repeating a history in which the most vulnerable students often encountered underprepared teachers and short-term substitutes year after year.

From Layoffs to Shortages

Increasing Teacher Demand

Over the past few decades, California's teaching workforce has expanded and receded with the economic tides. Throughout the 1990s and early 2000s, the number of teachers working in public schools grew dramatically, due to an increase in the number of school-age children and the implementation of a major initiative to reduce class size, made possible by the increased state revenue from the dot-com boom.[8] Through the mid-2000s, as revenues and state spending began to decline, the number of teachers grew more slowly, reaching a peak of 310,361 in 2007–08.[9] (See Figure 3.)

Figure 3: **The Teacher Workforce Is Expanding Again**



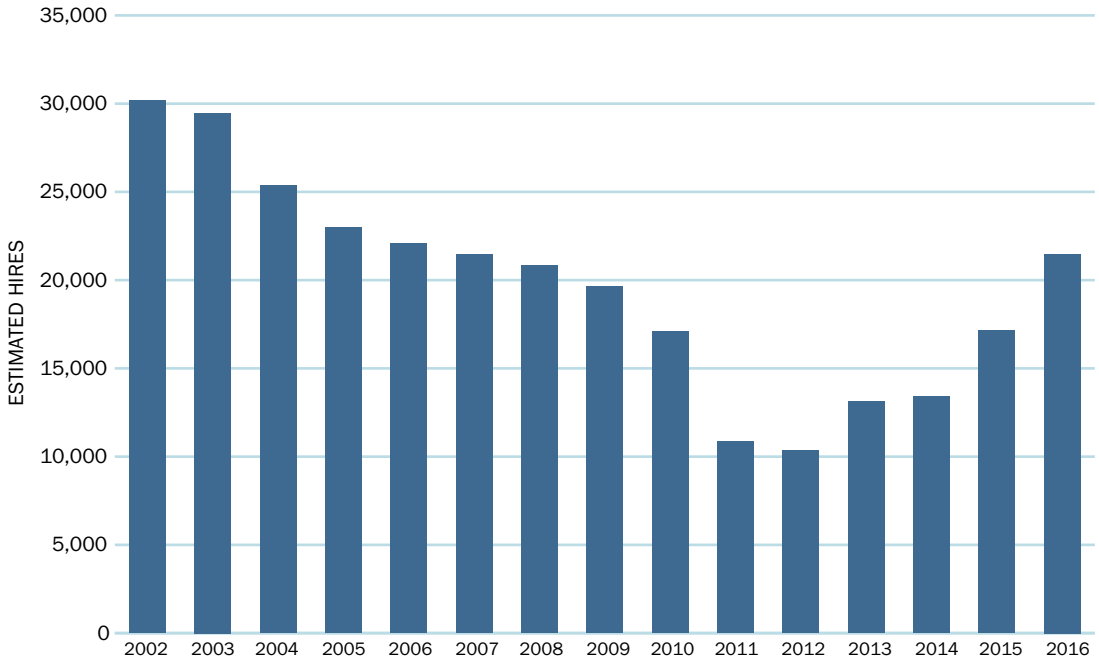
Number of California public school teachers, 2000-01 to 2014-15

Source: California Department of Education 2001-2015. Data available at http://data1.cde.ca.gov/dataquest/.

But with the collapse of the economy in late 2007 came an extended period of budget deficits and spending cuts, which took their toll on school funding and, by extension, the teacher workforce. Over the next five years, school districts saw their per-pupil funding drop by a total of $1,846 in inflation-adjusted dollars—a decrease of 20 percent.[10] Instead of advertising hiring fairs, districts were issuing layoff notices. By March 2012, after five years of budget cuts, class sizes had grown, many programs and services had been eliminated, and the teaching workforce in California had shrunk by 26,525 positions, or nearly 9 percent,[11] through a combination of layoffs and attrition.[12]

The tide began to turn once again in 2013, due to an upturn in the economy and passage of Proposition 30 in November 2012, which created new revenue for state programs and services, including schools.[13] By 2015–16, general fund dollars allocated to K–12 schools had increased by $9.8 billion in inflation-adjusted dollars over 2012–13 funding—an increase of 24 percent.[14] In addition to statewide increases in per pupil spending, schools serving high percentages of low-income students, English language learners, and foster youth now receive additional resources as a result of the passage of the Local Control Funding Formula in 2013, which provides an additional weighting for those students in funding calculations.

Figure 4: **District Hiring Is on the Rise**



Estimated new hires in California, 2001-02 to 2015-16

Source: California Department of Education 2002-2016. Data available at http://data1.cde.ca.gov/dataquest/.

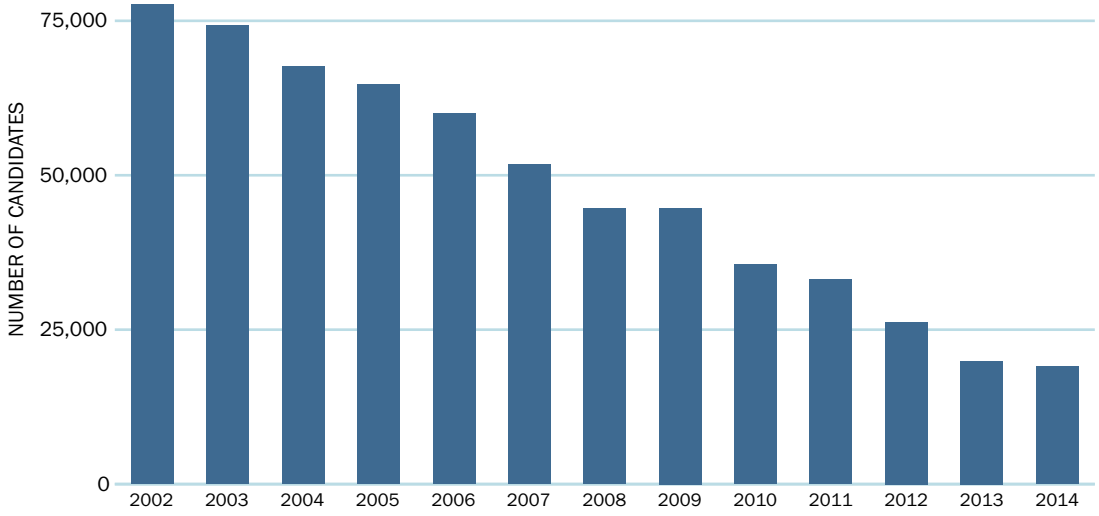
An increased demand for teachers has come in the wake of these new resources. After a decade of year-to-year reductions in district hiring (most dramatically between 2009–10 and 2010–11),[15] the trend has shifted. In 2014–15, districts projected they would hire 17,149 teachers statewide, a nearly 28 percent increase from the prior year's projections.[16] District projections for anticipated new hires increased to nearly 21,500 for 2015–16, another 25 percent increase from the previous year. (See Figure 4.)[17]

Local school officials cite several reasons for the recent dramatic increase in demand. The infusion of much-needed resources has enabled districts to act on the pent-up demand for teachers that grew during the cutbacks. Around the state, districts are beginning to reduce class sizes back to pre-Recession levels and are reinstating or expanding programs that were cut in lean economic times.[18] Some districts are also experiencing attrition as the first wave of baby boomers retire, along with others who are taking advantage of early retirement packages that districts began offering during the Recession to reduce overall personnel costs.

Decreasing Teacher Supply

Taken together, these factors have resulted in sharply increasing demand at the very time when the supply of newly prepared teachers is at a 12-year low. As Figure 5 shows, enrollments in California's teacher preparation programs declined by 76 percent from 2001 to 2014. Meanwhile, as Figure 6 illustrates, the number of preliminary teaching credentials issued to California-prepared individuals decreased by 58 percent from 2003 to 2015. Starting in 2012-13, new credentials actually dropped below the number of district-projected hires. If these trends continue, the deficit between

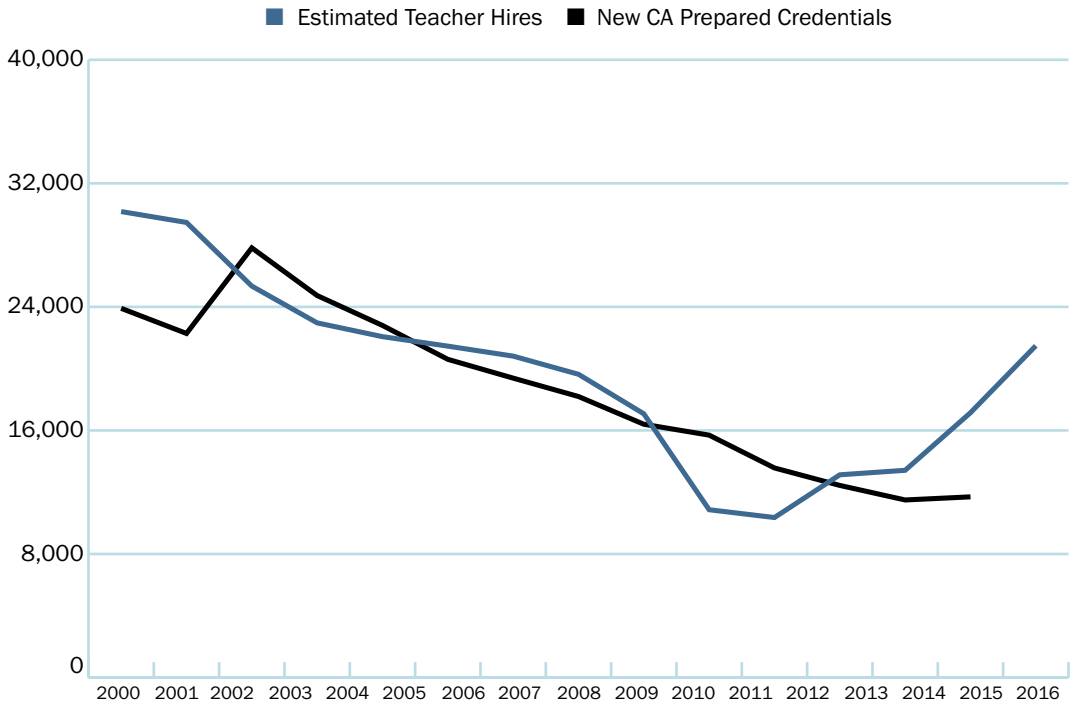
Figure 5: **Enrollment in Teacher Preparation Programs Has Declined**



Number of candidates enrolled in California teacher preparation programs, 2001-02 to 2013-14

Source: California Commission on Teacher Credentialing, 2002-2014. Teacher Supply in California: A Report to the Legislature. *Data available at http://www.ctc.ca.gov/reports/all-reports.html; 2014 Title II State Program Information. Data available at https://title2.ed.gov/Public/Report/StateHome.aspx.*

Figure 6: **Teacher Demand Is Outpacing Supply**



Number of preliminary new teaching credentials issued and district-estimated new hires, 1999-2000 to 2015-16

Note: Estimated teacher hires are reported annually by each California school district for the upcoming school year. New credentials are preliminary credentials issued to California-prepared teachers. 2014-15 credential data are preliminary.

Source: Estimated hires data are from California Department of Education DataQuest Web Page, at http://data1.cde.ca.gov/dataquest/. New credentials data were provided from the California Commission on Teacher Credentialing upon request.

the number of teachers being prepared in California and the number of teachers needed in public schools will grow even larger. According to the CTC's 2013-14 teacher supply report, there are approximately 3,000 additional teaching credentials issued each year to individuals prepared out of state. Even factoring in out-of-state credentials, however, estimated hires still outpaced total new teaching credentials in 2014-15.

The number of new credentials can actually overestimate the number of new teachers, since many teacher trainees earn more than one credential as they enter the profession (for example, in several discrete science areas, in English and English Language Development, or in general education along with special education). In addition, not all of those who receive credentials enter the classroom the following year. On the other hand, some veteran teachers re-enter the profession, typically comprising about 35 percent of those hired across the nation in a given year.[19]

After a 10-year decline in the annual number of preliminary credentials awarded in California (based on completion of a teacher preparation program and passage of state assessments), there was a very small increase (less than 1 percent) in 2014–15. This expanded the pipeline of fully prepared entrants by fewer than 100 additional candidates, while the number of substandard permits and credentials went up by more than 1,500 in the same period of time.[20]

There are signs that enrollment trends are also beginning to shift modestly.[21] Preliminary data from the California State University (CSU) and University of California (UC) systems show a small, 3.8 percent increase in enrollment across the two systems from 2013–14 to 2014–15. Historically, the UC/CSU system has been responsible for preparing 50–60 percent of newly credentialed teachers each year.[22] An informal survey of some independent California colleges and universities also shows small increases in program enrollment among a number of the respondents.[23]

Table 1: **Teacher Preparation Enrollments in the State University System**

Institution Type	2011-12	2012-13	2013-14	2014-15
University of California	1,055	788	726	883
California State University	9,496	8,052	8,642	8,837
Total	10,551	9,840	9,368	9,720

Source: Data from the CSU Office of the Chancellor and the UC Office of the President.

These modest increases, however, have not been enough to keep up with the increased demand. In addition to the fact that the overall numbers of new teachers are insufficient, new teaching candidates are not necessarily choosing the fields and subject areas in which there are large numbers of vacancies, or choosing to teach in the regions where the shortages are most pronounced. Most of the small increase occurred in multiple subject credentials, an area in which most districts have not noted shortages.

Although there have been large shortages of special education teachers for many years, and it is the area in which districts are hiring the highest number and proportion of teachers (see Table 2), new candidates do not appear to be flocking to fill those vacancies. In fact, there was a decline from 2013–14 to 2014–15 in the numbers of candidates receiving preliminary or internship credentials in this field. (See Appendix B.) The fact that demand for new special education teachers amounted to 27 percent of the current number of such positions suggests a high attrition rate in that field, augmenting more modest growth in the number of slots. As we discuss below, other high-demand fields like mathematics and science also show ongoing decline in the number of fully prepared new teachers.

As this example suggests, looking at state-level indicators of supply and demand is just a first step. It is equally important to understand imbalances in specific subjects or locations. The multilayered nature of the teacher labor market requires policies both to ensure that there are enough teachers to go around and to direct people to the regions and fields where they are most needed.

Table 2: **Top Hiring Areas, 2013-14 School Year**

Subject Area	Number of Full-Time Equivalent (FTE) Teachers	Percent of FTE Teachers in the Field
Special Education, including State Special Schools	4,540.3	26.9%
Mathematics/Computer Education	2,214.6	10.4%
Science	2,016.9	12.7%
English/Drama/Humanities	2,024.2	8.5%
PE/Health/Dance	903.2	7.4%
History/Social Science	1,184.9	7.1%
Other Specializations	967.9	6.8%
Totals	13,858.3	5.34%

Source: California Department of Education, district hiring estimates data.

The Impact of Shortages on Students

Shortages of teachers can result in larger class sizes, cancellation of courses, or the assignment of underprepared or out-of-field teachers. Shortages are also often addressed through the assignment of substitute teachers who are not required to meet standard qualifications and who, by California law, must be replaced after 30 days—often by another substitute teacher. All of these strategies undermine students' access to quality instruction.

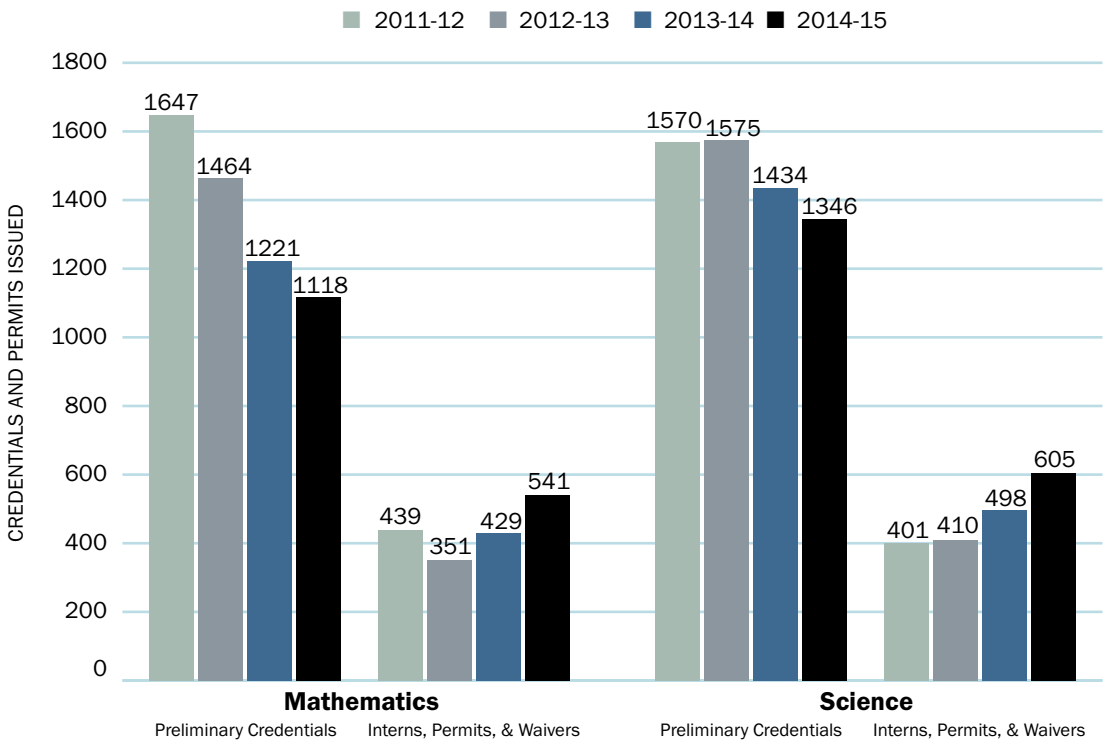
In particular, the assignment of teachers who have not undergone preparation and substitute teachers who come and go has been found to harm student achievement.[24] The numbers of these underprepared and out-of-field teachers reached 6,000 teachers in 2013–14 and about 7,700 in 2014–15, an increase of 26 percent in just one year. (See Figure 2 and Appendix B.)

Shortages of teachers can result in larger class sizes, cancellation of courses, or the assignment of underprepared or out-of-field teachers.

Year after year, mathematics, science, and special education appear on California's list of projected teacher shortage areas, which the CTC reports annually to the U.S. Department of Education. In all of these areas, the number of fully credentialed new teachers has been declining sharply in recent years, while the number of teachers on waivers, temporary permits, and intern credentials has increased. (See Figures 7 and 8.)

The shortages of mathematics and science teachers are a concern as the state seeks to implement new, more demanding standards in both subject areas, requiring teachers who deeply understand their content and how to teach it in ways that develop higher-order thinking and performance skills.

Figure 7: **Trends in Mathematics and Science Teacher Supply**



Credentials and permits issued, 2011-12 to 2014-15

Source: California Commission on Teacher Credentialing.

And, as we discuss more fully in a later section, if all students are to have an equitable chance to meet the new standards, the capacity of specialist teachers to support the needs of students with disabilities will be critical.

There is evidence that the list of impacted fields is expanding. California's most recent reporting of projected shortage areas (for the 2015–16 school year) also includes English/drama/humanities, computer education, physical education/health/and dance, and history/social science.[25]

The Effect of Shortages on Equitable Student Access

Historically, California has filled positions during times of shortages by reducing standards for teaching, and the least well-prepared teachers have been disproportionately placed in the schools serving the highest-need students. Students in high-poverty and high-minority schools have borne the brunt of shortages, as have English learners and students with special education needs.

During the 2000–01 school year, when the *Williams v. California* lawsuit was brought to challenge unequal access to basic educational resources, underprepared teachers constituted 15 percent of the entire teacher workforce in the state, and nearly half of beginning teachers were entering without having yet completed their preparation.[26] Whereas underprepared teachers represented 7 percent

of all teachers in low-poverty schools, they were 22 percent in high-poverty schools.[27] Similarly, in high-minority schools, more than one in four teachers were underprepared, compared with only 5 percent among the schools with fewer than 30 percent students of color.[28]

The overall situation improved with a slowdown in hiring, coupled with federal requirements for highly qualified teachers under the No Child Left Behind Act; however, the disproportionalities have continued. In a study using data from 2008–09, the proportion of uncredentialed teachers in high-minority schools was found to be more than twice that in low-minority schools.[29]

The proportion of uncredentialed teachers in high-minority schools was found to be more than twice that in low-minority schools.

And in the California educator equity plan recently filed with the federal government,[30] the proportion of students in 2013–14 being taught by a teacher on a waiver or permit (a teacher not yet even enrolled in a preparation program) was twice as large for those in high-minority schools as it was for those in low-minority schools.[31] Similar disparities existed between students in high- and low-poverty schools.

Although the percentages of underqualified teachers are currently smaller than they once were, they represent a concerning trend, given our state's history of allowing underprepared teachers to be assigned disproportionately to the highest-need students and schools.

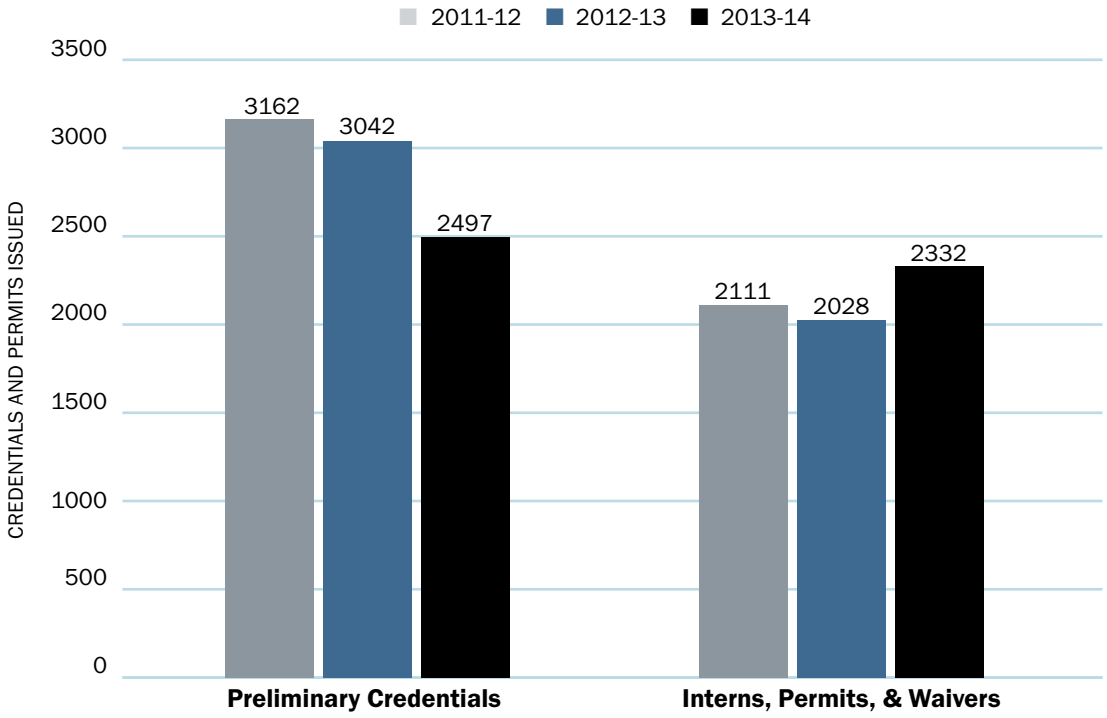
The Special Case of Special Education

Recruiting and retaining special education teachers has long presented a particularly vexing challenge for California schools and districts. Responding to perennial shortages, the state altered the special education credential requirements in 1996, removing the requirement that special education training be added on top of the preparation required to earn a general education credential. Unfortunately, this change has both failed to solve California's special education teacher supply problem *and* has resulted in a less prepared cadre of special education teachers, who lack knowledge of the range of learning approaches and repertoire of teaching strategies that most teachers possess.

It has also meant that many educational specialists are not authorized to teach general education students, reducing the opportunities for inclusive educational practices such as Response to Intervention (RTI) and Multi-Tiered Support Systems (MTSS) that often produce stronger outcomes for students. As a result of this credentialing strategy, California special-needs students are less likely than those in most other states to be in mainstreamed educational settings.

Even with the reduced level of expectations for the credential, nearly half (48 percent) of the new special education teachers California produced in 2013-14 entered teaching on substandard credentials or permits. (See Figure 8.) This likely contributes to the troubling outcomes for the state's special education students. According to a 2015 report from a Statewide Task Force on Special Education, California students with disabilities achieve at significantly lower levels, graduate from high school at lower rates, and have fewer employment opportunities and decreased lifetime earnings compared to their peers without disabilities. The report noted, "Instead of opening a door to a brighter future, special education for many students is a dead end. Once identified as needing special services, particularly for learning disabilities, students rarely catch up to their peers."[32]

Figure 8: **Trends in Special Education Teacher Supply**



Credentials and permits issued, 2011-12 to 2013-14

Source: California Commission on Teacher Credentialing.

According to the CTC's 2013–14 Teacher Supply Report, new credentials issued for special education were down in every category: Institutions of higher education saw a reduction in credentials of nearly 19 percent from the previous year; credentials issued through district intern programs were down 8.4 percent; and out-of-state credentials, which are generally increasing as a percentage of all credentials issued, were down 2.4 percent.[33]

In 2014-15, when districts were seeking to hire more than 4,500 special education teachers, there were only about 2,200 fully prepared new teachers receiving credentials in California. (See Appendix B.) According to the CTC's 2013-14 teacher supply report, another 500 licensed teachers entered from out of state.

To understand the impact of these shortfalls, one need look no further than the increase in short-term permits and waivers being issued. Special Education Limited Assignment Teaching Permits, issued to teachers from other fields taking on these responsibilities, went up nearly 149 percent from 2012–13 to 2013–14. Waivers were up 56 percent; two-thirds of these were for teachers who lacked the authorization required to teach students with autism spectrum disorders.[34] (See Appendix B.) In every category of permits issued to underprepared teachers, special education teachers were among the largest group of recipients.[35]

A Longer-Term Look at Supply and Demand

What does the future hold? In the labor market for teachers, many factors affect both the demand for new teachers and the supply of candidates for teaching positions. The interaction of these demand and supply factors will determine whether California can ensure that all of the state's students are taught by well-prepared teachers.

The demand for new teachers depends mainly on the number of students enrolled in the state's schools, on policies governing class sizes and student-teacher ratios, and on how many teachers choose to leave the profession, including both those who retire and those who leave for other reasons.[36] The supply of candidates for teaching positions depends mainly on the number of new teachers who complete teacher preparation programs within the state, but also on the re-entry of teachers who have left the classroom and on the recruitment of new and experienced teachers from other states.

Many of these factors are influenced by state and local policies that determine the attractiveness of teaching as a profession, including salaries, teaching conditions, and incentives for entry into and continuation in the profession. These may vary widely across districts and schools with different levels of resources, types of policies, and student populations. Other public policies, including the structure of retirement systems, can make a difference at the margins.

Factors Influencing Demand

As districts develop their annual hiring projections, key considerations include student population growth, class size, program expansion or contraction (such as adding or eliminating courses or areas of study), and the number of expected retirements, along with other kinds of teacher attrition, ranging from medical leave and family moves to departures for other districts, states, or out of the profession entirely. We take up each of these factors in turn.

Enrollment

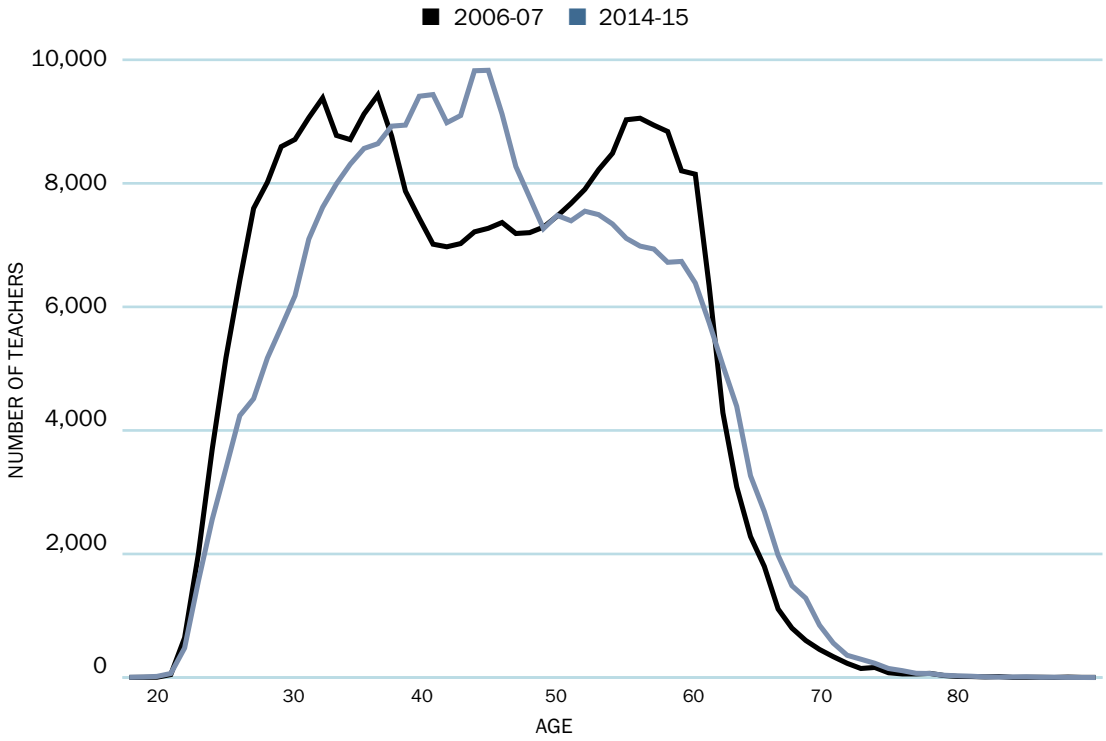
Demographers project that California's student enrollment will be relatively stable over the next decade if birthrates, immigration, and migration do not shift unexpectedly.[37] However, projections vary considerably by region. Throughout the state, 11 counties are projected to have an increase in enrollment of at least 5 percent by 2023–24, while four counties may see declines of at least 5 percent. Kern and Imperial counties are growing at the fastest rates, with projected enrollment increases of approximately 12 percent and 11 percent, respectively, by 2023.[38]

Student-Teacher Ratios

One of the strongest current drivers of growing teacher demand is the effort to return class sizes and teacher loads to more manageable levels. California's pupil-teacher ratios have been the largest in the country for many years. While the national pupil-teacher ratio averaged 16:1 in 2013, California's led the nation at 24:1, fully 50 percent higher than the national norm.[39] Class sizes are always larger than pupil-teacher ratios. During the Recession, many districts increased class sizes to 30 or more in elementary schools and 40 in some high schools.

With new resources, districts are seeking to increase the number of teachers.[40] One reasonable assumption is that pupil-teacher ratios might stabilize when they reach pre-Recession levels—

Figure 9: **California Nears the End of Retirement Surge**



California public school teacher age distribution, 2006-07 and 2014-15

Source: California Department of Education data, provided in response to a special request.

a very substantial increase from current levels. In 2014, to return to pre-Recession ratios of 19.8 students per teacher, California districts would have needed to hire 60,000 teachers—more than three times the number actually hired. If California wanted to reduce pupil-teacher ratios to the national average of 16:1, districts would need to hire 135,000 teachers. Relative to the total teaching workforce in California, these numbers are substantial, representing 20 percent and 46 percent of total teachers in the state, respectively.[41] In either case, it is reasonable to expect that efforts to reduce pupil-teacher ratios will continue for a number of years to come.

Retirements

Teacher attrition is another important variable. Nationally, teacher retirements have accounted for approximately one-third of attrition in recent years.[42] At various times, retirements have been a significant force in boosting demand in California, but it appears that the most recent retirement wave has passed its peak. As Figure 9 shows, a sizeable number of teachers were age 50 to 59 in 2007, many of them eligible for retirement. By 2014–15 that peak had flattened considerably. The numbers of teachers retiring annually dropped by about 30 percent in recent years, from 15,493 in 2009–10 to 10,736 in 2013–14.[43]

Table 3: **Age Distribution of the California Teacher Workforce**

Age	2006-07	2008-09	2010-11	2012-13	2014-15
Under 30	42,214	40,823	28,082	24,372	27,679
	13.7%	13.3%	9.8%	8.5%	9.4%
30 to 39	87,269	89,535	84,605	82,071	81,679
	28.3%	29.2%	29.5%	28.8%	27.6%
40 to 49	72,018	73,020	76,185	80,790	87,082
	23.3%	23.8%	26.5%	28.3%	29.4%
50 to 59	84,501	78,368	73,205	70,778	70,652
	27.4%	25.5%	25.5%	24.8%	23.9%
60 and older	22,009	24,357	24,854	27,294	28,706
	7.1%	7.9%	8.7%	9.6%	9.7%
Total	308,790	306,887	286,969	285,308	295,800

Number and percentage of teachers by age groupings, 2006-2007 to 2014-2015

Source: California Department of Education data, provided in response to a special request.

However, more teachers are working further into their 60s, which complicates the near-term retirement picture. As Table 3 indicates, more than one-third of California teachers are age 50 or older, and nearly one in 10 California teachers is age 60 or older, a 37 percent increase in this older cohort from 2006–07. These teachers who are 60 and older can be expected to retire in the next few years, which will cause a noticeable uptick in attrition rates, at least in the short-term. So, while the era of huge retirement numbers has passed, the state is not completely out of the woods.[44]

Of course, rates of retirement will vary across districts, depending both on local teacher demographics and district policies, such as the early retirement programs that were enacted during the Recession to encourage older, more expensive teachers to leave—some of which are still in place.

Non-Retirement Attrition

Teachers who leave for reasons other than retirement constitute the largest component of teacher attrition and the most important for projecting demand. Indeed, some experts argue that much of the nation's hiring challenge would be best addressed by stopping the revolving door of teachers.[45]

In some high-achieving countries, where teaching is considered a lifelong profession, annual attrition rates are only about 2 percent of the teaching force.[46] However, attrition in the United States has tended to be much higher. After decades of a nationwide 6 percent attrition rate, annual attrition increased over the last decade to between 7.7 percent and 8.4 percent.[47] With California's teacher workforce of 295,025 in 2014–15, an 8 percent attrition rate would indicate a loss of more than 23,000 teachers annually, nearly twice the number currently graduating from the state's teacher preparation programs.[48] These numbers are the best estimates we currently have for California, as state-specific studies have not been conducted in recent years.

Attrition rates are much higher for newcomers to teaching. National estimates have suggested that new teachers leave at rates of somewhere between 17 percent and 30 percent over their first five

years of teaching.[49] In line with these data, a 2006 study by the Public Policy Institute of California found that 26 percent of the state's teachers had left the profession by their fifth year of teaching.[50] Most studies find that attrition rates are highest in high-poverty schools and districts.[51]

Summary

To ensure that all classrooms are staffed by fully prepared teachers, it is crucial to understand all of the factors affecting demand: student enrollment, class size, and teacher attrition. Although student enrollment is predicted to remain stable statewide, tens of thousands of teachers are needed to return class sizes to pre-Recession levels. Additionally, about 10 percent of the state's teaching workforce is 60 or older (and about one-third is 50 or older), so demand will increase as districts need to replace retiring teachers. Non-retirement attrition, which is about two-thirds of total attrition, is the area where policy can potentially make the most difference, as teachers' decisions to stay or leave the profession can often be influenced by decisions at the state and local levels about salaries, working conditions, preparation, and supports. (Discussed further below.) Based on the evidence available, California will remain at elevated levels of teacher demand for the foreseeable future.

Based on the evidence available, California will remain at elevated levels of teacher demand for the foreseeable future.

Factors Influencing Supply

A critical factor in California is that the supply of new teachers has declined at a precipitous rate. Understanding the factors that have contributed to this sharp decline is critical if policy makers are to craft an effective response. Researchers and practitioners point to the large number of Recession-era layoffs as a major cause of the much-diminished interest in the teaching profession, noting that young people were discouraged from entering a field in which there were few jobs and little job security. As the San Diego school system's director of human resources noted: "For several years there was no incentive to go into teaching and as a result, the pipeline for new teachers is smaller. Now, we have to do more than just recruit teachers. We have to let people know teaching is a viable career."[52]

During the years of layoffs, the law required that notifications be delivered to teachers in danger of being laid off by March 15th. Between March 2008 and March 2012, the California Teachers Association reported that roughly 100,000 California teachers received such "pink slips."[53] Although a significant percentage of these teachers ultimately kept their jobs in many of these years, the layoffs caused others to leave the profession, and the annual flurry of news articles announcing these events left a mark on the public psyche, including the perceptions of individuals who might have been considering teaching as a profession. As an *Orange County Register* headline noted in March 2015, "March used to be the month we dreaded."[54]

Salaries were frozen and working conditions suffered during the era of cutbacks, as resource limitations led to increased class sizes, less availability of materials, and fewer instructional supports. In addition, some observers suggest that the teaching profession has also become less attractive because it has been at the center of intense policy debates and legal battles over such issues as teacher evaluation and tenure.[55]

The impact of these various factors can be seen in the results of an annual survey of high school students taking the ACT college entrance exam, which found that the number of high school students interested in becoming educators dropped by more than 16 percent between 2010 and 2014.[56] Potentially interested students now comprise only 5 percent of high school students taking the college admissions test—a number that will dwindle further as candidates encounter the higher standards for entry that have been put in place in most states and explore other career options that are available to them.

These trends suggest reason for strong concern. However, we need to know more to measure supply and gauge future trends accurately. On one hand, counting the number of enrollees in California teacher education programs overestimates supply, as not all individuals who complete preparation enter the teaching force within the state in a given year. On the other hand, former teachers re-enter the teaching force each year, and they are not included in data about the number of new, first-time credentials unless they have changed fields and are thus awarded new credentials.

Nationally, re-entrants constitute roughly 35 percent of the teacher supply in a given year.[57] This number might be expected to be a bit lower in California, because California has more stringent re-entrance polices, often requiring teachers who have left the classroom for an extended period of time to re-certify, pay fees, and sometimes take additional coursework before returning to the classroom. The factors that influence re-entrants are similar to those that influence new entrants and those from out of state as well: the ease of entry and the attractiveness of salaries and teaching conditions.

California does not currently provide data on either the proportion of trainees who enter or the number of leavers who return, because credentialing and preparation data reside at the Commission on Teacher Credentialing (CTC) and employment data reside at the California Department of Education (CDE). The agencies do not currently share data. Solving this data-sharing problem will be important if the state is to plan and manage teacher supply with better knowledge and information.

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What Matters for Recruiting and Retaining Teachers

In times of shortages, policymakers often focus attention, understandably, on how to get more teachers into the profession. However, it is equally important to focus on how to retain effective teachers. Each time a teacher leaves the profession, it not only increases demand, it also imposes costs on districts. Replacement costs for teachers have been found to be about $18,000 per teacher who leaves, which adds up to a national price tag of over $7 billion a year.[58] High turnover also negatively affects the achievement of all students in a school.[59] A comprehensive approach to reducing attrition would reduce the demand for new teachers and save money that could be better spent on mentoring and other approaches to supporting teacher development and advancing student achievement.

Policies to address the root problems of teacher shortages must acknowledge at least four major factors that strongly influence teacher entry and retention:

- Compensation
- Preparation
- Mentoring and support
- Teaching conditions

Compensation

Even if teachers may be more motivated by altruism than some other workers, teaching must compete with other occupations for talented college and university graduates. Since the early 1990s, teacher salaries have been declining in relation to other professional salaries. Even after adjusting for the shorter work year in teaching, teachers earn 15–30 percent less than individuals with college degrees who enter other fields, depending on the field and the region.[60] In California, salaries for similarly trained and experienced teachers have been extremely unequal across differently resourced districts, which can trigger shortages in districts that pay below-market wages compared to neighboring school districts.[61] Teachers are more likely to quit when they work in districts with lower wages and when their salaries are low relative to alternative wage opportunities, especially in high-demand fields like math and science.[62]

The pressure for higher compensation is greater when candidates have had to go into debt to prepare to enter a profession. To make teaching affordable, some states and the federal government have at times provided forgivable loans and service scholarships that subsidize preparation, just as the Health Professions Education Assistance Act has long done for doctors. These subsidies are paid back with a number of years of service in the profession.

Perhaps the best-known model of such an approach—since copied in other states—is the North Carolina Teaching Fellows Program. In operation for more than 25 years, the program selects highly able high school students and pays all college costs, including an enhanced and fully funded teacher education program, in return for several years of teaching.[63] The program has recruited nearly 11,000 candidates into teaching, representing approximately 10 percent of all teachers credentialed each year in North Carolina. Among these have been a larger than usual number of males, minority candidates, and math and science teachers. A recent study of the program found that the Teaching Fellows are generally more effective than their peers in supporting student achievement and are much more likely to stay in teaching.[64] The financial incentives offered by service scholarships like the Teaching Fellows program indirectly enhance compensation by eliminating student debt payments, while improving preparation—two critical factors for recruiting and retaining teachers.

Teacher Preparation

An often-overlooked factor is the effect of preparation on teacher retention. A growing body of evidence indicates that attrition is unusually high for those who lack preparation for teaching. For example, the National Center for Education Statistics found that 30 percent of uncertified entrants left the profession within a five-year span, compared to 15 percent of certified entrants.[65] Another study found that new recruits who have had student teaching, received feedback on their teaching, and had coursework in specific aspects of teaching leave the profession after the first year at half the rate of those who have had no training in these areas.[66]

High turnover is often linked to teachers' sense of effectiveness, which is, in turn, linked to how well teachers have been prepared for their work. The teacher residency model is a new and important strategy that better prepares teachers for high-need communities. Residency programs place mid-career entrants who want to commit to high-need urban or rural schools in paid apprenticeships with expert mentor teachers for a year, while they complete credential coursework in curriculum, teaching, and learning with local partnering universities. When they become teachers, these recruits also receive two years of mentoring. In exchange for this high-quality preparation—which is directly focused on becoming an excellent teacher in a high-need community—candidates pledge to spend 3-5 years in the district's schools. Some charter organizations have also started residencies. This model has already shown teacher retention rates of over 85 percent after four or more years for graduates in Chicago, Boston, Denver, and elsewhere.[67]

The teacher residency model is a new and important strategy that better prepares teachers for high-need communities.

Mentoring and Support

Strong mentoring in the first years of teaching enhances the retention effects of strong initial preparation. A number of studies have found that well-designed mentoring programs improve retention rates for new teachers, as well as their attitudes, feelings of efficacy, and instructional skills.[68] Key to success is having a mentor teacher in the same subject area, common planning time with teachers in the same subject, and regularly scheduled collaboration with other teachers.[69] Beginning teachers' practice is enhanced further when their mentors also receive formal training and are released from some of their own classroom duties to provide one-to-one observation and coaching in the classroom, so they can demonstrate effective methods and help new teachers solve immediate problems of practice.[70]

A large-scale national study found that beginning teachers who participated in induction programs providing mentoring showed a 15 percent attrition rate versus a 26 percent attrition rate for those who had no induction supports in their first three years on the job.[71] Early Peer Assistance and Review programs in urban districts like Cincinnati, Columbus, and Toledo, Ohio, and Rochester, New York, were found to reduce attrition rates of beginning teachers by more than two-thirds (often from levels exceeding 30 percent to rates of under 5 percent) by providing expert mentors with release time to coach beginners in their first year on the job.[72] In California, early studies of the Beginning Teacher Support and Assessment Program (BTSA) found similarly high rates of retention for teachers who experienced high-quality mentoring over their initial two years.[73]

Notably, researchers have found that beginning teachers who participate in induction are more able to keep students on task, develop workable lesson plans, use effective questioning practices, adjust classroom activities to meet students' interests, maintain a positive classroom atmosphere, and demonstrate successful classroom management.[74] At least one study has found that students of beginning teachers who participated in induction showed stronger gains on academic achievement tests.[75]

Teaching Conditions

Surveys of teachers have long shown that teaching conditions play a major role in their decisions to move schools or leave the profession. Teachers' plans to stay in teaching and their reasons for actually having left are strongly associated with how they feel about administrative support, resources for teaching, and teacher input into decision making.[76] The most recent survey data from the National Center for Education Statistics found that, of the approximately 238,000 men and women who quit teaching after the 2011–12 school year, nearly two-thirds left voluntarily for reasons other than retirement. [77] After pregnancy and child rearing, the most important factors were, in order of importance:

> Researchers have found that beginning teachers who participate in induction are more able to keep students on task, develop workable lesson plans, use effective questioning practices, adjust classroom activities to meet students' interests, maintain a positive classroom atmosphere, and demonstrate successful classroom management.

- The impact of school accountability measures on teachers' teaching or curriculum;
- Dissatisfaction with the school administration; and
- Dissatisfaction with salary.

Other national studies have found that similar factors consistently rise to the top as most highly related to teachers' decisions to leave or stay in a given school: school leadership and administrative support, high-stakes accountability systems, opportunities for professional collaboration and shared decision-making, and resources for teaching and learning.[78] A 2007 report on teacher retention in California produced similar findings, based on a survey of current and former public school teachers.[79]

Teachers in high-poverty schools are more than twice as likely to leave due to dissatisfaction as those in low-poverty schools.[80] Recent evidence suggests that this attrition is more a function of the poor working conditions typically found in schools serving less advantaged students—including poorer facilities, less availability of textbooks and supplies, fewer administrative supports, and larger class sizes—than it is of the students themselves.[81] This finding suggests that improving working conditions should be an important target for policies aimed at retaining qualified teachers in high-need schools.

Most important are the conditions that teachers feel enable them to succeed with students, including administrative supports, strong colleagues, and opportunities to participate in decisions. A poll by the Public Agenda Foundation found that almost 80 percent of teachers would choose to teach in a school where administrators supported them, as opposed to only about 20 percent who would teach at one with significantly higher salaries.[82]

Some policies have emphasized monetary bonuses or "combat pay" to attract teachers to high-need schools. However, the evidence shows that investments in professional working conditions and supports for teacher learning are more effective than offering bonuses for teachers to go

to dysfunctional schools that are structured to remain that way. One recent summary of the literature notes:

> *[S]chool districts have tried offering additional pay for high-needs schools without much positive result, even when substantial bonuses are awarded. In 2004, Palm Beach, Florida, eliminated its $7,500 high-needs school stipend after few teachers took the offer. Dallas's offer of $6,000 to accomplished teachers to move to challenging schools also failed to generate much interest.... A decade ago, South Carolina set out to recruit "teacher specialists" to work in the state's weakest schools. Despite the offer of an $18,000 bonus, the state attracted only 20 percent of the 500 teachers they needed in the first year of the program, and only 40 percent after three years.*[83]

A more recent study of efforts to recruit high-performing teachers to struggling schools found that, among 1,500 such teachers in the Talent Transfer Initiative, only 22 percent were willing to apply to transfer to high-need schools for a two-year bonus of $20,000. Although the targeted teachers filled most of the 81 vacancies, attrition rates of these teachers soared to 40 percent after the bonuses were paid out.[84]

Although money can help, teachers are primarily attracted by principals who are good instructional leaders, by like-minded colleagues who are committed to the same goals, by having the teaching conditions and instructional materials they need readily available, and by having learning supports that enable them to be effective. As one National Board Certified teacher noted in a discussion of what would attract him to a high-needs school:

> *I would move [to a low-performing school], but I would want to see social services for parents and children, accomplished leadership, adequate resources and facilities, and flexibility, freedom and time.... One of the single greatest factors in school success is principal leadership. Effective administrators are magnets for accomplished teachers. In addition, it is amazing to me that attention is being paid to teaching quality in hard-to-staff schools when little is done to address the sometimes appalling conditions in which teachers are forced to work and students are forced to learn.... Finally, as an accomplished teacher, my greatest fear is being assigned to a hard-to-staff school and not being given the time and the flexibility to make the changes that I believe are necessary to bring about student achievement.*[85]

Attracting Re-Entrants

As we noted earlier, about one-third of teachers hired each year are returnees to teaching. According to the National Center for Education Statistics (NCES), 53 percent of teachers who left the profession said they would consider returning to the classroom. When asked what would bring them back to teaching, leavers' responses included salary increases (67 percent), smaller class sizes/student loads (61 percent), student loan forgiveness, and housing incentives (about 25 percent each). Importantly, of former teachers who said they would consider returning to the profession, the more frequently cited factors that would encourage their return (in addition to the availability of positions) include relatively low-cost strategies: having the ability to maintain retirement benefits (68 percent), the availability of part-time teaching positions or having child-care options (41 percent and 30 percent, respectively), and simpler methods for renewing teacher certification and transferring certification between states (41 percent each).[86]

Box 2: **Supports for Recruiting and Retaining Teachers Have Dwindled**

Discontinued and inactive California teacher development and support programs

Program	Description	When Instituted	Current Status
Teacher Recruitment Incentive Program (TRIP)	Established six regional teacher recruitment centers to address the teacher shortage. Centers assisted school districts in recruiting qualified teachers to low-performing and hard-to-staff schools. $9.4 million allocated annually.	Funded beginning in 2000-01	Suspended 2003-04
California Center for Teaching Careers (CalTeach)	Created to serve as a one-stop information, recruitment, and referral service for prospective teachers. Funding peaked at $11 million in 2000-01 and 2001-02.	Funded beginning in 1997	Suspended in 2003-04
Governor's Teaching Fellowship	Created to attract and retain qualified individuals in the teaching profession. Provided $20,000 for tuition and living costs in exchange for a four-year teaching commitment in a low-performing school. $21.1 million allocated in 2001-02.	Funded beginning in 2000-01	Suspended 2002-03
Cal Grant T	Provided tuition and fee assistance to students in teacher preparation programs in exchange for teaching in a low-performing school for at least one year. $10 million allocated annually, from 1998-99 through 2001-02.	Funded beginning in 1998-99	Discontinued 2003-04
Teacher Retention Tax Credit	Allowed teachers to claim a state income tax credit of up to $1,500, depending on years of service.	Funded beginning in 2000	Suspended in 2004
Mathematics Initiative for Teaching	Created to address shortage of credentialed math teachers. Provided funds for tuition and related expenses. Recipients agreed to teach one year of math for every $2,500 received.	Funded beginning in 1998	Eliminated in 2003-04
Teaching as a Priority (TAP) Block Grant	Provided competitive block grants to districts to create incentives to recruit and retain credentialed teachers for low-performing schools. Incentives included signing bonuses, improved working conditions, teacher compensation, and housing subsidies.	Funding beginning in 2000-01	Funding suspended in 2003-04; incorporated into the Professional Development Block Grant in 2005-06
Assumption Program of Loans for Education (APLE)	Long-standing loan forgiveness program designed to encourage outstanding students to work in teacher shortage areas. Teachers received a total of up to $19,000 in outstanding loan forgiveness.	Established in 1983	New warrants suspended in 2012-13 (active recipients still received remaining funds)

Source: Teaching and California's Future: California's Teaching Force 2006: Key Issues and Trends; and California Student Aid Commission data available at http://www.csac.ca.gov/doc.asp?id=111.

Policy Recommendations

No single policy can solve California's emerging teaching shortage. What is needed is a comprehensive set of strategies at the local and state levels that are focused on increasing the number of well-prepared entrants to the field of teaching, directing them to the fields and locations where they are needed, and plugging the leaky bucket of teacher attrition, which has high costs for both district budgets and student achievement. Without policy interventions, it is likely that even if more new candidates—heartened by reports of greater hiring—consider teaching, they will fail to choose the fields in which there are shortages or to go to the high-poverty communities where they are more sorely needed. Furthermore, a status quo approach will not leverage better preparation that supports student achievement or stem turnover where it is currently high.

When California last experienced severe teacher shortages in the late 1990s, it took a wide array of programs to begin to stabilize the teaching force. Most of these have, unfortunately, been discontinued or sharply reduced since then, leaving the state with few existing tools to use to address the current situation. (See Box 2.)

> Without policy interventions, it is likely that even if more new candidates consider teaching, they will fail to choose the fields in which there are shortages or to go to the high-poverty communities where they are more sorely needed.

Prior research on these and other teacher recruitment and retention initiatives suggests the following strategies might be considered:

1. **Reinstate the CalTeach program,** which helped recruit teachers from colleges, other careers, and other states; provided them information about how to become credentialed; and directed them to preparation programs and districts so that entry into the profession was made simpler and more supported.

2. **Create incentives to attract diverse, talented individuals to teach in high-need fields and locations,** by funding candidates who prepare for and teach in schools and subject areas experiencing shortages, as did these two highly successful California programs:

    - **The Governor's Teaching Fellowship** provided $20,000 for tuition and living expenses to individuals who were pursuing a teaching credential and agreed to teach for at least four years in a low-performing school. That same program could now be tailored to address high-poverty schools and high-need subjects. California's program, which was modeled after the successful North Carolina Teaching Fellows Program, recruited nearly 1,200 academically able students into teaching between 2000 and 2002. A new version could recruit the top students from across California's high schools (by, for example, offering free preparation to the top 5 percent of graduates in each school), as well as top college students.

    - **The Assumption Program of Loans for Education (APLE)** provided loan forgiveness to encourage outstanding students to work in teacher shortage areas. From 1999–2000 to 2006–07, California's APLE program offered 5,500 to 7,500 teachers per year loan forgiveness of $11,000 to $19,000 in exchange for a commitment to teach for four years in a high-need field or school.[88] The state has not funded any new entrants into the program since 2012–13.

A Harvard University study found both of these programs to be successful at recruiting and retaining teachers in high-need schools.[89] Seventy-five percent of recruits remained in low-performing schools for at least four years. In addition, about two of every seven fellowship recipients would not have taught in such schools in the absence of the incentive.

These kinds of subsidies can be coupled with other programmatic initiatives, such as Grow-Your-Own programs and teacher residencies, which develop teachers for specific local communities, as described below.

3. **Create innovative pathways into teaching,** such as *high school career pathways* and *Grow-Your-Own* teacher preparation models. These strategies are rooted in research demonstrating that teachers prefer to teach near where they grew up and attended high school.[90] In addition, locally grown teachers are typically more diverse than the teaching workforce as a whole and are often rooted in the community and familiar with cultural contexts. Thus they may bring critical knowledge and skills, as well as long-term commitments, to schools that may have had long-standing shortage issues.

Locally grown teachers are typically more diverse than the teaching workforce as a whole and are often rooted in the community and familiar with cultural contexts.

   - **High school teaching career pathway programs** could be encouraged through the California Career Pathways Trust, which funds a number of *Linked Learning* programs in districts around the state, but does not currently focus on teaching as a career. These programs combine academic study with vocational courses and real-world experiences for students.[91] Examples include the Education Academy at Skyline High School in Oakland Unified School District, where two graduates of the academy served as assistant principals and continue to work in the district.[92] Another model is the partnership between Hamline University and Mounds View Public Schools outside of St. Paul, Minnesota, in which students earn credits toward both a teaching credential and high school graduation requirements during their junior and senior years in high school.[93]

   - **Grow-Your-Own programs** could be encouraged through challenge grants to two- and four-year colleges to structure aligned programs and supports that offer incentives and partnerships to recruit community members into teaching and support them as they complete their bachelor's degrees and teaching credentials. These programs can be designed to recruit high school or college students, or local paraprofessionals who want to become teachers, to prepare them to teach in their communities. One successful model is the California Teacher Pathway program, which recruits young people interested in becoming educators, supports them through the process of earning their associate's degrees, bachelor's degrees, and teaching credentials, and helps them to gain stable employment in after-school programs while they are studying; the program allows them to gain experience working with youth and supports them through their studies.[94] Another example is the (now defunct) California Paraprofessional Teacher Training Program, which funded academic scholarships and other academic support services to individuals recruited from paraprofessional jobs who sought to become K–12 teachers; the program placed special emphasis on bilingual teaching, special education, or another field of identified district need. The programs were sponsored by local school districts, county offices of education, and/or consortia that applied to the CTC for funding through a competitive grant process.[95]

4. **Increase access to high-quality teacher preparation programs that support teacher success in high-need districts and fields.** New approaches to training and recruitment are needed if we are to solve shortages in communities and fields that have long-standing challenges with both adequate preparation and adequate supply, which are interrelated.

In particular, innovation is needed to develop new model programs for training urban and rural teachers in high-need communities, in addition to well-prepared special educators. These could be accomplished by making two recent innovations more widely available:

- **Urban and rural teacher residencies** that create a supply of expertly-trained, career teachers in shortage fields could be expanded across high-need districts and charter school organizations via state matching grants. These could also take advantage of federal funds for residencies, AmeriCorps, and TEACH grants. Patterned on medical residencies and earlier Teacher Corps programs, these programs provide teacher candidates with a yearlong apprenticeship teaching alongside an expert mentor teacher, while they take tightly linked credential coursework from a partner preparation program. Residents receive a scholarship and living stipend to enable them to devote the full year to their preparation. In exchange, they commit to teach three to five years in the local schools. Typically, after this time, teachers commit to teaching as a long-term career. Research has shown residencies to be effective at recruiting and retaining talented and diverse candidates in high-need schools and better preparing them for the challenges they will face.[96] In California, residencies in Los Angeles and San Francisco, as well as in the Aspire Public Schools, are preparing math, science, special education, and bilingual teachers for the students who need them most.

Innovations are needed to develop new model programs for training urban and rural teachers in high-need communities, in addition to well-prepared special educators.

- **New model special education programs** that prepare teachers more efficiently and effectively could be expanded across the state through a competitive grant program. Right now, many California special education teachers are prepared in post-baccalaureate internship programs that do not include general education training, do not provide student teaching where good practice can be observed, and do not take advantage of the time candidates could be using during the undergraduate years to assemble the knowledge and skills needed for the very sophisticated practice needed to succeed with their students. Currently there are not enough education specialists being prepared, and there are too few high-quality preparation programs, such as the blended programs or dual-credentialing models that have proven more effective in preparing teachers to succeed and stay in the profession.[97] New models could be cultivated in both undergraduate and graduate settings to boost recruitment, stronger training, and retention of these very important teachers.

5. **Ensure that all beginning teachers have access to a high-quality and affordable induction program** through stronger accreditation and strategic programmatic support.

- California pioneered the first statewide teacher induction effort in the nation and set the standard with its Beginning Teacher Support and Assessment (BTSA) program, which was shown to reduce attrition and improve teacher competence and became a model for other states. These programs provide novice teachers with structured guidance and support from experienced mentor teachers. However, since budget cuts and the elimination of specific requirements for categorical programs, BTSA programs have faltered in many districts.[98]

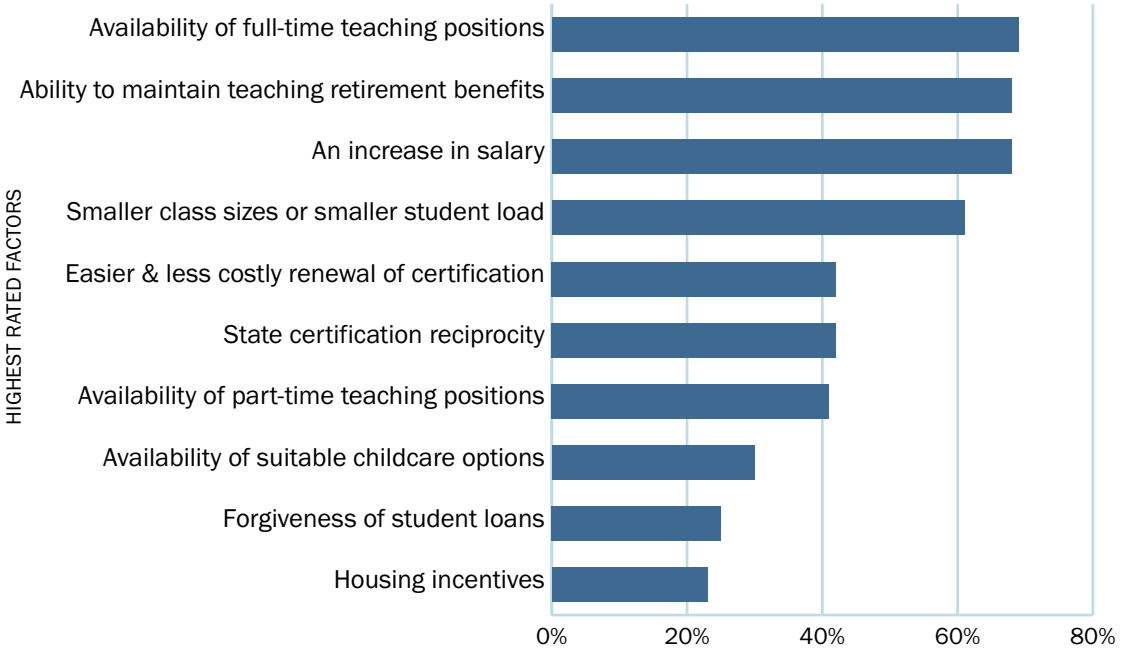
Although there are still strong programs (often in larger or wealthier districts that have the capacity to run their own programs), they are fewer each year.

California took an important first step in supporting access to induction programs last year, when an additional $490 million was allocated to support professional learning for educators, including mentoring and induction for beginning teachers. This could be viewed as a down payment on the state's investment in teacher development and as a model for an ongoing professional learning block grant.

- New accreditation standards that eliminate unnecessary rules for induction programs, while focusing on strong mentoring by accomplished mentors, could help improve program quality. If coupled with an infrastructure to help programs design effective services and train mentors, and a clear set of expectations about what beginning teachers should receive, the gains offered by BTSA could be preserved.

6. **Provide incentives that support teachers' ability to stay in or re-enter the profession** through strategies like mortgage guarantees for housing, ease of credential renewal, streamlined reciprocity with other states, and opportunities to continue teaching and mentoring after retirement.

Figure 10: **What Would Bring Leavers Back?**



Factors rated by former teachers as important in a decision to return

Source: U.S. Department of Education, National Center for Education Statistics, 2012-13 Teacher Follow-up Survey.

- State action to **allow retired teachers to return** to service as teachers or mentors without the caps on earning that were enacted several years ago could help relieve some shortages and provide mentors who can enable new teachers to survive and succeed. If teachers were to pay into the state teacher retirement fund while they resume employment, there would be no financial loss to the state fund.

- **Regulatory streamlining** for teachers re-entering the profession and for teachers entering from other states could expand the pool of prospective teachers.

- State, county, and/or local actions to create **mortgage guarantees** for housing in exchange for service commitments could allow more teachers to remain in the profession and serve in communities with high costs of living. Twenty-five percent of teachers nationwide point to housing incentives as an important factor in their decision to return to teaching. (See Figure 10.) Housing is likely an even bigger factor in many areas of California, due to its high cost. Bay Area communities are beginning to address the issue. For example, San Francisco recently passed a measure to provide stabilized housing for 500 teachers by 2020, and the Cupertino Union School District recently announced plans to develop more than 200 units of affordable housing for teachers and staff on district-owned land.[99]

7. **Improve teaching conditions by supporting administrative training** that helps leaders create productive teaching and learning environments.

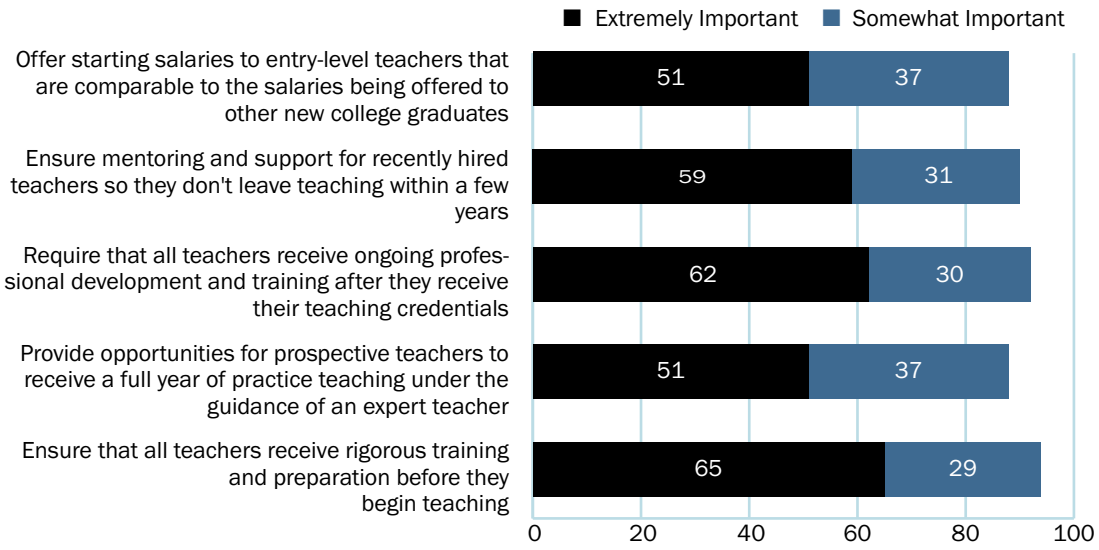
    - Teachers are clear that their decisions to stay in the profession rest substantially on the capacity of administrators to create a productive teaching and learning environment in which they can be effective and continue to develop their skills. California is one of only a few states that currently make no investments in the professional development of school principals and superintendents. The California School Leadership Academy (CSLA) was sponsored and funded by the state for nearly 20 years, but was eliminated as part of budget cuts in 2002. The highly successful Academy, which became the model for similar academies in more than 20 other states, trained principals, superintendents, and teacher leaders and helped school teams implement curriculum and teaching reforms, school improvement initiatives, and turnaround initiatives. More than 25,000 school leaders, including at least 600 school superintendents and many leadership teams, participated in these programs. Reinstatement of this or other leadership development opportunities focusing on how to develop productive teaching and learning environments could have a major influence on retaining teachers in the profession and strengthening their capacity to teach well. The new California Collaborative for Excellence in Education is one possible site for organizing this kind of training.

Californians Are Ready to Invest in Teaching

California is on a trajectory that, if left unchecked, could result in increased teacher shortages and greater inequities among students in different communities. A recent Field Poll of 1,002 registered voters in the state indicates not only that Californians are attuned to the looming crisis, but that there is broad support for strategic investments and research-based policies to recruit and retain high-quality teachers.[100]

In the September 2015 survey, 86 percent of respondents said the teacher shortage was a serious problem and overwhelming majorities indicated support for a range of strategies for addressing the shortage. These include loans and scholarships to incentivize new teachers and mentoring and support for recently hired teachers so they don't leave the profession quickly. Nearly 90 percent of respondents also supported an expansion of residency-type programs, which provide prospective teachers with a full year of practice teaching under the guidance of an expert teacher. Nine in 10 respondents supported competitive salaries, rigorous preparation, supportive mentoring, and ongoing professional development for teachers. (See Figure 11.)

Figure 11: **California Voters Appear Ready to Invest in Teaching**



Percent of registered voters who feel that specific policies to address the teacher shortage are important

Source: Learning Policy Institute, developed from Field Poll survey data.

Californians participating in the poll were equally clear about what they did not want to see happen as a result of the teacher shortage: They do not want poor and minority students being increasingly taught by underprepared teachers. A full 89 percent of respondents said it was a problem for public schools in low-income communities to have fewer qualified teachers than public schools in wealthier areas, and a majority felt that shortages should not be resolved by recruiting individuals who are not fully prepared.

California policymakers have a unique opportunity not only to take strategic action to prevent a serious teaching shortage, but to build a system of supports that enable more effective teaching for the state's 6.2 million students. Acting with foresight now could engage a new generation in the critical work of teaching and help ensure that all teachers receive the preparation, induction, and support necessary to provide their students with a 21st-century education.

Appendix A: Number of Vacancies Listed in EdJoin by County

County	2013	2014	2015	% Change from 2013 to 2015
Alameda	1,632	2,393	2,539	55.6
Alpine	0	4	1	NA
Amador	55	54	92	67.3
Butte	231	316	374	61.9
Calaveras	36	61	70	94.4
Colusa	60	81	66	10.0
Contra Costa	1,631	1,978	2,236	37.1
Del Norte	5	19	77	1440.0
El Dorado	196	199	219	11.7
Fresno	1,233	1,230	1,227	-0.5
Glenn	47	55	74	57.4
Humboldt	58	115	141	143.1
Imperial	194	548	618	218.6
Inyo	52	54	52	0.0
Kern	300	438	733	144.3
Kings	124	184	262	111.3
Lake	104	161	544	423.1
Lassen	31	64	85	174.2
Los Angeles	2,146	3,378	4,071	89.7
Madera	180	334	259	43.9
Marin	324	339	426	31.5
Mariposa	7	30	27	285.7
Mendocino	185	248	230	24.3
Merced	354	576	629	77.7
Modoc	13	26	15	15.4
Mono	16	33	32	100.0
Monterey	868	1,428	1,676	93.1
Napa	92	205	218	137.0
Nevada	96	129	105	9.4
Orange	1,661	2,627	2,450	47.5
Placer	492	521	550	11.8
Plumas	34	35	46	35.3
Riverside	1,547	2,041	2,262	46.2
Sacramento	898	1,365	1,905	112.1
San Benito	104	186	250	140.4
San Bernardino	1,096	2,234	2,573	134.8
San Diego	1,151	1,824	2,117	83.9
San Francisco	135	503	190	40.7
San Joaquin	616	858	987	60.2
San Luis Obispo	303	305	301	-0.7
San Mateo	953	1,269	1,599	67.8
Santa Barbara	313	383	489	56.2
Santa Clara	1,944	2,578	3,041	56.4
Santa Cruz	468	534	619	32.3
Shasta	158	233	253	60.1
Sierra	1	2	3	200.0
Siskiyou	38	52	81	113.2
Solano	582	818	937	61.0
Sonoma	689	930	990	43.7
Stanislaus	900	1,006	1,217	35.2
Sutter	210	226	203	-3.3
Tehama	86	98	72	-16.3
Trinity	23	11	19	-17.4
Tulare	718	1,043	1,223	70.3
Tuolumne	44	53	51	15.9
Ventura	248	398	501	102.0
Yolo	439	622	577	31.4
Yuba	56	90	160	185.7
Total	**26,177**	**37,525**	**42,764**	

Note: Numbers reflect open teaching positions advertised on EdJoin over 12-month period, beginning October 16 and ending October 15.
Source: EdJoin data on postings for 12-month period provided to LPI by request.

Appendix B: Teaching Permits, Waivers, and Credentials Issued by Year, 2012-2015

Type of Credential	2012-2013	2013-2014	2014-2015	1-year change 2013-14 to 2014-15
University Interns				
Education Specialist Instruction Credential	1,318	1,395	1,359	-2.6%
Multiple Subject Teaching Credential	253	342	554	62.0%
Single Subject Teaching Credential	570	704	828	17.6%
Total University Interns	2,141	2,441	2,741	12.3%
District Interns	461	522	674	29.1%
Total Intern Credentials	2,602	2,963	3,415	15.3%
Provisional Internship Permit	186	267	525	96.6%
Short-Term Staff Permit	665	914	1,884	106.1%
Total Short-Term and Provisional Permits	851	1,181	2,409	104.0%
General Education Limited Assignment Multiple Subject Teaching Permit	42	68	76	11.8%
General Education Limited Assignment Single Subject Teaching Permit	792	897	1,170	30.4%
Special Education Limited Assignment Teaching Permit	308	767	485	-36.8%
Total Limited Assignment Teaching Permits	1142	1732	1731	0.0%
Teaching Waivers	129	201	126	-37.3%
New Preliminary Teaching Credentials recommended by IHEs, excluding interns (first time credentials and new types of credentials added to an existing credential)				
California State University	6,004	5,552	5,499	-1.0%
Private and Independent Colleges and Universities	5,231	4,747	4,842	2.0%
University of California	861	843	883	4.7%
Total IHE Preliminary Credentials	12,096	11,142	11,224	0.7%
IHE: New Credentials by Type				
Education Specialist Instruction Credential	2,807	2,276	2,195	-3.6%
Multiple Subject Teaching Credential	4,574	4,444	4,709	6.0%
Single Subject Teaching Credential	4,715	4,422	4,320	-2.3%
Total IHE New Credentials	12,096	11,142	11,224	0.7%

These data are drawn from the Commission on Teacher Credentialing database to represent the number of credentials issued between July 1 of each year and June 30 of the following year. Due to processing time, there are credentials counted in this data run from applicants who completed preparation in the prior year; therefore they differ from data in the annual teacher supply report, which reflects only those applicants who completed preparation in that academic (July–June) year.

Endnotes

1. Acacia Thede, Executive Director of Human Resources, San Diego Unified School District, telephone interview by Learning Policy Institute, 11/16/15. See also: Maureen Magee, "SD Schools Brace for Hiring Spree," *San Diego Union-Tribune*, September 1, 2015, accessed 10/13/15, http://www.sandiegouniontribune.com/news/2015/sep/01/sd-schools-brace-for-hiring-spree/.
2. Magee, "SD Schools."
3. Motoko Rich, "Teacher Shortages Spur a Nationwide Hiring Scramble (Credentials Optional)," *New York Times*, August 9, 2015, accessed 10/13/15, http://www.nytimes.com/2015/08/10/us/teacher-shortages-spur-a-nationwide-hiring-scramble-credentials-optional.html; Jill Tucker, "Bay Area School Districts Scramble Amid Teacher Shortage," *San Francisco Chronicle*, August 31, 2015, accessed 10/13/15, http://www.sfgate.com/education/article/Bay-Area-school-districts-scramble-amid-teacher-6446569.php; Kaytlyn Leslie, "SLO County School Districts Feeling Impacts of Teacher Shortages," *San Luis Obispo Tribune*, September 22, 2015, accessed 10/13/15, http://www.sanluisobispo.com/news/local/education/article39063087.html; Kelly Alvarado, "National Teacher Shortage Affecting Valley Schools," *KMIR News*, September 15, 2015, accessed 10/13/15, http://www.kmir.com/story/29870353/national-teacher-shortage-affecting-valley-schools; Magee, "SD Schools."
4. The 5,116 postings represent postings from district and county offices of education; vacancies for charter schools are not included in total. A large number of vacancies as the school year starts represents one indicator of hiring difficulties in school districts across the state.
5. EdJoin ran custom queries for the Learning Policy Institute tallying openings at the start of the year by subject and by county.
6. See for example, Ian Whitaker, "Nevada Needs Teachers, and it's Shelling Out $5 Million to Get Them," *Las Vegas Sun*, November 27, 2015, accessed 12/7/15, http://lasvegassun.com/news/2015/nov/27/nevada-needs-teachers-and-its-shelling-out-5-milli/; Kristen A. Graham, "First Marking Period in Philly Ends with Many Teacher Shortages," *Philadelphia Inquirer*, November 20, 2015, accessed 12/7/15, http://articles.philly.com/2015-11-20/news/68416094_1_vacancies-arlene-kempin-school-year; Mark Markovich, "Principals Say State Teachers Shortage Now a Crisis," *San Francisco Chronicle*, November 30, 2015, accessed 12/7/15, http://www.sfgate.com/local/komo/article/Principals-say-state-teacher-shortage-now-a-crisis-6666518.php; Emma Brown, "High-poverty Schools Often Staffed by Rotating Cast of Substitutes," *Washington Post*, December 4, 2015, accessed 12/7/15, https://www.washingtonpost.com/local/education/how-can-students-learn-without-teachers-high-poverty-schools-often-staffed-by-rotating-cast-of-substitutes/2015/12/04/be41579a-92c6-11e5-b5e4-279b4501e8a6_story.html; Naomi Nix, "Why Oklahoma is Racing to Put Nearly 1,000 Uncertified Teachers in its Classrooms," *The Seventy Four*, December 1, 2015, accessed 12/7/15, https://www.the74million.org/article/why-oklahoma-is-racing-to-put-nearly-1000-uncertified-teachers-in-its-classrooms.
7. Linda Darling-Hammond, "Access to Quality Teaching: An Analysis of Inequality in California's Public Schools," *Santa Clara Law Review* 43, no. 4 (2003): 101-239, accessed 10/19/15, http://digitalcommons.law.scu.edu/lawreview/vol43/iss4/2/.
8. California Department of Finance, "California Public K–12 Graded Enrollment Projections Table, 2014 Series.xls," Demographic Research Unit, December 2014, accessed 10/20/15, http://www.dof.ca.gov/research/demographic/reports/projections/k-12/.
9. California Department of Education, annual CBEDs reporting available through DataQuest, accessed 10/7/15, http://data1.cde.ca.gov/dataquest/NumTeachCo.asp?cChoice=StateNum&Radio2=T&cYear=2007-08&cLevel=State&cTopic=Paif&myTimeFrame=M&submit1=Submit.
10. K–12 Proposition 98 spending (excluding funds spent for pre-school, child care, and adult education) dropped from $9,175 in 2007–08 to $7,329 in 2011–12 in inflation-adjusted (2015–16) dollars. Calculation provided to LPI by the California Budget and Policy Center, based on data from the Legislative Analyst's Office and using Department of Finance Consumer Price Index (CPI) data.

11. California Department of Education, annual CBEDs reporting available through DataQuest, accessed 10/7/15, http://data1.cde.ca.gov/dataquest/NumTeachCo.asp?cChoice=StateNum&Radio2=T&cYear=2007-08&cLevel=State&cTopic=Paif&myTimeFrame=M&submit1=Submit; and http://data1.cde.ca.gov/dataquest/Staff/StaffByEth.aspx?cLevel=State&cYear=2011-12&cChoice=StateNum&cType=T&cGender=B&Submit=1.

12. In a March 2012 report, the Legislative Analyst's Office estimated the reduction in the teacher workforce at 32,000 between the 2007–08 school year and the 2010–11 school year, based on a survey of 230 school districts (including eight of the state's 10 largest districts) and information provided from the Department of Education, the Office of Administrative Hearings, and the California Teachers Association. See Mac Taylor, *A Review of the Teacher Layoff Process in California* (Sacramento: Legislative Analyst's Office, March 22, 2012), accessed 11/4/15, http://www.lao.ca.gov/reports/2012/edu/teacher-layoffs/teacher-layoffs-032212.pdf.

13. California State Controller's Office, Track Prop 30, accessed 10/7/15, http://trackprop30.ca.gov.

14. Governor's Budget, 2012–13, Enacted Budget Detail, accessed 10/20/15, http://www.ebudget.ca.gov/2012-13-EN/Enacted/agencies.html; Governor's Budget, 2015–16, Enacted Budget Detail, accessed 10/20/15, http://www.ebudget.ca.gov/2015-16/Enacted/agencies.html; Inflation adjustment to 2015 real dollars was calculated using the CPI from the Department of Finance (DOF).

15. California Department of Education, annual CBEDs reporting, available through DataQuest, accessed 10/7/15, http://data1.cde.ca.gov/dataquest/TchHires1.asp?RptYear=2009-10&TheRpt=TchHires&Submit=1 and http://data1.cde.ca.gov/dataquest/TchHires1.asp?RptYear=2010-11&TheRpt=TchHires&Submit=1.

16. California Department of Education, annual CBEDs reporting, available through DataQuest, accessed 10/7/15, http://data1.cde.ca.gov/dataquest/TchHires1.asp?RptYear=2014-15&TheRpt=TchHires&Submit=1.

17. California Department of Education, annual CBEDs reporting, available through DataQuest, accessed 10/7/15, http://data1.cde.ca.gov/dataquest/TchHires1.asp?RptYear=2015-16&TheRpt=TchHires&Submit=1. Note: Estimated teacher hires are self-reported by districts in October of the previous year. We assume districts randomly over- and under-estimate their expected hires; therefore, in statewide aggregate, the differences should even out. Also, theoretically these estimates include both teachers hires who were not teaching the prior year, as well as teacher hires who were teaching in another school (accounting for both new entrants and movers). This results in an overestimate of the number of new teachers demanded statewide.

18. Leslie, "SLO County;" Tucker, "Bay Area School Districts;" Sharon Noguchi, "Bay Area Schools in a Hiring Frenzy Just Days Before Students Return to Class," *San Jose Mercury-News*, August 9, 2015, accessed 10/13/15, http://www.mercurynews.com/bay-area-news/ci_28610885/bay-area-schools-hiring-frenzy-just-days-before.

19. Linda Darling-Hammond and Gary Sykes, "Wanted, a National Teacher Supply Policy for Education: The Right Way to Meet the 'Highly Qualified Teacher' Challenge," *Education Policy Analysis Archives* 11 (2003): 33.

20. Data provided by California Commission on Teacher Credentialing. See Appendix B of this paper for details.

21. Enrollment and credential trends are merely indicators of shifting supply. It is unknown exactly how many candidates who are enrolled in a program or who obtain a credential go on to teach in the classroom in the following year or thereafter. Using Title II reporting in tandem with the federal *Baccalaureate and Beyond* (B&B) survey from 2008 to 2012, national data suggest only a quarter of individuals enrolled in teacher preparation programs end up teaching the following year. The other three-quarters complete their programs in other years, matriculating into the classroom later. Nationally, most programs are undergraduate models in which students are enrolled in teacher education for two to four years. In California, most programs are one-year post-baccalaureate programs, so the rate at which students move from teacher preparation programs into the classroom the following year can be expected to be significantly higher than 25 percent.

22. According to internal tabulations from the CSU Office of the Chancellor, enrollments increased from 8,642 to 8,837 between 2013–14 and 2014–15. Data on historic contributions to the supply pool are from California Commission on Teacher Credentialing, Reports 2006–07 to 2013–14, *Teacher Supply in California: A Report to the Legislature*, accessed 10/7/15, http://www.ctc.ca.gov/reports/all-reports.html.

23. Conducted by the Association of Independent Colleges and Universities of a subset of California members in fall of 2015.

24. Ranjana Damle, *Investigating the Impact of Substitute Teachers on Student Achievement: A Review of the Literature* (Albuquerque: Albuquerque Public Schools, 2009), accessed 11/16/15, http://www.aps.edu/re/documents/2008-2009-publications/Impact_of_Sub_Teachers_on_Achievement_Review_Jan-2009.pdf; Raegen T. Miller, Richard J. Murnane, and John B. Willett, "Do Teacher Absences Impact Student Achievement? Longitudinal Evidence from One Urban School District," *Educational Evaluation and Policy Analysis* 30, no. 2 (2008): 181-200; Sidney L. Brown and Anethia T. Arnell, "Measuring the Effect Teacher Absenteeism Has on Student Achievement at a 'Urban but not too Urban:' Title I elementary school," *International Journal of Humanities and Social Science 2*, no. 17 (2012): 172–183; Donald Boyd, Pamela Grossman, Hamilton Lankford, Susanna Loeb, and James Wyckoff, "How Changes in Entry Requirements Alter the Teacher Workforce and Affect Student Achievement," *Education Finance and Policy 1*, no. 2 (2006): 176-216; Linda Darling-Hammond, Deborah J. Holtzman, Su Jin Gatlin, and Julian Vasquez Heilig, "Does Teacher Preparation Matter? Evidence about Teacher Certification, Teach for America, and Teacher Effectiveness," *Education Policy Analysis Archives 13*, no. 42 (2005); Charles T. Clotfelter, Helen F. Ladd, and Jacob L. Vigdor, "Teacher Credentials and Student Achievement: Longitudinal Analysis with Student Fixed Effects," *Economics of Education Review* 26, no. 6 (2007): 673-682.

25. U.S. Department of Education, *Teacher Shortage Areas Nationwide Listing 1990–1991 through 2015–16*, March 2015, accessed 10/22/15, https://www2.ed.gov/about/offices/list/ope/pol/tsa.pdf.

26. Patrick Shields, Daniel C. Humphrey, Marjorie E. Wechsler, L. M. Riel, Juliet Tiffany-Morales, Katrina Woodworth, V. M. Young, and Tiffany Price, *The Status of the Teaching Profession 2001* (Santa Cruz: The Center for the Future of Teaching and Learning, 2001), accessed 11/5/15, https://www.wested.org/resources/the-status-of-the-teaching-profession-2001-report/.

27. High-poverty schools are defined in the report as those in which 76-100 percent of the students are eligible for free and reduced-priced lunches. Low-poverty schools are defined as those in which 0-25 percent of students are on free and reduced-price lunches. Patrick Shields et al, *Status of the Teaching Profession*.

28. Patrick Shields et al, *Status of the Teaching Profession*.

29. Frank Adamson and Linda Darling-Hammond, "Funding disparities and the inequitable distribution of teachers: Evaluating Sources and Solutions," *Education Policy Analysis Archives* 20 (2012).

30. *California State Plan to Ensure Equitable Access to Excellent Educators*, July 2015, accessed 11/9/15, http://www2.ed.gov/programs/titleiparta/equitable/caequityplan092915.pdf.

31. In 2013–14, 1.5 percent of students in the lowest minority decile were being taught by an underprepared or unqualified teacher, compared to 3.3 percent of students in the highest minority decile. Similarly, in the same year, only 1.7 percent of students in the lowest poverty decile were being taught by an underprepared or unqualified teacher, compared to 2.9 percent of students in the highest poverty decile. See *California State Plan to Ensure Equitable Access to Excellent Education* (2015).

32. *One System: Reforming Education to Serve ALL Students*, Report of California's Task Force on Special Education, March 2015, accessed 11/9/15, http://www.smcoe.org/assets/files/about-smcoe/superintendents-office/statewide-special-education-task-force/Special_Ed_Task_Force_Report-reduced.pdf.

33. Roxann Purdue and Marjorie Suckow, *Teacher Supply in California, 2013-14: A Report to the Legislature* (Sacramento: California Commission on Teacher Credentialing, April 2015), accessed 10/4/15, http://www.ctc.ca.gov/reports/TS-2013-2014-AnnualRpt.pdf.

34. Purdue and Suckow, *Teacher Supply in California*.

35. Purdue and Suckow, *Teacher Supply in California*.

36. Gus Haggstrom, Linda Darling-Hammond, and David Grissmer, *Assessing Teacher Supply and Demand* (Santa Monica: The RAND Corporation, May 1988), accessed 10/11/15, http://eric.ed.gov/?id=ED299224.

37. California Department of Finance, "Public K–12."

38. According to the California Department of Finance, Public K–12, the largest raw increases in county enrollment by 2023–24 are expected in Riverside (more than 26,000 students), San Diego (more than 23,000 students), and Kern (more than 21,000 students).

39. Patrick Keaton, *Selected Statistics From the Public Elementary and Secondary Education Universe: School Year 2012–13* (Washington, D.C.: National Center for Education Statistics, U.S. Department of Education, October 2014), accessed 11/7/15, http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014098.

40. Leslie, "SLO County;" Tucker, "Bay Area School Districts;" Noguchi, "Bay Area Schools."

41. Calculated using pupil/teacher ratio data, total public school FTE teachers, and total public school student enrollment from the Digest of Education Statistics, U.S. Department of Education, accessed 11/30/15, https://nces.ed.gov/programs/digest/current_tables.asp. Common Core of Data (CCD) from the U.S. Department of Education was used for the 2013–14 school year, accessed 11/30/15, https://nces.ed.gov/ccd/stnfis.asp. The statewide student-teacher ratio hit a low in 2009–10, therefore comparisons were made between 2009–10 to 2013–14.

42. Richard Ingersoll and Lisa Merrill, *Seven trends: The Transformation of the Teaching Force*, CPRE Working Paper (#WP-01). (Philadelphia: Consortium for Policy Research in Education, University of Pennsylvania, 2012).

43. Roxann Purdue and Marjorie Suckow, "Teacher Supply in California, 2013-14: A Report to the Legislature," Presentation to the California Commission on Teacher Credentialing, April 2015, Item 4D, page GS 3A-6, accessed 10/19/15, http://www.ctc.ca.gov/commission/agendas/2015-06/2015-06-3A.pdf.

44. California Department of Education (CDE) data on Age Distribution of Teachers 2014–15, provided by special request.

45. Richard Ingersoll, *Is There Really a Teacher Shortage?* (Philadelphia: GSE Publications, University of Pennsylvania Graduate School of Education, 2003), accessed 9/17/15, https://depts.washington.edu/ctpmail/PDFs/Shortage-RI-09-2003.pdf.

46. Linda Darling-Hammond and Robert Rothman, *Teacher and Leader Effectiveness in High-Performing Education Systems* (Washington, DC: Alliance for Excellent Education and Palo Alto: Stanford Center for Opportunity Policy in Education, 2011).

47. Digest of Education Statistics, National Center Education for Statistics, accessed 11/18/15, https://nces.ed.gov/programs/digest/d14/tables/dt14_210.30.asp?current=yes.

48. Purdue and Suckow, *Teacher Supply in California*.

49. Studies have produced a range of estimates for beginning teacher attrition, all of which have shortcomings. For example, one recent estimate using national longitudinal data put the attrition rate around 17 percent, finding 83 percent of beginning teachers still teaching at the end of their fifth year, including some who had left and re-entered. (See Lucinda Gray and Soheyla Taie, *Public School Teacher Attrition and Mobility in the First Five Years: Results From the First Through Fifth Waves of the 2007–08 Beginning Teacher Longitudinal Study* (Washington, D.C.: National Center for Education Statistics, U.S. Department of Education, 2015).) However, the analysis omitted the large number of individuals who did not respond to the survey at various points during these years without adjusting for nonresponse bias. In general, survey evidence finds that those who do not respond to such surveys are more likely to have left their position than to have continued teaching. For that reason, the 17 percent figure likely underestimates attrition by an unknown margin. Our own imputations to adjust these data based on the characteristics of non-respondents suggest that the attrition rate is likely at least 19 percent. Older estimates of attrition using national cross-sectional data suggested about a 30 percent attrition rate at the end of five years. (See Darling-Hammond and Sykes, "Wanted.")

50. Deborah Reed, Kim S. Rueben, and Elisa Barbour, *Retention of New Teachers in California* (San Francisco: Public Policy Institute of California, 2006), accessed 11/17/15, http://www.ppic.org/content/pubs/report/R_206DRR.pdf.

51. See for example, Susanna Loeb, Linda Darling-Hammond, and John Luczak, "How Teaching Conditions Predict Teacher Turnover in California Schools," *Peabody Journal of Education* 80, no. 3 (2005).

52. Acacia Thede, Executive Director of Human Resources for the San Diego Unified School District.

53. Figures represent the total pink slips reported by the California Teachers Association in press releases from April 7, 2008, through March 15, 2012, accessed 10/6/15, http://www.cta.org/About-CTA/News-Room/Press-Releases/2008/04/20080407-1.aspx; http://www.cta.org/About-CTA/News-Room/Press-Releases/2009/03/20090313-1.aspx; http://www.cta.org/en/About-CTA/News-Room/Press-Releases/2010/03/20100311_1.aspx; http://www.cta.org/About-CTA/News-Room/Press-Releases/2011/03/20110315_1.aspx ; http://www.cta.org/About-CTA/News-Room/Press-Releases/2012/03/20120315_1.aspx.

54. Fermin Leal, Sarah Tully, and Rebecca Kheel, "'March Used to be the Month We all Dreaded': From 2,219 to a Trickle, Pink-Slip Season Slows for Orange County's Teachers," *The Orange County Register*, March 2015, accessed 10/6/15, http://www.ocregister.com/articles/teachers-654470-school-jobs.html.

55. Stephen Sawchuk, "Steep Drops Seen in Teacher-Prep Enrollment Numbers," *Education Week*, October 21, 2014, accessed 11/11/15, http://www.edweek.org/ew/articles/2014/10/22/09enroll.h34.html.

56. ACT, *The Condition of Future Educators 2014*, ACT (2015), accessed 9/4/15, http://www.act.org/newsroom/data/2014/states/pdf/FutureEducators.pdf.

57. Darling-Hammond and Sykes, "Wanted."

58. Thomas Carroll, *Policy Brief: The High Cost of Teacher Turnover* (Arlington: National Commission on Teaching and America's Future, 2007), accessed 10/16/15, http://nctaf.org/wp-content/uploads/2012/01/NCTAF-Cost-of-Teacher-Turnover-2007-policy-brief.pdf.

59. Matthew Ronfeldt, Susanna Loeb, and James Wyckoff, "How Teacher Turnover Harms Student Achievement," *American Educational Research Journal* 50, no. 1 (2013): 4-36.

60. Linda Darling-Hammond, "Recruiting and Retaining Teachers: Turning Around the Race to the Bottom in High-Need Schools," *Journal of Curriculum and Instruction* 4, no. 1 (2010): 16-32.

61. Adamson and Darling-Hammond, "Funding Disparities."

62. Dominic J. Brewer, "Career Paths and Quit Decisions: Evidence from Teaching," *Journal of Labor Economics* (1996): 313-339; Daniel Mont and Daniel I. Rees, "The Influence of Classroom Characteristics on High School Teacher Turnover," *Economic Inquiry* 34, no. 1 (1996): 152–167; Richard Murnane, Judith Singer, and John Willett, "The Influences of Salaries and 'Opportunity Costs' on Teachers' Career Choices: Evidence from North Carolina," *Harvard Educational Review* 59, no. 3 (1989): 325-347; Richard Murnane and Randall J. Olsen, "The Effects of Salaries and Opportunity Costs on Length of Stay in Teaching: Evidence from North Carolina," J*ournal of Human Resources* (1990): 106–124; Neil D. Theobald, "An Examination of the Influence of Personal, Professional, and School District Characteristics on Public School Teacher Retention," *Economics of Education Review* 9, no. 3 (1990): 241-250; Neil D. Theobald and R. Mark Gritz, "The Effects of School District Spending Priorities on the Exit Paths of Beginning Teachers Leaving the District," *Economics of Education Review* 15, no. 1 (1996): 11-22.

63. In 2011, the North Carolina legislature voted to eliminate funding for the NC Teaching Fellows Program. Until new appropriations are made, the last class of funded fellows graduated in the spring of 2015.

64. Gary T. Henry, Kevin C. Bastian, and Adrienne A. Smith, "Scholarships to Recruit the 'Best and Brightest' into Teaching: Who Is Recruited, Where Do They Teach, How Effective Are They, and How Long Do They Stay?" *Educational Researcher* 41, no. 3 (2012): 83-92.

65. Gray and Taie, Public School Teacher Attrition.

66. Darling-Hammond and Sykes, "Wanted."

67. Linda Darling-Hammond, Roneeta Guha, and Maria Hyler, *Teacher Residencies: An Innovative Model for Preparing Teachers* (Palo Alto: Learning Policy Institute, 2016, forthcoming).

68. Richard M. Ingersoll and Michael Strong, "The Impact of Induction and Mentoring Programs for Beginning Teachers: A Critical Review of the Research," *Review of Educational Research* 81, no. 2 (2011): 201-233; Susan Headden, *Beginners in the Classroom: What Challenging Demographics of Teaching Mean for Schools, Students, and Society* (Stanford: Carnegie Foundation for the Advancement of Teaching, 2014), accessed 11/16/15, http://www.carnegiefoundation.org/wp-content/uploads/2014/09/beginners_in_classroom.pdf.

69. Public Schools of North Carolina, *Quick Facts: School Personnel*, accessed October 28, 2015, http://www.ncpublicschools.org/quickfacts/personnel/; William Bushaw and Shane Lopez, *Public Education in the United States: A Nation Divided*, Phi Delta Kappa/Gallup Poll (September, 2012), accessed 10/15/15, http://valees.org/pdf/pdk_2012_gallup_poll.pdf; Ingersoll and Strong, "Impact of Induction;" Richard Ingersoll and Jeffrey M. Kralik, "The Impact of Mentoring on Teacher Retention: What the Research Says," *Research Review: Teaching Quality* (2004); Maisy Cheng and Robert S. Brown, *A Two-Year Evaluation of the Peer Support Pilot Project: 1990–1992* (Toronto: Toronto Board of Education, Research Department, 1992); Sandra J. Odell and Douglas P. Ferraro, "Teacher Mentoring and Teacher Retention," *Journal of Teacher Education* 43, no. 3 (1992): 200-204; Lee Spuhler and Alan Zetler, *Montana Beginning Teacher Support Program. Final Report* (1995); Edward Fuller, *Beginning Teacher Retention Rates for TxBESS and non-TxBESS teachers*, Unpublished white paper. State Board for Educator Certification, Texas (2003).

70. Carol A. Bartell, "Shaping Teacher Induction Policy in California," *Teacher Education Quarterly* (1995): 27-43; Thomas M. Smith and Richard M. Ingersoll, "What are the Effects of Induction and Mentoring on Beginning Teacher Turnover?" *American Educational Research Journal* 41, no. 3 (2004): 681-714; Margaret Olebe, "A Decade of Policy Support for California's New Teachers: The Beginning Teacher Support and Assessment Program," *Teacher Education Quarterly* (2001): 71-84; Jian Wang, Sandra J. Odell, and Sharon A. Schwille, "Effects of Teacher Induction on Beginning Teachers' Teaching: A Critical Review of the Literature," *Journal of Teacher Education* (2008).

71. Xianglei Chen, Paula R. Knepper, Sonya Geis, and Robin R. Henke. *Progress Through the Teacher Pipeline 1992-93 College Graduates and Elementary Secondary School Teaching as of 1997*. (Washington, DC: National Center for Educational Statistics, 2000).

72. National Commission on Teaching and America's Future, *What Matters Most: Teaching for America's Future*, NCTAF (1996).

73. California Commission on Teacher Credentialing, *Report on New Teacher Induction*, 2015, accessed 11/20/15, http://www.ctc.ca.gov/reports/new-teacher-induction-2015.pdf.

74. Ingersoll and Strong, "Impact of Induction."

75. Ingersoll and Strong, "Impact of Induction;" Glazerman et al. (2010), on finding significant differences in student achievement for teachers who had participated in two years of induction versus the control group.

76. Richard M. Ingersoll, "Teacher Turnover and Teacher Shortages: An Organizational Analysis," *American Educational Research Journal* 38, no. 3 (2001): 499-534; Richard M. Ingersoll, "The Teacher Shortage: A Case of Wrong Diagnosis and Wrong Prescription," *NASSP bulletin* 86, no. 631 (2002): 16-31.

77. The National Center for Education Statistics, part of the U.S. Department of Education, performs the nationally representative Schools and Staffing Survey (SASS) and the Teacher Follow-up Survey (TFS) of current and former elementary, middle, and high school teachers.

78. For examples of recent surveys finding the importance of these factors, see U.S. Department of Education, National Center for Education Statistics, 2012–13 Teacher Follow-up Survey; North Carolina Teacher Working Conditions Survey (2014), accessed 10/28/15, http://www.ncteachingconditions.org/results; Vermont Working Conditions Survey (2013), accessed 10/28/15, http://www.tellvermont.org/results; Maryland Working Conditions Survey (2015), accessed 10/28/15, http://www.tellmaryland.org/results.

79. Ken Futernick, *A Possible Dream: Retaining California Teachers So All Students Learn* (Sacramento: California State University, 2007), accessed 10/28/15, https://www.calstate.edu/teacherquality/documents/possible_dream.pdf.

80. Linda Darling-Hammond, *Doing What Matters Most: Investing in Quality Teaching* (New York: National Commission on Teaching & America's Future, 1997).

81. Loeb, Darling-Hammond, and Luczak, "Teaching Conditions."

82. Jonathan Rochkind, Amber Ott, John Immerwahr, John Doble, and Jean Johnson, *Lessons Learned: New Teachers Talk about Their Jobs, Challenges and Long-Range Plans. Issue No. 2. Working without a Net: How New Teachers from Three Prominent Alternate Route Programs Describe Their First Year on the Job*, (New York: Public Agenda and Washington, DC: National Comprehensive Center for Teacher Quality, 2007), accessed 11/10/15, http://www.publicagenda.org/files/lessons_learned_2.pdf.

83. Barnett Berry, *Keeping the Promise: Recruiting, Retaining, and Growing Effective Teachers for High-Needs Schools* (Carrboro, North Carolina: Center for Teaching Quality, 2009).

84. Steven Glazerman, Ali Protik, Bing-ru Teh, Julie Bruch, and Jeffrey Max, *Transfer Incentives for High-Performing Teachers: Final Results from a Multisite Randomized Experiment, NCEE 2014-4003* (Washington, DC: National Center for Education Evaluation and Regional Assistance, 2013).

85. Berry, *Keeping the Promise*.

86. U.S. Department of Education, National Center for Education Statistics, Teacher Follow-up Survey (TFS), "Former Teacher Data File," 2012–13.

87. Roneeta Guha, Ashley Campbell, Daniel Humphrey, Patrick Shields, Juliet Tiffany-Morales, and Marjorie Wechsler, *California's Teaching Force 2006: Key Issues and Trends* (Santa Cruz, CA: The Center for the Future of Teaching and Learning, 2006).

88. California Student Aid Commission, *2006-07 Annual Report to the Legislature On: Assumption Program of Loans for Education* (2007), accessed 11/19/15, http://www.csac.ca.gov/pubs/forms/grnt_frm/2006-07RprtLegAssumpProgLoanEdu.pdf.

89. Jennifer L. Steele, Richard J. Murnane, and John B. Willett, *Do Financial Incentives Draw Promising Teachers to Low-Performing Schools? Assessing the Impact of the California Governor's Teaching Fellowship*, Policy Brief 10-3 (Stanford: Policy Analysis for California Education, 2010).

90. Michelle Reininger, "Hometown Disadvantage? It Depends on Where You're From: Teachers' Location Preferences and the Implications for Staffing Schools," *Educational Evaluation and Policy Analysis* 34, no. 2 (2012): 127–145; Donald Boyd, Hamilton Lankford, Susanna Loeb, and James Wyckoff, "The Draw of Home: How Teachers' Preferences for Proximity Disadvantage Urban Schools," *Journal of Policy Analysis and Management* 24, no. 1 (2005): 113–132; Darling-Hammond and Sykes, "Wanted."

91. Laurance Warford, "College and Career Transitions Initiative: Responding to a Quiet Crisis," *Pathways to Student Success: Case Studies from the College and Careers Transitions Initiative* (2006): 8, cited in Debra D. Bragg, "Teacher Pipelines: Career Pathways Extending from High School to Community College to University," *Community College Review* 35, no. 1 (2007): 10-29.

92. Gary Yee, "Dispatches from OUSD: How Do You Find Great Leaders For Our Schools," *Oakland Local*, March 21, 2014, accessed 10/28/15, http://linkedlearning.org/zoomfolio/dispatches-from-ousd-how-do-we-find-great-leaders-for-our-schools-community-voices/.

93. Kassie Petermann, "Mounds View Schools begins partnership with Hamline University," *Sun Focus*, October 17, 2013, accessed 11/29/15, http://focus.mnsun.com/2013/10/17/mounds-view-schools-begins-partnership-hamline-university/, cited in Sean Mead, Chad Aldeman, Carolyn Chuong, and Julie Obbard, *Rethinking Teacher Preparation: Empowering Local Schools to Solve California's Teacher Shortage and Better Develop Teachers*, Bellwether Education Partners (2015), accessed 11/9/15, http://bellwethereducation.org/sites/default/files/Bellwether_TFA-CA.pdf.

94. California Teacher Pathway: Teachers From and For Local Communities, accessed October 28, 2015, http://californiateacherpathway.org/.

95. California Commission on Teaching Credentialing, *California School Paraprofessional Teaching Training Program*, (December 2014), accessed 10/17/15, http://www.ctc.ca.gov/reports/PTTP-2014-report.pdf.

96. Darling-Hammond, Guha, and Hyler, *Teacher Residencies*.

97. Feng Li and Tim Sass, *Special Education Teacher Quality and Student Achievement* (Washington, DC: National Center for Analysis of Longitudinal Data in Education Research (2010), accessed 12/4/15, http://www.caldercenter.org/; Andre Nougaret, Thomas Scruggs, and Margo Mastropieri, "Does Teacher Education Produce Better Special Education Teachers?" *Exceptional Children*, 71 (2005): 217-229.

98. To provide school districts with more flexibility in their use of funds during the period of significant budget cuts, the state eased or removed the spending requirements associated with roughly 40 categorical programs, including the Beginning Teacher Support and Assessment Program (BTSA). In the fall of 2010, the Legislative Analyst's Office sent a survey to all 1000 school districts to better understand how they were using the new flexibility. Of the 382 that responded, 48 percent reported shifting funds away from BTSA. Another six percent said they had eliminated the program; 15 percent said they had changed the program in major ways; and 35 percent said they had changed the program in minor ways. See Mac

Taylor, *The 2011–12 Budget: Year-Two Survey: Update on School District Finance in California* (Sacramento: California Legislative Analyst's Office, February 7, 2011).

99. Office of the Mayor, "Mayor Lee Announces New Plan to Provide Stabilized Housing for 500 Teachers by 2020," *City and County of San Francisco*, October 2, 2015, accessed 12/7/15, http://www.sfmayor.org/index.aspx?recordid=973&page=846; Kristi Myllenbeck, "Cupertino: School District Wants to Build Housing for Teachers," *San Jose Mercury News*, December 9, 2015, accessed 12/7/15, http://www.mercurynews.com/cupertino/ci_29220510/cupertino-school-district-wants-build-housing-teachers.

100. Findings are based on a survey carried out from September 17 to October 4, 2015, by the Field Poll and commissioned by EdSource and the Learning Policy Institute. Telephone interviews were conducted by live interviewers of a random sample of 1,002 registered voters.

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