The Teacher Shortage:
Causes and Recommendations for Change

by

J. M. Pogodzinski
Department of Economics (0114)
San Jose State University
One Washington Square
San Jose, CA 95192-0114
Tel: (408) 924-5421

email: pogodzinski@earthlink.net
website: www.pogodzinski.com

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Executive Summary

This study examined the causes of the apparent shortage of qualified teachers in California public schools, based upon data from four counties (Alameda, Fresno, Los Angeles, and San Diego) which are representative of the state. The influence of two aspects of teachers' pay on the use of emergency permits and credential waivers was investigated: the *level* of teachers' pay and the *dispersion* of teachers' pay within a county. The report's main conclusions are:

- **Teachers' real compensation varies considerably across the state, and also varies considerably across school districts within the same county.**
- **Where teachers were paid poorly relative to earnings within the county, pay is a significant factor in explaining the use of emergency permits and credential waivers.**

These results must be interpreted with caution. The study looked at only four counties, and only two years' worth of data on emergency permits and credential waivers was available. New teacher hires, transfers from other districts, and exits due to retirement or resignation were not distinguished in the data, so the effect of teachers' salaries on retention and recruitment into teaching cannot be directly gauged.

The report also developed a county-level grade-specific forecasting model of the demand for teachers. Estimates of teacher demand by grade in the four counties studied are made to 2007-08. The main conclusions concerning demand forecasting are:

- **The demand for teachers will vary across the state because enrollment will grow at different rates in different counties.**
- **State-wide enrollment in grades subject to class-size reduction will *decline* in the next ten years, while enrollment in non-regulated grades will *increase* significantly.**

The report recommends:

- **Increasing teachers' pay in markets where teachers' salaries are low relative to earnings and costs in the county.**

- **Reducing the dispersion of teachers' pay across districts, to limit concentration of emergency permits in particular districts.**

In so doing, the report recommends that pay increases be targeted to those counties and regions where teachers' pay is low relative to their opportunity cost. These appear to be the areas where changes in pay have a significant impact on the use of emergency permits and credential waivers. The concentration of emergency permits in some districts is at least partly accounted for by the dispersion of teachers' pay across districts in the same county. A method of supplementation designed to reduce the dispersion of teachers' pay across districts (in targeted counties) will limit the concentration of emergency permits in particular districts.

The study suggests new lines of research. In particular, research concerning the long-run effect of salary and other variables on recruitment into teaching should be based upon an explicit economic model of career choice. Specific recommendations for new research include:

- **Identifying counties where teachers' salaries are low relative to earnings and costs in the county and where salary increases would have a significant impact on the use of emergency permits and credential waivers.**

- **Estimating the cost of relying on targeted salary increases to reduce reliance on emergency permits and credential waivers.**

I. INTRODUCTION

The shortage of teachers in public schools is one of the most significant public policy issues facing Californians. The teacher shortage lowers the quality of instruction in public schools. Either students are taught by uncertified teachers, or class sizes are larger than would be the case if schools were more fully staffed. Evidence of this shortage is apparent from a number of indicators - the number of emergency permits and credential waivers,[1] the number and duration of faculty vacancies in schools, and the pupil-teacher ratio in non-regulated grades.[2] The situation in California mirrors that in the rest of the U.S.; the teacher shortage has been recognized as a national problem.[3]

Suggestions for ameliorating the shortage focus the system that generates the demand for and supply of teachers. For example, some suggestions focus on increasing the capacity of teacher preparation programs, or on providing new avenues for obtaining teaching licenses. Much of the national debate has focused on the appropriate kind of licensing.[4] These suggestions point to parts of the system which seem not to work efficiently or effectively. However, focus on these elements in isolation is misleading. Appropriate policy can only be developed by understanding how the entire system functions.

This report examines three related elements of the teacher shortage: teachers' compensation, the determinants of the demand for emergency credentials by school districts, and forecasts of demand for teachers in California. To understand the teacher shortage, it is

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[1] An emergency permit authorizes an individual who has not completed all requirements for a teaching credential to serve in a California classroom. A credential waiver is issued at the request of a school district to temporarily waive specific credential requirements for an individual. See California Commission on Teacher Credentialing, *1997-98 Annual Report: Emergency Permits and Credential Waivers*, May 1999.

[2] Exacerbating the California teacher shortage have been recent policies concerning class size reduction, which have mandated lower class sizes in grades K-3.

[3] The U.S. Department of Education recently issued a report entitled *Back to School: Special Report on the Baby Boom Echo, No End in Sight*. Internet. <www.ed.gov/pubs/bbecho99/index.html>.

necessary to understand the labor market for teachers, consisting of the supply of teacher labor and the demand for teacher labor. Generally, separate factors affect supply and demand. If the market for teacher labor is competitive - that is, if teachers' compensation is determined by numerous buyers and sellers of labor, none of whom is large relative to the market - then the pay of teachers is determined as a competitive equilibrium.[5] Below, the factors that determine demand and supply in the teacher labor market are outlined. The question of whether the teacher labor market is competitive is also discussed.

A. Determinants of Demand

School districts are the demanders (buyers) of teacher labor for public schools. Demand for teachers depends on a number of factors, but most importantly on enrollment and class size. Enrollment projections are published by grade for each county in California by the Demographic Research Unit of the California Department of Finance (DOF). These projections are updated periodically. Presently, enrollments are forecast to the 2007-08 school year.

Consider school districts as producers of education; teacher labor is one of the inputs (resources) used in the production process. Most forecasts of the demand for teachers[6] are based on the assumption that there is a fixed pupil-teacher ratio or a fixed class size.[7]

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[4] See, for example, Darling-Hammond, Linda, Arthur E. Wise, and Stephen P. Klein. *A License to Teach: Raising Standards for Teaching.* Jossey-Bass, 1999.

[5] The term competitive equilibrium means that the anonymous market determines the pay of teachers, not either the demanders of labor (school districts) nor the suppliers of labor (unionized teachers).

[6] For example, the SRI Model, which is the only previously published forecast that is specific to California, and the Grade-Specific Demand Forecasting Model, developed in this paper, make this assumption.

[7] This assumption can be termed a *fixed-proportions technology* in the production of education. The fixed-proportions assumption does not allow for the substitution of one input for another in production. A more general assumption would allow the same output to be produced using various combinations of inputs. For example, teachers' aides or computers might substitute for teachers in the production of education. Licensing directly constrains the ability of school districts to substitute teachers across activities; a teacher who is certified in one subject cannot teach another subject. This raises the cost of producing those activities.

There is considerable variation in class sizes across school districts in the California. Both the pupil-teacher ratio and the class size are available by district from California Basic Educational Data System (CBEDS).[8] Invariably average class sizes are greater than the pupil-teacher ratio. For example, in 1997 the average enrollment-weighted class size was 27.3, while the enrollment-weighted pupil-teacher ratio was 21.9. Class size also varies by grade. The 1997 CBEDS data indicate that the enrollment-weighted class size in Kindergarten was 25.55, in first grade 21.56, in second grade 20.86, in third grade 24.62, and in the remaining grades class size averaged 29.40. In general, the pupil-teacher ratio was 80.21% of the class size.

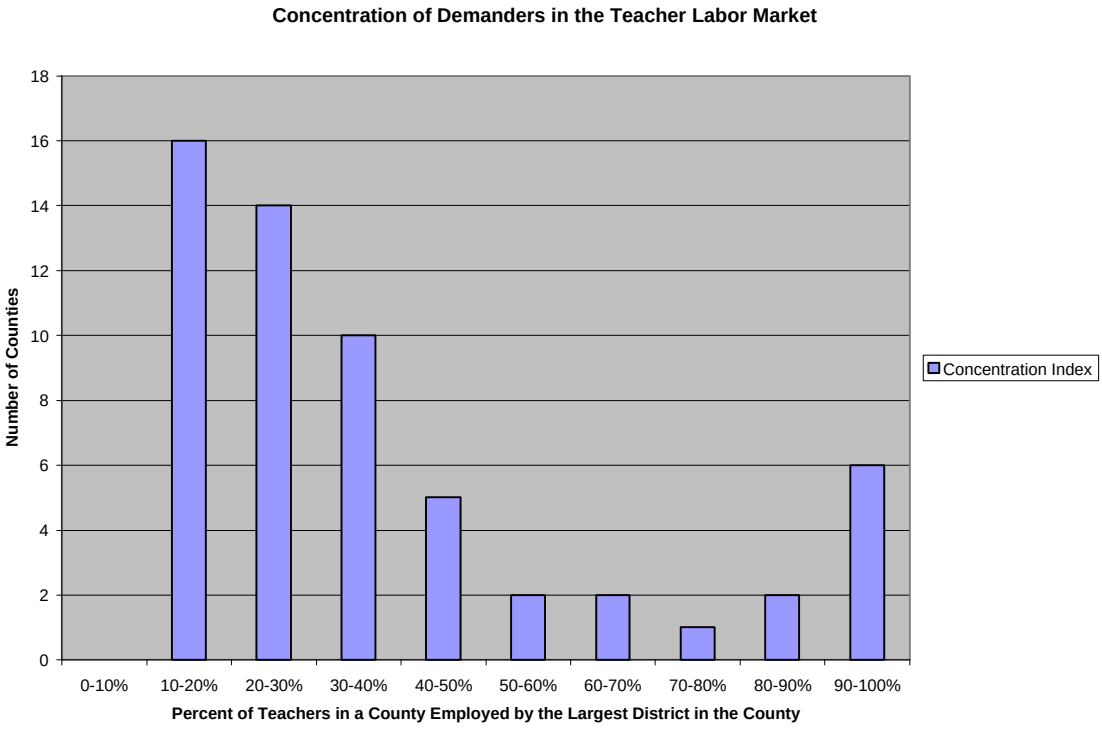
Class size reduction (CSR) is a program to reduce class sizes in certain ("regulated") grades. Presently, CSR affects grades K-3 and 9. If the number of teachers and students in a school is fixed, and if, initially, class sizes in regulated classes are larger than the CSR targets, the effect of implementing CSR will be to lower class sizes in the regulated classes, and increase class sizes in unregulated classes.

The market for public school teachers in California cannot generally be characterized as competitive because of the high degree of concentration on the demand side. Public school districts are the predominant demanders of teacher labor in California. About 90% of K-12 pupils in California attend public schools. Seven California counties have only one public school district, and even those that have numerous public school districts may exhibit a high degree of employer concentration. **Figure 1** illustrates the concentration of public school employers across California's 58 counties. About half of the counties have a single

[8] The pupil-teacher ratio and the class size are distinct statistics. Each is reported separately in the CBEDS data. The pupil-teacher ratio is computed as the district enrollment divided by the number of full-time equivalent teachers. The average class size is computed as the average number of students per class. A difference in the figures arises if some teachers have non-class assignments.

school district that employs at least 30% of the public school teachers in the county. The degree of concentration affects the relative bargaining power of teachers and school districts.[9]

Figure 1



Four counties which are representative of California were studied in detail in this report (Alameda, Fresno, Los Angeles, and San Diego). **Table 1** gives the number of school districts, the concentration measure,[10] and an index which shows whether the dominant school district in the county pays more than (index greater than 100) or less than (index less than 100) the average teachers' pay in the county.[11] Los Angeles County has the highest concentration (about 44% of public school teacher employment by the dominant district);

[9] Almost all school districts in California are unionized.
[10] The concentration measure is the percentage of employment in the largest school district in the county.
[11] This indicates whether the dominant school district is relatively high-paying or relatively low-paying. The dominant school district in Alameda County (Oakland Unified) pays about 8% less than the average of districts in Alameda County, whereas the dominant school district in Fresno County (Fresno Unified) pays more than 1% above the average of districts in Fresno County.

Alameda County has the lowest concentration (about 27% of public school teacher employment by the dominant district). In the counties with the greatest degree of concentration (Fresno and Los Angeles) the dominant district pays more than the county average teachers' pay. This is the opposite of what economic theory leads one to expect. Generally, the more competitive are public school districts for teacher labor, the greater will be the tendency to bid up teachers' pay.

Table 1. Characteristics of School Districts in Selected Counties (1997)

County	Number of Districts	Percent of Employment in Largest District	Average Real Pay of Largest District*
Alameda	19	26.88	92.32
Fresno	36	43.95	101.35
Los Angeles	82	44.04	100.42
San Diego	44	30.88	97.76

*100=average teachers' pay in county

B. Determinants of Supply

This report will focus on teachers' salaries as a potential explanation for the shortage of teachers. The role of salaries in the shortage of teachers has not been well understood despite the attention it has received. Obviously, there are other factors, such as class size or the physical condition of school facilities, that account for the supply of teachers. Salaries may affect both the *short-run* and *long-run* supply of teachers to a district. In the short-run, the supply of teachers is fixed, but the available teachers are allocated across competing districts based upon districts' relative pay. Most of those taking jobs are new teachers (i.e., recent gradates of teacher preparation programs) for whom the starting salary is perhaps the most important consideration. However, the *salary structure* of a district may also impact the number of new teachers willing to work in the district in the short-run. Recent graduates may be motivated by their prospective career earnings in a district. The salary structure may also affect the attractiveness of the district to veteran teachers.

Teachers' salaries also affect the long-run supply of teachers. Undergraduates choose majors to prepare for careers based in part on the relative compensation (pecuniary and non-pecuniary) offered by different professions. Veteran teachers continue in teaching or start a new career based in part on the prospective lifetime earnings in the career.

This report examines the influence of two aspects of teachers' pay on the use of emergency permits and credential waivers: the *level* of teachers' pay and the *dispersion* of teachers' pay within a county. Each of these factors may exert an independent influence on the supply of teachers to a district. If the level of pay is low, veteran and potential teachers will be attracted to alternative occupations. If the dispersion of teachers' pay is great, then teachers will be attracted to districts where the pay is higher. The level of teachers' pay can be measured by examining the purchasing power of teachers' pay (the *real* teachers' pay) or by comparing teachers' pay with others' pay, or with other costs. The dispersion of teachers' pay within a county can be measured by determining what percentage of teachers earn a given percentage of the average teachers' pay in a county.

C. Methodology for Comparing Salaries

In order to compare teachers' pay across counties over time, data on teachers' salaries must be adjusted. Three basic adjustments were made to the initial data.

1. *Real* average annual salary was computed from the data for *nominal* average annual salary. Nominal annual salary amounts are the dollar amounts actually paid each year. Changes in nominal figures do not accurately reflect changes in purchasing power because of inflation. The effects of inflation can be removed by converting the nominal figures to real figures, using a Consumer Price Index (CPI).[12] For the data from Alameda,

[12] A Consumer Price Index number, e.g., 154 for the CPI for California in 1995, means that consumer prices were on average 54% greater in 1995 than in the base period of the CPI, 1982-84. To determine whether the

Los Angeles and San Diego counties, the Consumer Price Index specific to the region in which the school district is located was employed. For Fresno, the CPI for California was employed. In addition, the CPI for fiscal years (as opposed to calendar years) was available for the regions containing Alameda County and Los Angeles County. Such a CPI was deemed more appropriate to apply to teachers' pay, which is usually negotiated on a school-year basis.[13] Each of these price indexes has the same base period: 1982-1984.[14]

2. The real *per diem* salary figure is computed, because the number of service days differs across districts (by as much as two work weeks), and sometimes is different in different years for the same district.

3. Most comparisons use an *employment-weighted* average. This measure computes the average salary as weighted by employment in the district. There appears to be greater dispersion of teachers' salaries when presented in terms of the distribution across school districts. However, districts that pay significantly above or below the average of a county are often small. The employment-weighted average gives a clearer sense of the market significance of salaries paid by these districts.

Table 2. Teachers' Real Average Annual Salaries Compared to 1995-96

Year	Alameda	Fresno	Los Angeles	San Diego
1995-96	100.0	100.0	100.0	100.0
1996-97	103.5	99.6	97.4	99.7
1997-98	105.5	103.0	99.6	102.3

salary paid in 1995 has increased or decreased in purchasing power, the real salary must be computed from the nominal salary by the following formula: real salary_{95}=(nominal salary_{95}/price index_{95})*100.

[13] Appendix Table 1 shows the CPI figures for 1995-98 for the U.S., California, and the three regions of California for which official CPI figures are available. Using data for individual regions or fiscal as opposed to calendar years where available makes a slight difference in the results; the figures differ by only about 3%.

[14] By adjusting to real from nominal teachers' pay, the effects of inflation *since the base period* are removed. This controls for the different rates at which prices may change across parts of California, e.g., the different rates at which prices may change in Southern California compared to the San Francisco Bay Area. This method does *not* control for different *costs of living* in different regions. A separate calculation is made to control for that effect.

Table 2 shows the growth in teachers' real average annual salaries in the four counties over the last three years for which data were available. Teachers' real average salaries grew in three counties, and declined slightly in Los Angeles County. The purchasing power of teachers' salaries was on average 5.5% *greater* in Alameda County in 1997-98 than in 1995-96. The purchasing power of teachers' salaries was on average (4/10) of 1% *less* in Los Angeles County in 1997-98 than in 1995-96. This reflects differences in the growth of nominal teachers' pay rather than different rates of inflation in the counties. The CPI rose somewhat more quickly in the regions containing Alameda County and San Diego County than in the region containing Los Angeles County or California as a whole.

Table 3. Teachers' Real Minimum Annual Salaries Compared to 1995-96

Year	Alameda	Fresno	Los Angeles	San Diego
1995-96	100.0	100.0	100.0	100.0
1996-97	106.2	101.3	100.1	100.3
1997-98	107.8	102.9	103.9	103.7
1998-99	106.5	106.3	106.2	104.5

The purchasing power of minimum (starting) teachers' salaries increased on average in all four counties, as seen in **Table 3**. Purchasing power of starting salaries in Alameda County was on average 6.5% *greater* in 1998-99 than in 1995-96, and on average 4.5% *greater* in San Diego County comparing the same periods. Purchasing power of starting salaries has increased more, and more consistently, in the four counties under study than average salaries. This is undoubtedly the effect of conscious policies to increase the number of teachers by attracting new recruits to the profession. The statistics on the average teachers' pay, however, tends to mask the variation in teachers' pay across school districts within each county.

Computing real salaries controls for differential rates of inflation across regions and over time. However, this correction does not account for differences in the *cost of living* as

that term is usually understood. It also does not capture the *opportunity cost of teaching*, which is the value of the next best employment alternative teachers have to teaching. The opportunity cost depends in part on local labor market conditions. Two kinds of salary comparisons can capture these effects. The cost of living can be reflected in the cost of a *numeraire* good (i.e., one can express the cost of living across different regions in terms of the cost of buying a specific good, like bread). Because data on median housing prices is available for regions including the counties under study, teachers' real annual salaries are compared with real median house prices in the region. The opportunity cost of teaching can be measured by comparing teachers' real annual salaries with real earnings per job in the same county (which is available for 1996).[15]

Table 4. Median Single Family Home Price Compared to Teachers' Salary

Ratio of Real Median Existing Single-family Home Sale Price to Real Average Teachers' Salary

Year	Alameda	Fresno	Los Angeles	San Diego
1995-96	6.26	2.73	3.90	3.92
1996-97	6.27	2.73	4.03	4.11
1997-98	6.71	2.72	4.24	4.39

Change* in Ratio of Real Median Existing Single-family Home Sale Price to Real Average Teachers' Salary

Year	Alameda	Fresno	Los Angeles	San Diego
1995-96	100.0	100.0	100.0	100.0
1996-97	100.2	99.8	103.2	104.7
1997-98	107.2	99.5	108.5	111.9

*100=1995-96

Table 4 gives the ratio of median value single-family house to real teachers' salary for the four counties. The ratio can be interpreted roughly as the number of years of work required to earn the purchase price of a median-priced house in the region.[16] Where this ratio

[15] Ideally, the comparison would be with jobs involving the same level of education and skills as teaching. However, county-level data of such detail is not available. California Department of Finance, *County Profiles*.
[16] Of course, this is not a forecast of the time required to acquire a house, because it does not account for any other determinants of house purchase. Furthermore, the comparisons made in Table 4 should be taken as a

is the lowest, a teacher's salary is greatest in terms of purchasing a house and vice versa. Fresno County teachers are best-off when comparison is made in terms of purchasing the median priced house. The ratio is 2.7 and *declined* slightly over the period. It takes 2.7 years on average for Fresno County teachers to earn the price of a median priced home in Fresno County. Alameda County teachers are the worst-off. The ratio *increased* from 6.2 to 6.7 over the period. It requires about two and one-half times the number of years for Alameda County teachers to earn the purchase price of the median-priced house as for Fresno County teachers. The lower panel shows that the relative inflation of house prices compared with teachers' salaries has most adversely affected San Diego County teachers, whereas Fresno County teachers are on average slightly better off in these terms.

Table 5 compares real teachers' salaries in the county with real average earnings per job in the county. All of the (employment-weighted) average magnitudes are greater than 100. Teachers' salaries on average are more than 100% of the earnings on the average job in the county in which the school district is located. This is not surprising since teachers have above average educational attainment. Note, however, that the relative ranking of teachers' pay compared with the average earnings on jobs in the county varies considerably by county. Teachers in Fresno County school districts earn about 54% more than the average job in the county, whereas Alameda County teachers earn only about 21% more than the average job in the county.

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rough gauge only since the characteristics of the median priced home may differ from region to region (i.e., quality is not held constant).

Table 5. Comparison of Average Teachers' Salary with Average Earnings Per Job

County	Average Teachers' Salary Compared with Real Average Earnings Per Job in County, 1996 (100=Average Earnings Per Job in County)
Alameda average*	120.94
Alameda min**	111.93
Alameda max***	158.04
Fresno average*	153.89
Fresno min**	135.59
Fresno max***	175.90
Los Angeles average*	126.24
Los Angeles min**	98.10
Los Angeles max***	139.48
San Diego average*	150.61
San Diego min**	126.46
San Diego max***	162.81

*employment-weighted average
**minimum among school districts from the county included in the sample
***maximum among school districts from the county included in the sample

There is also wide dispersion across school districts *within* counties when teachers' salaries are compared with the average earnings per job in the county. Los Angeles County teachers fared the worst. Some districts paid less than the county average earnings per job. In Los Angeles County, teachers never earn more than 40% above the real average earnings per job in the county. In contrast, Fresno County teachers never earn less than 35% above the real average earnings per job in the county, and the best-paid Fresno County teachers earn 75% above the real average earnings per job in the county.

The dispersion of teachers' real per diem pay also varies considerably *across* counties. One way to measure this dispersion is to determine what percentage of teachers earn a real per diem pay within a given band around the county average of teachers' pay. **Table 6** presents the percentage of teachers in each county who earn plus or minus 5% or 10% of the average pay of teachers in the county. About 21.5% of teachers in Alameda County earn plus

or minus 5% of the county average teachers' pay, while almost 97% of teachers in San Diego County earn plus or minus 5% of the county average teachers' pay. The dispersion of teachers' pay is greater in Alameda County than in San Diego County, whether plus or minus 5% or 10% is used as a gauge. The dispersion of teachers' pay should be greater the larger is the number of school districts, and the lower the degree of employer concentration in the county.

Table 6. Dispersion of Teachers' Salaries

AVERAGE TEACHERS' SALARIES

County	Percent of FTE Teachers Earning Plus or Minus 5% of County Average (1997-98)	Percent of FTE Teachers Earning Plus or Minus 10% of County Average (1997-98)
Alameda	21.44	85.98
Fresno	80.44	95.74
Los Angeles	84.35	92.93
San Diego	96.94	99.53

MINIMUM TEACHERS' SALARIES

County	Percent of FTE Teachers Employed in Districts Paying +/- 5% of County Average (1998-99)	Percent of FTE Teachers Employed in Districts Paying +/- 10% of County Average (1998-99)
Alameda	1.98	42.56
Fresno	77.90	96.28
Los Angeles	74.23	87.08
San Diego	58.03	97.07

In the lower panel of **Table 6**, the percentage of teachers employed in districts that pay plus or minus a given percent of the county average minimum (starting) teachers' pay is given. Less than 2% of teachers in Alameda County are employed in districts that pay plus or minus 5% of the county average teachers' minimum (starting) pay, whereas almost 78% of teachers in Fresno County are employed by such districts. The dispersion of teachers' minimum (starting) pay is greater in Alameda County than in Fresno County. Moreover, the dispersion of minimum (starting) pay is generally greater than the dispersion of average pay.

Some of the observations made above about the dispersion of teachers' average and starting pay can be appreciate visually. **Figure 2** shows the dispersion of teachers' real *average* per diem salaries in each of the four counties. The wide dispersion of teachers' real salaries is apparent. The skewness of the distribution, with its long upper (right-hand) tail, is notable for Alameda County. **Figure 3** shows the dispersion of teachers' real *minimum* per diem salaries in each of the four counties. The greater dispersion of minimum (starting) salaries compared with average salaries is evident by comparing the corresponding histograms for each county. Again, the greater dispersion of minimum (starting) salaries in Alameda County compared with the other three counties is evident. **Appendix Figures 4a-4d** and **5a-5d** give the distribution of teachers' average and minimum salaries, respectively, for each of the counties for several years.

Figure 2

Distribution of Real Average Per Diem Teachers' Salaries, Selected Counties, 1997-98

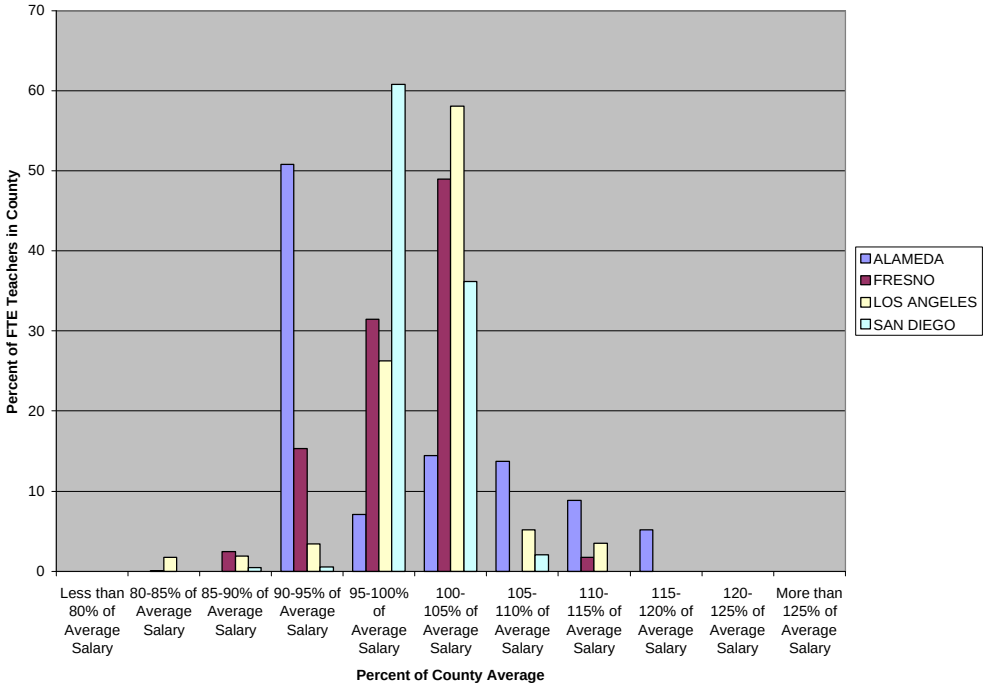
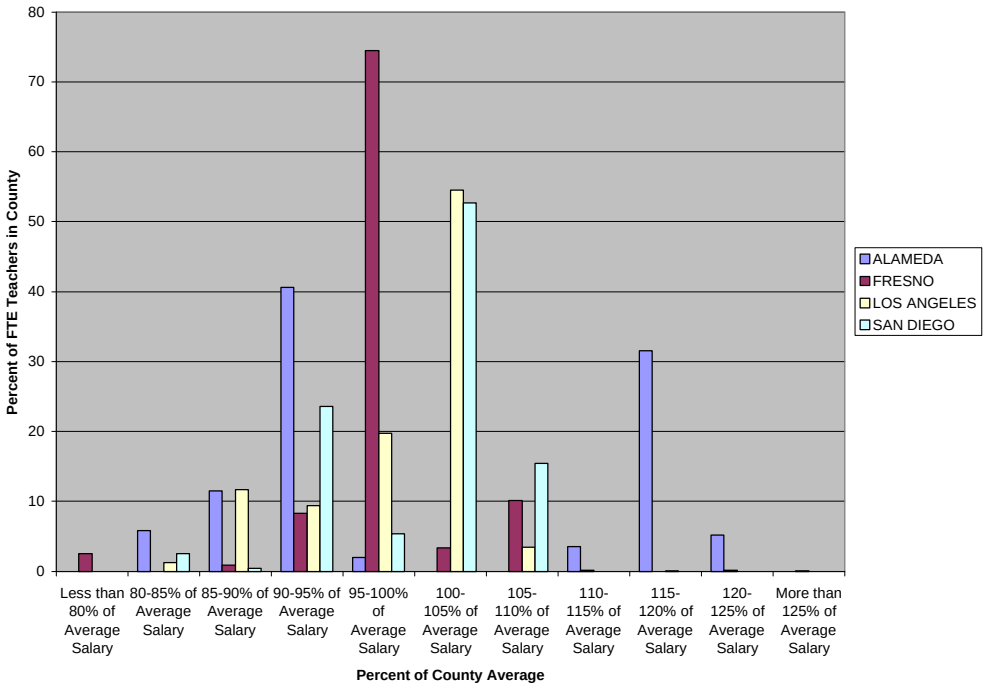


Figure 3

Distribution of Real Minimum Per Diem Teachers' Salaries, Selected Counties, 1998-99



II. TEACHERS' SALARIES AND EMERGENCY PERMITS

Table 7 gives a comparison among the four counties in the extent of use of emergency permits. The use of emergency permits increased from 1996-97 to 1997-98 in each of the counties. Almost 20% of teachers in Los Angeles county districts used emergency permits, while fewer than 6% of San Diego County teachers used emergency permits.

Table 7. Percent of FTE Teachers with Emergency Credentials, Selected Counties

County	1996-97	1997-98
Alameda	8.9	11.3
Fresno	7.4	8.5
Los Angeles	17.7	19.9
San Diego	4.7	5.7

Economic theory holds that the supply of labor to any activity depends on the opportunity cost of labor, i.e., on the compensation available in the next-best alternative activity. This suggests that the supply of teacher labor will be greater to districts that offer higher real compensation. Thus, the use of emergency permits should be *negatively* related to measures of real compensation. The distribution of salaries across districts within the same county partly captures the opportunity cost of teachers working in a particular district. The shortage of teachers can be expected to be greater in districts that pay relatively less than competing districts within the same county. As a corollary, we expect greater use of emergency permits to be associated with paying below average salaries, especially starting salaries (i.e., the coefficient on below average salaries should be *positive*).

A. Elasticity Estimates

One way to test these ideas is to estimate (using school district-level data) regression equations that have as a dependent variable the logarithm of the number of emergency permits and credential waivers (see Appendix A for details of the methodology). The

advantage of this approach is that it allows us to isolate the effect of each independent variable upon the number of emergency permits demanded. Thus, the effects of teachers' compensation on the use of emergency permits and credential waivers can be determined *holding constant other variables* that also may contribute to the demand for emergency permits and credential waivers.

Table 8 gives the results of estimating these equations for each of the counties. Other determinants of the level of emergency permits and credential waivers included in the equations are enrollment in the district, factors specific to each year of observations, and measures of the level and dispersion of teachers' compensation. Generally, expectations about the sign of coefficients are borne out. The year dummy is always positive but statistically significant in only one case. The coefficient on enrollment is always significant and positive, and the estimated values cluster around one. The estimated coefficients range from 0.96 (Fresno) to 1.14 (Los Angeles). This means that other factors held constant an increase in district enrollment of 1% will result in a 0.96 % increase in the use of emergency credentials in Fresno county, and a 1.14% increase in the use of emergency credentials in Los Angeles County.

Three different variables measuring teachers' pay were employed. In Specification 1, the logarithm of teachers' real per diem salary, reflecting the *level* of average salaries, was used. In Specification 2, the index of real salary (i.e., the salary relative to the county average teachers' salary), reflecting the *dispersion* of average salaries, was used. Both of these teachers' pay variables are statistically significant and of the expected sign in the regressions for Alameda County and Los Angeles County, and not significant in the other counties. This result is in keeping with the notion that teachers' pay makes a difference

where teachers' salaries are low relative to other salaries and other costs. Where teachers' pay is relatively high compared to other pay in the county (as in Fresno and San Diego counties), the level of pay does not appear to play a significant role in explaining the use of emergency credentials and waivers.[17]

Table 8. Regression Summary

Specification 1 Estimated Coefficients (* indicates statistically significant coefficients)

County	Const	YrDummy	Ln(Enroll)	Ln(Real Pay)	LOWDUMMY	# Obs	Adj R Squared
Alameda	19.47*	0.19	1.10*	-5.10*	-0.41	32	0.80
Fresno	4.12	0.23	0.96*	-1.89	0.76*	38	0.76
Los Angeles	18.59*	0.22*	1.14*	-4.97*	-0.10	136	0.77
San Diego	-12.93	0.09	1.03*	1.27	0.13	56	0.72

Specification 2 Estimated Coefficients (* indicates statistically significant coefficients)

County	Const	YrDummy	Ln(Enroll)	Rel. Real Pay	LOWDUMMY	# Obs	Adj R Squared
Alameda	-1.10	0.10	1.11*	-0.05*	-0.45	32	0.81
Fresno	-3.20*	0.17	0.96*	-0.02	0.76*	38	0.76
Los Angeles	-1.36	0.10	1.14*	-0.05*	-0.09	136	0.77
San Diego	-7.93*	0.13	1.03*	0.01	0.13	56	0.72

The size of the estimated coefficient on teachers' real per diem salary (in Specification 1) is similar in both Alameda and Los Angeles counties - about 5 in absolute value. This means that, holding other factors constant, a small (say a 1%) increase in real average per diem salary will result in about a 5% *decrease* in the use of emergency credentials. Alameda and Los Angeles are also the counties where the extent of the teacher shortage as measured by the percentage of teachers with emergency permits (see **Table 7**) is the greatest.

That the index of relative pay variable, reflecting the dispersion of pay, used in Specification 2 is statistically significant in the same cases where the real per diem salary

[17] In addition, the variable LOWDUMMY, which is a dummy variable indicating that a district pays less than 95% of the county average starting salary, is common to both specifications. The variable LOWDUMMY is statistically significant and of the expected sign (positive) only in Fresno County (for both Specification 1 and Specification 2).

variable is significant suggests that relative pay across districts serves to allocate some teachers who may be relatively immobile. Thus, pay disparity contributes to the concentration of the use of emergency permits and credential waivers in some school districts. (Other factors may account for the concentration of emergency permits and credential waivers in particular schools within school districts.)

Consider altering teachers' pay as a strategy for reducing the use of emergency permits and waivers. **Table 9** presents calculations for Alameda and Los Angeles Counties based on the elasticity estimates of **Table 8**. The top panel gives percentage changes from the present average starting teachers' salary for starting teachers' salaries to reach target levels of $32,000 and $40,000.[18] These percentages differ because starting salaries are lower in Los Angeles County than in Alameda County. Raising starting teachers' salaries to $32,000 would constitute about a 2% increase in Alameda County, and a more than 10% increase in Los Angeles County.

The middle panel of **Table 9** applies these same percentages to the average salary paid in each county.[19] Using the elasticity estimates and the percentages from the top panel, estimated reductions in the use of emergency permits and credential waivers (EP&CWs) are given.[20] The bottom panel gives target nominal salary figures needed to reduce the use of EP&CWs by 50% in Alameda and Los Angeles Counties.

These calculations are subject to a number of caveats and limitations. First, the estimates are based only on data from two counties for two years (the only period for which computerized data on district-level use of EP&CWs was available). Second, the regression

[18] These figures have been mentioned as targets for starting teachers' salaries.
[19] The nature of the data and the estimation methodology do not support interpreting the results as applying only to starting teachers.

equations did not contain variables representing school characteristics. Third, the data included only the total number of teachers employed in each district in each year, and did not distinguish new hires from transfers of veteran teachers.

Table 9. Elasticity Estimates and the Use of Emergency Permits and Credential Waivers

		Percent Increase in Starting Salary If Raised to:	
County	**Estimated Salary Elasticity**	**$32,000**	**$40,000**
Alameda	-5.10	1.9	27.4
Los Angeles	-4.97	10.3	37.9

		Estimated Reduction in Number of P&Ws Used for Increase in Average Salary Which is the Same as Percentage Increase of Starting Salary to:	
County	**Current Use of EP&CWs**	**$32,000**	**$40,000**
Alameda	2365	212	1660
Los Angeles	26854	10405	21469

	Target Teachers' Pay to Reduce Use of EP&CWs by 50%	
County	**Nominal Pay**	**1997-98 Actual Nominal**
Alameda	$52,963	$46,870
Los Angeles	$50,830	$44,982

B. Policy Implications

What does this suggest about public policy? First, the regressions in **Table 8** suggest that the level and dispersion of average pay are not a significant factor determining the use of emergency permits and credential waivers in Fresno and San Diego counties. Thus, increasing teachers' average pay or reducing dispersion of average pay in those counties would be irrelevant to addressing this problem. A possible explanation for the insignificance of teachers' pay in those counties is that teachers in Fresno and San Diego counties are relatively well paid compared to alternative jobs in the county. Where teachers are well-paid, salary seems not to be a significant explanatory variable in the use of emergency permits and

[20] These estimates are based upon using the estimated point elasticity (which assumes small changes in salary) in a formula which uses the integral of the natural logarithm function to estimate the effect of relatively large changes in salary.

credential waivers. The relative pay variable of Specification 2 is significant in the same cases (Alameda and Los Angeles Counties) as the real pay variable of Specification 1. This means that for Alameda and Los Angeles Counties, the average pay of a school district relative to other districts in the same county is a statistically significant factor in explaining the use of EP&CWs. One interpretation of this is that (new and veteran) teachers allocate themselves to school districts within a county partly based on relative pay. Therefore, dispersion of pay contributes to the concentration of use of EP&CWs in particular school districts.

Low teachers *starting* salaries (as distinct from *average* salaries) are associated with greater use of EP&CWs in only Fresno. This suggests that starting salaries may play an independent role in explaining the use of EP&CWs some cases. However, since the data do not distinguish new hires from veteran teachers, any such conclusion is very tentative.

III. FORECASTS OF THE TEACHER SHORTAGE

These observations about the significance of pay in reducing the use of emergency permits and credential waivers in some regions of California raises the issue of the regional demand for teachers. As mentioned above, the two main factors underlying teacher demand are enrollment and class size. The SRI Demand Forecasting Model[21] is the only previously published model that is specific to California. In this section, an alternative forecasting model is developed to estimate the demand for teachers in each of the four counties.

There are two basic approaches (econometric and simulation) to forecasting, and most forecasts involve elements of both approaches. Econometric estimates are those that arise from the application of regression techniques, like the elasticities estimated above.

[21] Shields, Patrick, et al.., *Teaching and California's Future: An Inventory of the Status of Teacher Development in California,* SRI International, June 12, 1998.

Simulation models are mathematical representations that try to mimic the working of a system, like the system of teacher supply and demand. Such simulation models may rely on estimates of components that arise from the application of econometric techniques. Most forecasts of the demand for teachers are based upon enrollment projections published by the Demographic Research Unit of the California Department of Finance, and coincide with the horizon of those enrollment forecasts.

A. The Grade-Specific Demand Forecasting Model (GS-DFM)

The Grade-Specific Demand Forecasting Model (GS-DFM) is based on enrollment projections, uses target pupil-teacher ratios, and makes assumptions about attrition rates. The main features of the Grade-Specific Demand Forecasting model which distinguish it from the SRI model are:

- **Use of Disaggregated Data.** The GS-DFM uses more disaggregated data. Specifically, enrollment projections *by grade* are used in the statewide demand forecasting model. Enrollment projections *by grade and by county* are used in the countywide demand forecasting model.
- **Enrollment-weighted Pupil-teacher and Class-size Estimates.** The GS-DFM uses enrollment-weighted pupil-teacher and class-size estimates.
- **Grade-Specific Demand Forecast.** Using the class size figures as targets, and incorporating the relationship between class size and the pupil-teacher ratio, one can use the enrollment estimates by grade to forecast the number of teachers needed by grade (see Appendix 2a-2d).

- **Attrition Rate Base on NCES Age Distribution and Continuation Rates.** A National Center for Education Statistics (NCES) study[22] gives the age distribution of teachers by state in 1993-94, continuation rates by age 1993-94 to 1994-95, and the age distribution of newly-hired teachers in 1993-94. This data can be used to estimate an attrition rate (see Appendix 3). In this method, the attrition rate is not a constant. In the Grade-Specific Demand Forecasting Model Base Case the average attrition rate over the period 1998-99 to 2007-08 is 7%. By altering the target class size in the Grade-Specific Demand Forecasting Model, one can obtain the projected teachers needed to implement full CSR. As before, the forecasts can be disaggregated by grade.

Each of these features is an improvement over the method used in the SRI model. Overall, the GS-DFM predicts somewhat greater need for teachers in the next ten years compared with the SRI model, but the reasons for the different overall estimates are complicated. For example, class-size reduction leads to a lower estimated demand for teachers in the GS-DFM than in the SRI model because the GS-DFM accounts for the *decrease* in enrollment forecast by the Department of Finance in the grades regulated by CSR. On the other hand, the GS-DFM uses a slightly lower attrition rate of teachers than the SRI model, which would make the GS-DFM estimates lower.

B. Forecasts Using the GS-DFM

The real advantage of the GS-DFM, however, is in the ability to make forecasts *by grade* and *by county*. The implications of the forecasting model for teacher demand in each of the four counties is summarized in **Table 10**. This gives the total number of teachers needed to be hired and the percent this number is of the current FTE teacher workforce for

[22] *Predicting the Need for Newly Hired Teachers in the United States to 2008-09*, by William Hussar. Working Paper 1999026, U.S. Department of Education.

each county for two scenarios - maintaining the current class size (Base Case), and fully implementing class-size reduction in K-3. (The figures *do not* include replacing teachers who have emergency permits and credential waivers with fully certified teachers.) The counties are not expected to have equivalent increases in demand over the period. San Diego and Los Angeles counties will have to hire a relatively larger number of teachers (as a percentage of their existing workforce) compared to Alameda and Fresno. This is because projected growth of population is greater in those areas.

Table 10. New Hires Forecast by the Grade-Specific Forecasting Model in Selected Counties to 2007-08

	Total New Hires Needed for:	
County	**Current Class Size**	**CSR Fully Implemented**
Alameda	7,046	7,804
Fresno	6,160	6,938
Los Angeles	55,320	61,612
San Diego	17,530	19,537

	Percent Total New Hires of 1997 FTE Workforce	
County	**Current Class Size**	**CSR Fully Implemented**
Alameda	68.1	75.4
Fresno	72.9	82.1
Los Angeles	78.8	87.8
San Diego	81.5	90.8

The more detailed statistics contained in Appendix Tables 2a-2d shows that Los Angeles County school districts are in a more difficult position than indicated in Table 10. They will need to hire more than 8,000 new teachers immediately (over 11% of the current FTE teacher workforce), and 12,000 new teachers immediately (over 17% of the current FTE teacher workforce) if class-size reduction is fully implemented now.

Class Size Reduction applied to Grades K-3 or K-3 & 9 will increase the demand for teachers, but generally by less than is often forecast. The Demographic Research Unit of the California Department of Finance now projects a *decline* in K-3 enrollment over most of the period from now to 2007-08. Appendix Table 3 shows that Kindergarten enrollment is

projected to decline by 10% by 2002-03, whereas enrollment in K-3 will decline by 4% by the same year. On the other hand, enrollment in non-regulated classes will increase by almost 17% by the end of the period.

IV. RECOMMENDATIONS

The research suggests the following recommendations.

1. Increase teachers' pay in markets where teachers' salaries are low. Although further investigation is necessary, the analysis above suggests that in markets where teachers' salaries are low relative to teachers' opportunity costs, salaries are a major factor accounting for the use of emergency credentials. A method of supplementation of teachers' salaries in targeted districts and counties should be examined.

2. Reduce the dispersion of teachers' pay across districts, to limit concentration of emergency permits in particular districts. The concentration of emergency permits in some districts is at least partly accounted for by the dispersion of teachers' pay across districts in the same county. A method of supplementation designed to reduce the dispersion of teachers' pay across districts (in targeted counties) will limit the concentration of emergency permits in particular districts.

In order to implement these recommendations, several steps must be undertaken.

A. Identify counties where teachers' salaries are low relative to earnings and costs in the county, and where salary increases would have a significant impact on the use of emergency permits and credential waivers. Counties or regions that have low teachers' pay can be identified by the methods employed above on the four counties in this study. An inventory of these counties or regions would form the basis for making a plan to target salary increases to areas where their impact would be greatest.

B. Estimate the cost of relying on targeted salary increases to reduce reliance on emergency permits and credential waivers. Costs of reducing reliance on emergency permits and credential waivers can be estimated for varying degrees of reduction. For example, the cost of reducing reliance on emergency permits and credential waivers by 25%, 50%, 75% and 100% could be estimated. This would give policy makers a sense of the trade-off involved in increasing teachers' salaries.

V. NEXT STEPS

The results of this study are preliminary, but they suggest several avenues of further study. The first is to further document the impact of low teachers' pay and wide dispersion of pay on the shortage of teachers across schools and districts. More detailed school-level data

may contribute further insights into this connection. Such a study should combine school characteristics and salary variables. An inventory of counties and regions that exhibit low teachers' pay should be constructed.

Data is lacking on new teacher hiring and retention in California schools, and also on attrition due to retirement or other causes. A further study, which relies upon a fully specified career choice model, should be undertaken. Such a study would examine the factors, including starting teachers' salaries and salary structure, on the recruitment of undergraduates into teacher preparation programs.

County-level and grade specific estimates of teacher demand based upon California Department of Finance enrollment data should be published. The implications of enrollment estimates by grade, county and region should be studied.

Appendix A: Regression Methodology

The number of emergency permits and credential waivers demanded by a district is modeled as a function of the variables mentioned above, i.e.,

EMERG = F(ENRL,RTC,LOWMINDUMMY,YRDUMMY), where

EMERG is the number of emergency permits and credential waivers,[23]

ENRL is the enrollment in the district,

RTC (Real Teachers' Compensation) is measured by one of the following variables:

RAPDP, Real Average Per Diem Pay,

RelRAPDP, Relative Real Average Per Diem Pay,

LOWMINDUMMY is a dummy variable[24] which is 1 if the district has a minimum (starting) salary which is less than 95% of the county average starting salary and 0 otherwise, and YRDUMMY is a dummy variable which is 0 in 1996 and 1 in 1997.

The variables EMERG, RAPDP, and ENRL were transformed by computing the natural logarithm, so that the coefficient estimates for RAPDP and ENRL will represent *elasticities* with respect to the use of emergency permits and credential waivers. An elasticity measures the percentage change in one variable for a given percentage change in another variable. For example, the elasticity of emergency permits and credential waivers with respect to changes in real pay will be estimated below. The coefficients on these variables can be interpreted as the percentage change in emergency credentials and waivers

[23] Both emergency permits and credential waivers are indicators of teacher shortage. The total number of emergency permits and credential waivers used by a district was employed as the dependent variable to reduce the number of districts which would have a value of zero for the dependent variable. For reasons indicated below it is desirable to use the natural logarithm of the indicator of teacher shortage. However, the natural logarithm is undefined for zero.

[24] A dummy variable is a variable that can only take on one of two values, for example "district pays less than 95% of county average salary" or does not.

which arise for a 1% change in the value of the corresponding dependent variable. The specifications employed were the following[25]

Specification 1

$\ln(EMERG)=a_0+a_1 YRDUMMY+a_2 \ln(ENRL)+a_8 \ln(RAPDP)+LOWMINDUMMY+\varepsilon$

Specification 2

$\ln(EMERG)=a_0+a_1 YRDUMMY+a_2 \ln(ENRL)+a_8 RelRAPDP+LOWMINDUMMY+\varepsilon$

Expectations of Sign

The discussion above suggests that one may expect the following signs of coefficients in the estimated equations.

Variable	Expected Sign	Reason
YRDUMMY	positive (+)	deteriorating labor market situation
ENRL	positive (+)	larger districts demand more permits
RAPDP	negative (-)	higher pay attracts teachers
RelRMPDP	negative (-)	higher pay attracts teachers
LOWMINDUMMY	positive (+)	higher dispersion of min. pay deters teachers

[25] ln( ) denotes the natural logarithm operator.

Appendix B: Data Sources

The data for this study was obtained from the following sources.

All data was obtained from the California Department of Education, except:

Data on emergency permits and credential waivers was obtained from the California Commission on Teacher Credentialing.

Data on teacher salaries was obtained from California Rand, Inc.

Appendix C: Districts Included in the Sample

ALAMEDA

Unified School Districts
ALAMEDA CITY UNIFIED
ALBANY CITY UNIFIED
BERKELEY UNIFIED
CASTRO VALLEY UNIFIED
DUBLIN UNIFIED
EMERY UNIFIED
FREMONT UNIFIED
HAYWARD UNIFIED
LIVERMORE VALLEY JOINT UNIFIED
NEW HAVEN UNIFIED
NEWARK UNIFIED
OAKLAND UNIFIED
PIEDMONT CITY UNIFIED
PLEASANTON UNIFIED
SAN LEANDRO UNIFIED
SAN LORENZO UNIFIED

FRESNO

Unified School Districts
CENTRAL UNIFIED
CLOVIS UNIFIED
COALINGA/HURON JOINT UNIFIED
FIREBAUGH-LAS DELTAS UNIFIED
FOWLER UNIFIED
FRESNO UNIFIED
KERMAN UNIFIED
KINGS CANYON JOINT UNIFIED
LATON JOINT UNIFIED
MENDOTA UNIFIED
PARLIER UNIFIED
RIVERDALE JOINT UNIFIED
SANGER UNIFIED
SELMA UNIFIED
SIERRA UNIFIED

Elementary School Districts

WEST FRESNO ELEMENTARY

High School Districts
WASHINGTON UNION HIGH

County Office of Education
FRESNO CO. OFFICE OF EDUCATION

LOS ANGELES

Unified School Districts
ABC UNIFIED
ARCADIA UNIFIED
AZUSA UNIFIED
BALDWIN PARK UNIFIED
BASSETT UNIFIED
BELLFLOWER UNIFIED
BEVERLY HILLS UNIFIED
BONITA UNIFIED
BURBANK UNIFIED
CHARTER OAK UNIFIED
CLAREMONT UNIFIED
COMPTON UNIFIED
COVINA-VALLEY UNIFIED
CULVER CITY UNIFIED
DOWNEY UNIFIED
GLENDALE UNIFIED
HACIENDA LA PUENTE UNIFIED
INGLEWOOD UNIFIED
LA CANADA UNIFIED
LAS VIRGENES UNIFIED
LONG BEACH UNIFIED
LOS ANGELES UNIFIED
LYNWOOD UNIFIED
MANHATTAN BEACH UNIFIED
MONROVIA UNIFIED
MONTEBELLO UNIFIED
NORWALK-LA MIRADA UNIFIED
PASADENA UNIFIED
POMONA UNIFIED
REDONDO BEACH UNIFIED
ROWLAND UNIFIED
SAN GABRIEL UNIFIED
SAN MARINO UNIFIED
SANTA MONICA-MALIBU UNIFIED
SOUTH PASADENA UNIFIED
TEMPLE CITY UNIFIED
WALNUT VALLEY UNIFIED

Elementary School Districts
CASTAIC UNION ELEMENTARY
EL MONTE CITY ELEMENTARY
KEPPEL ELEMENTARY
LANCASTER ELEMENTARY
LAWNDALE ELEMENTARY
LENNOX ELEMENTARY
LITTLE LAKE CITY ELEMENTARY
LOS NIETOS ELEMENTARY
LOWELL JOINT ELEMENTARY

MOUNTAIN VIEW ELEMENTARY
NEWHALL ELEMENTARY
PALMDALE ELEMENTARY
ROSEMEAD ELEMENTARY
SAUGUS UNION ELEMENTARY
SOUTH WHITTIER ELEMENTARY
SULPHUR SPRINGS UNION ELEMENTARY
VALLE LINDO ELEMENTARY
WESTSIDE UNION ELEMENTARY
WHITTIER CITY ELEMENTARY

High School Districts
ANTELOPE VALLEY UNION HIGH
CENTINELA VALLEY HIGH
EL MONTE UNION HIGH
WHITTIER UNION HIGH

SAN DIEGO

Unified School Districts
CARLSBAD UNIFIED
CORONADO UNIFIED
MOUNTAIN EMPIRE UNIFIED
OCEANSIDE CITY UNIFIED
POWAY UNIFIED
RAMONA CITY UNIFIED
SAN DIEGO CITY UNIFIED
SAN MARCOS UNIFIED
VISTA UNIFIED

Elementary School Districts
ALPINE UNION ELEMENTARY
CAJON VALLEY UNION ELEMENTARY
CHULA VISTA ELEMENTARY
ENCINITAS UNION ELEMENTARY
FALLBROOK UNION ELEMENTARY
JULIAN UNION ELEMENTARY
LAKESIDE UNION ELEMENTARY
LEMON GROVE ELEMENTARY
NATIONAL ELEMENTARY
SANTEE ELEMENTARY
SOLANA BEACH ELEMENTARY
SOUTH BAY UNION ELEMENTARY
VALLEY CENTER UNION ELEMENTARY

High School Districts
ESCONDIDO UNION HIGH
SAN DIEGUITO UNION HIGH
SWEETWATER UNION HIGH

County Office of Education
SAN DIEGO COUNTY OFFICE OF EDUCATION

Appendix D
Computing Attrition Rates

Assumed Age Distribution of Existing Teachers

less than 25	25-29	30-39	40-49	50-59	60-64	65 or more	Total
0.01	0.08	0.21	0.37	0.28	0.04	0.01	1

Assumed Continuation Rates of Public School Teachers by Age

less than 25	25-29	30-39	40-49	50-59	60-64	65 or more
0.96	0.9	0.93	0.96	0.94	0.7	0.66

Assumed Age Distribution of Newly Hired Teachers

less than 25	25-29	30-39	40-49	50-59	60-64	65 or more	Total
0.16	0.29	0.25	0.25	0.05	0	0	1

First Year Attrition:

(proportion of existing teachers < 25) times (1-continuation rate of those < 25)
plus **(proportion of existing teachers 25-29) times (1-continuation rate of those 25-29)**
plus **(proportion of existing teachers 30-39) times (1-continuation rate of those 30-39)**
plus **(proportion of existing teachers 40-49) times (1-continuation rate of those 40-49)**
plus **(proportion existing teachers 50-59) times (1-continuation rate of those 50-59)**
plus **(proportion of existing teachers 60-64) times (1-continuation rate of those 60-64)**
plus **(proportion of existing teachers 65+) times (1-continuation rate of those 65+)**

Example:

0.0004 + 0.008 + 0.0147 + 0.0148 + 0.0168 + 0.012 + 0.0034 = 0.0701

Attrition in Subsequent Years:

Previous Year's Attrition Determines the Percentage of Veteran Teachers and the Percentage of Newly-Hired (Rookie) Teachers. Age Distribution of Veteran Teachers and Newly-Hired Teachers Differs, Hence Attrition Rates of Veteran and Newly-Hired Teachers Will Differ.

Attrition of Veteran Teachers:

(proportion of veteran teachers < 25) times (1-continuation rate of those < 25)
plus **(proportion of veteran teachers 25-29) times (1-continuation rate of those 25-29)**
plus **(proportion of veteran teachers 30-39) times (1-continuation rate of those 30-39)**
plus **(proportion of veteran teachers 40-49) times (1-continuation rate of those 40-49)**
plus **(proportion veteran teachers 50-59) times (1-continuation rate of those 50-59)**
plus **(proportion of veteran teachers 60-64) times (1-continuation rate of those 60-64)**
plus **(proportion of veteran teachers 65+) times (1-continuation rate of those 65+)**

Attrition of Newly-Hired Teachers

(proportion of new teachers < 25) times (1-continuation rate of those < 25)
plus **(proportion of new teachers 25-29) times (1-continuation rate of those 25-29)**
plus **(proportion of new teachers 30-39) times (1-continuation rate of those 30-39)**
plus **(proportion of new teachers 40-49) times (1-continuation rate of those 40-49)**
plus **(proportion new teachers 50-59) times (1-continuation rate of those 50-59)**
plus **(proportion of new teachers 60-64) times (1-continuation rate of those 60-64)**
plus **(proportion of new teachers 65+) times (1-continuation rate of those 65+)**

The Attrition Rate is computed as the weighed average of the attrition rate of veteran teachers and the attrition rate of newly-hired teachers.

Appendix Table 1. Consumer Price Indexes

Year	U.S. city average***	California****	San Francisco-Oakland-San Jose***	Los Angeles-Riverside-Orange County***	San Diego****
1995	152.4	154	151.6	154.6	156.8
1996	156.9	157.1	155.1	157.5	160.9
1997	160.5	160.5	160.4	160	163.7
1998	163.0	163.7	165.5	162.3	166.9

***Not Seasonally Adjusted**
****Base Period: 1982-84=100**
*****Bureau of Labor Statistics, U.S. Department of Labor**
******California Department of Finance, Statistical Abstract of California**

Fiscal Year (July-June)	Los Angeles CMSA	San Francisco CMSA
1994-95	153.7	150.2
1995-96	155.7	153.0
1996-97	158.8	157.6
1997-98	161.0	163.0
1998-99	164.1	168.8

Appendix Table 2a.

Alameda County Forecast (Base Case)

Year	K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
1998-99	811.1424	1022.532	1084.516	926.6689	738.8229	725.9317	688.7849	671.0172	644.3445	735.9817	686.1134	572.2559
1999-00	793.884	994.8729	1055.326	921.2462	777.8355	742.0032	728.1792	696.2058	654.7337	730.2146	693.9583	600.4128
2000-01	779.7058	977.1291	1026.736	896.4641	772.7893	781.1431	744.2931	737.3387	679.2862	742.0032	690.6507	607.2825
2001-02	771.8833	963.0384	1008.455	872.1888	751.4596	776.0969	783.5602	754.9792	719.4438	769.8209	704.0083	604.3989
2002-03	777.8969	956.7179	993.8899	856.6302	730.5963	754.6823	778.4716	796.1969	736.6178	815.3639	732.6317	616.1027
2003-04	767.8743	967.5033	987.3567	844.2645	717.0691	733.7343	757.0146	792.3804	776.8602	834.8279	776.0121	641.1641
2004-05	773.7412	958.2835	998.5052	838.7405	706.2558	720.1222	735.9817	771.8988	773.1285	880.4133	794.5007	679.1166
2005-06	781.2214	968.837	988.975	848.1668	701.1248	709.2666	722.3273	751.7564	753.1558	876.1728	837.9234	695.2729
2006-07	789.5328	981.4781	999.8837	840.1088	708.5457	704.1355	711.4292	739.1197	733.4798	853.5709	833.8525	733.2678
2007-08	800.4843	995.2208	1012.95	849.3831	701.2944	711.5564	706.2982	729.1969	721.1824	831.2658	812.3532	729.7058

Alameda County Forecast (CSR)

Year	K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
1998-99	1034.207	1099.222	1127.897	1139.803	738.8229	725.9317	688.7849	671.0172	644.3445	735.9817	686.1134	572.2559
1999-00	1012.202	1069.488	1097.539	1133.133	777.8355	742.0032	728.1792	696.2058	654.7337	730.2146	693.9583	600.4128
2000-01	994.1249	1050.414	1067.805	1102.651	772.7893	781.1431	744.2931	737.3387	679.2862	742.0032	690.6507	607.2825
2001-02	984.1512	1035.266	1048.793	1072.792	751.4596	776.0969	783.5602	754.9792	719.4438	769.8209	704.0083	604.3989
2002-03	991.8185	1028.472	1033.646	1053.655	730.5963	754.6823	778.4716	796.1969	736.6178	815.3639	732.6317	616.1027
2003-04	979.0397	1040.066	1026.851	1038.445	717.0691	733.7343	757.0146	792.3804	776.8602	834.8279	776.0121	641.1641
2004-05	986.52	1030.155	1038.445	1031.651	706.2558	720.1222	735.9817	771.8988	773.1285	880.4133	794.5007	679.1166
2005-06	996.0573	1041.5	1028.534	1043.245	701.1248	709.2666	722.3273	751.7564	753.1558	876.1728	837.9234	695.2729
2006-07	1006.654	1055.089	1039.879	1033.334	708.5457	704.1355	711.4292	739.1197	733.4798	853.5709	833.8525	733.2678
2007-08	1020.617	1069.862	1053.468	1044.741	701.2944	711.5564	706.2982	729.1969	721.1824	831.2658	812.3532	729.7058

Appendix Table 2a (continued).

12th	Total	Required New Hires	New Hires as Percentage of Current FTE Teachers
497.3686	9805.481	725.23357	7.01
500.8458	9889.718	686.5871268	6.636449219
525.4831	9960.305	690.0318005	6.669744923
531.5047	10010.84	695.0227704	6.717986897
528.9604	10074.76	698.6283878	6.752838259
539.2224	10135.28	703.0378626	6.795459588
561.1458	10191.83	707.2764275	6.836428927
594.3489	10228.55	711.2394687	6.874735094
608.5122	10236.92	713.8798788	6.900256907
641.7577	10242.65	714.5744251	6.906970288
		7045.511718	

12th	Total	Required New Hires	New Hires as Percentage of Current FTE Teachers
497.3686	10361.75	741.2826869	7.165128381
500.8458	10436.75	798.2478528	7.715745215
525.4831	10495.26	786.7766627	7.604866396
531.5047	10536.28	773.4239268	7.475800833
528.9604	10597.21	796.283925	7.696762181
539.2224	10652.69	794.9929099	7.684283421
561.1458	10709.33	800.0615784	7.733276418
594.3489	10750.69	788.7149147	7.623601252
608.5122	10760.87	760.4948389	7.35083019
641.7577	10773.3	763.5734853	7.380587929
		7803.852781	

Current (1997) FTE Teachers in County 10345.7

Appendix Table 2b.

Fresno County Forecast (Base Case)

Year	K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
1998-99	715.8548	861.9681	878.989	733.0237	586.504	579.9736	566.1072	566.7432	557.4989	650.1539	569.8812	488.5484
1999-00	701.7254	875.2469	877.2508	737.5342	607.028	583.6204	576.3268	566.4888	559.5768	656.2603	580.4401	480.5338
2000-01	692.2407	857.5031	890.7968	737.1287	612.159	604.9502	580.9065	576.9629	559.916	658.7198	586.2496	489.9477
2001-02	683.0493	845.4999	872.7555	749.5451	613.1768	610.9717	603.1268	581.8394	570.8989	659.1014	588.8363	495.3756
2002-03	669.3599	833.8446	860.5282	735.4056	624.9229	612.8799	610.1236	604.3989	576.3692	672.0349	589.5572	498.1319
2003-04	688.7695	816.7966	848.6605	726.182	614.4913	625.559	613.0495	611.735	599.3951	678.4805	601.5154	499.2768
2004-05	708.8146	840.1072	831.2785	717.1611	608.1306	616.0179	626.7888	614.9578	607.3249	705.5773	607.6641	509.9629
2005-06	730.7175	864.1715	855.0139	703.4777	601.897	610.5476	618.2654	629.0362	611.2261	714.9064	632.3438	515.73
2006-07	753.7938	890.4974	879.5285	724.611	591.7198	605.1622	613.7704	620.8097	625.8983	719.4862	641.1217	537.2293
2007-08	779.9991	918.2729	906.3207	746.403	610.8445	595.7907	609.3603	616.5692	618.3926	736.7874	645.659	545.2863

Fresno County Forecast (CSR)

Year	K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
1998-99	912.7149	926.6157	914.1486	901.6192	586.504	579.9736	566.1072	566.7432	557.4989	650.1539	569.8812	488.5484
1999-00	894.6999	940.8905	912.3409	907.167	607.028	583.6204	576.3268	566.4888	559.5768	656.2603	580.4401	480.5338
2000-01	882.6069	921.8158	926.4287	906.6683	612.159	604.9502	580.9065	576.9629	559.916	658.7198	586.2496	489.9477
2001-02	870.8878	908.9124	907.6657	921.9405	613.1768	610.9717	603.1268	581.8394	570.8989	659.1014	588.8363	495.3756
2002-03	853.4339	896.383	894.9493	904.5489	624.9229	612.8799	610.1236	604.3989	576.3692	672.0349	589.5572	498.1319
2003-04	878.1811	878.0564	882.6069	893.2039	614.4913	625.559	613.0495	611.735	599.3951	678.4805	601.5154	499.2768
2004-05	903.7386	903.1152	864.5296	882.1082	608.1306	616.0179	626.7888	614.9578	607.3249	705.5773	607.6641	509.9629
2005-06	931.6648	928.9844	889.2144	865.2776	601.897	610.5476	618.2654	629.0362	611.2261	714.9064	632.3438	515.73
2006-07	961.0871	957.2847	914.7096	891.2715	591.7198	605.1622	613.7704	620.8097	625.8983	719.4862	641.1217	537.2293
2007-08	994.4989	987.1433	942.5735	918.0757	610.8445	595.7907	609.3603	616.5692	618.3926	736.7874	645.659	545.2863

Appendix Table 2b (continued).

12th	Total	Required New Hires	New Hires as Percentage of Current FTE Teachers
390.6776	8145.924	288.7335726	3.417167555
404.332	8206.364	630.2572895	7.459107515
398.056	8245.537	611.7917058	7.240566966
406.1978	8280.374	610.2800283	7.222676233
411.0744	8298.631	596.14794	7.055422687
413.7459	8337.657	618.2560969	7.317073163
415.0604	8408.846	653.0618913	7.729000429
424.3047	8511.638	689.5093204	8.160356475
429.4782	8633.106	715.2381849	8.464858097
447.7971	8777.483	746.5531995	8.835471915
		6159.829229	

12th	Total	Required New Hires	New Hires as Percentage of Current FTE Teachers
390.6776	8611.186	753.9962614	8.923560701
404.332	8669.705	658.9963193	7.799234503
398.056	8705.387	640.6606914	7.582231983
406.1978	8738.931	641.1005332	7.587437519
411.0744	8748.808	619.7834238	7.335149108
413.7459	8789.297	651.1771	7.706693888
415.0604	8864.976	689.0741711	8.155206475
424.3047	8973.399	726.9631751	8.603623588
429.4782	9109.029	761.6119476	9.013692497
447.7971	9268.779	795.0940639	9.409954008
		6938.457687	

Current (1997) FTE Teachers in County 8449.5

Appendix Table 2c.

Los Angeles County Forecast (Base Case)

Year	K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
1998-99	6325.014	8150.512	8438.414	7071.013	5477.5	5262.252	5000.232	4826.032	4747.498	5351.685	4924.327	4164.004
1999-00	6051.765	7908.071	8312.845	7079.933	5853.718	5413.087	5183.803	4981.998	4788.843	5565.872	4947.565	4292.534
2000-01	5902.306	7591.929	8065.541	6985.163	5863.004	5785.022	5333.026	5164.89	4943.579	5599.118	5163.83	4312.804
2001-02	5738.425	7428.988	7743.135	6777.327	5786.421	5794.266	5700.169	5313.562	5125.072	5764.328	5213.02	4501.294
2002-03	5536.312	7246.272	7576.927	6506.447	5616.08	5718.7	5709.965	5679.391	5272.599	5959.646	5385.736	4544.166
2003-04	5573.078	7013.515	7390.58	6366.775	5393.369	5550.437	5636.18	5689.144	5635.629	6114.424	5587.753	4694.746
2004-05	5594.687	7082.403	7153.167	6210.176	5279.299	5330.44	5471.012	5615.613	5645.297	6517.484	5752.921	4870.854
2005-06	5627.2	7132.097	7223.474	6010.703	5151.151	5217.769	5254.789	5451.04	5572.318	6510.699	6153.521	5014.819
2006-07	5663.965	7195.534	7274.121	6069.744	4987.298	5091.19	5144.324	5235.622	5409.016	6408.8	6168.49	5364.024
2007-08	5718.918	7264.48	7338.854	6112.315	5037.93	4929.33	5020.162	5125.539	5195.252	6203.814	6092.967	5377.085

Los Angeles County Forecast (CSR)

Year	K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
1998-99	8064.393	8761.801	8775.951	8697.346	5477.5	5262.252	5000.232	4826.032	4747.498	5351.685	4924.327	4164.004
1999-00	7716	8501.177	8645.358	8708.317	5853.718	5413.087	5183.803	4981.998	4788.843	5565.872	4947.565	4292.534
2000-01	7525.441	8161.324	8388.163	8591.75	5863.004	5785.022	5333.026	5164.89	4943.579	5599.118	5163.83	4312.804
2001-02	7316.492	7986.162	8052.86	8336.113	5786.421	5794.266	5700.169	5313.562	5125.072	5764.328	5213.02	4501.294
2002-03	7058.798	7789.743	7880.004	8002.93	5616.08	5718.7	5709.965	5679.391	5272.599	5959.646	5385.736	4544.166
2003-04	7105.674	7539.528	7686.204	7831.133	5393.369	5550.437	5636.18	5689.144	5635.629	6114.424	5587.753	4694.746
2004-05	7133.226	7613.583	7439.293	7638.517	5279.299	5330.44	5471.012	5615.613	5645.297	6517.484	5752.921	4870.854
2005-06	7174.679	7667.004	7512.413	7393.165	5151.151	5217.769	5254.789	5451.04	5572.318	6510.699	6153.521	5014.819
2006-07	7221.556	7735.199	7565.086	7465.786	4987.298	5091.19	5144.324	5235.622	5409.016	6408.8	6168.49	5364.024
2007-08	7291.621	7809.316	7632.408	7518.147	5037.93	4929.33	5020.162	5125.539	5195.252	6203.814	6092.967	5377.085

Appendix Table 2c (continued).

12th	Total	Required New Hires	New Hires as Percentage of Current FTE Teachers
3579.663	73318.15	8063.250842	11.49035163
3566.221	73946.25	5733.842995	8.170882128
3667.993	74378.21	5591.502493	7.968043043
3676.983	74562.99	5375.213098	7.659824776
3828.962	74581.2	5222.501693	7.442206872
3856.653	74502.28	5127.287449	7.306523986
3975.387	74498.74	5197.533404	7.406626382
4115.111	74434.69	5136.48323	7.319628224
4227.018	74239.15	5000.755688	7.126212788
4511.005	73927.65	4871.663742	6.942253255
		55320.03463	

12th	Total	Required New Hires	New Hires as Percentage of Current FTE Teachers
3579.663	77632.68	12377.78765	17.63868386
3566.221	78164.49	5921.873093	8.438830129
3667.993	78499.94	5789.910379	8.250779674
3676.983	78566.74	5545.327352	7.902242212
3828.962	78446.72	5364.214633	7.644151664
3856.653	78320.87	5350.740287	7.624950356
3975.387	78282.93	5429.873143	7.737716826
4115.111	78188.48	5370.380237	7.652937818
4227.018	78023.41	5293.387578	7.543221185
4511.005	77744.58	5168.374953	7.365074797
		61611.86931	

Current (1997) FTE Teachers in County 70174.1

Appendix Table 2d.

San Diego County Forecast (Base Case)

Year	K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
1998-99	1776.73	2304.612	2316.12	1992.3	1593.581	1544.646	1478.748	1473.448	1453.517	1621.823	1475.186	1368.453
1999-00	1757.125	2259.209	2370.543	1961.791	1668.68	1594.896	1541.677	1499.866	1473.066	1642.474	1513.012	1370.276
2000-01	1719.626	2236.42	2323.792	2015.207	1643.11	1670.08	1592.097	1563.982	1499.484	1664.567	1532.306	1405.43
2001-02	1706.425	2190.611	2300.356	1975.475	1687.847	1644.467	1667.451	1615.462	1563.558	1694.42	1552.915	1423.325
2002-03	1668.34	2175.592	2253.245	1955.558	1654.602	1689.247	1642.177	1692.215	1615.038	1766.806	1580.732	1442.492
2003-04	1716.937	2128.855	2237.841	1915.521	1637.894	1655.959	1687.211	1666.899	1691.749	1824.985	1648.284	1468.317
2004-05	1766.365	2192.64	2189.711	1902.395	1604.352	1639.251	1654.263	1712.909	1666.475	1911.661	1702.562	1531.076
2005-06	1820.634	2257.585	2255.343	1861.497	1593.369	1605.667	1637.852	1679.791	1712.442	1883.123	1783.428	1581.496
2006-07	1877.787	2328.676	2322.173	1917.295	1559.106	1594.684	1604.564	1663.422	1679.324	1935.069	1756.798	1656.595
2007-08	1942.811	2403.653	2395.298	1974.106	1605.836	1560.42	1593.878	1629.922	1662.998	1897.625	1805.267	1631.873

San Diego County Forecast (CSR)

Year	K	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
1998-99	2265.331	2477.458	2408.764	2450.529	1593.581	1544.646	1478.748	1473.448	1453.517	1621.823	1475.186	1368.453
1999-00	2240.334	2428.649	2465.365	2413.003	1668.68	1594.896	1541.677	1499.866	1473.066	1642.474	1513.012	1370.276
2000-01	2192.523	2404.152	2416.743	2478.705	1643.11	1670.08	1592.097	1563.982	1499.484	1664.567	1532.306	1405.43
2001-02	2175.692	2354.907	2392.37	2429.834	1687.847	1644.467	1667.451	1615.462	1563.558	1694.42	1552.915	1423.325
2002-03	2127.133	2338.762	2343.375	2405.336	1654.602	1689.247	1642.177	1692.215	1615.038	1766.806	1580.732	1442.492
2003-04	2189.094	2288.519	2327.354	2356.091	1637.894	1655.959	1687.211	1666.899	1691.749	1824.985	1648.284	1468.317
2004-05	2252.116	2357.088	2277.299	2339.946	1604.352	1639.251	1654.263	1712.909	1666.475	1911.661	1702.562	1531.076
2005-06	2321.308	2426.904	2345.556	2289.641	1593.369	1605.667	1637.852	1679.791	1712.442	1883.123	1783.428	1581.496
2006-07	2394.178	2503.327	2415.06	2358.273	1559.106	1594.684	1604.564	1663.422	1679.324	1935.069	1756.798	1656.595
2007-08	2477.084	2583.927	2491.109	2428.151	1605.836	1560.42	1593.878	1629.922	1662.998	1897.625	1805.267	1631.873

Appendix Table 2d (continued).

12th	Total	Required New Hires	New Hires as Percentage of Current FTE Teachers
1089.173	21488.34	1479.67826	6.876787005
1151.381	21804	1815.777543	8.438804403
1152.908	22019.01	1735.846385	8.067325302
1182.507	22204.82	1722.051813	8.003215192
1197.56	22333.6	1678.110428	7.798998132
1213.674	22494.13	1719.0601	7.989311242
1235.386	22709.05	1784.538082	8.293619378
1288.222	22960.45	1835.810564	8.531907628
1330.627	23226.12	1867.48921	8.679133754
1393.811	23497.5	1891.68572	8.791586745
		17530.04811	

12th	Total	Required New Hires	New Hires as Percentage of Current FTE Teachers
1089.173	22700.66	2691.998689	12.51103169
1151.381	23002.68	1882.032711	8.746724501
1152.908	23216.09	1817.990046	8.449086981
1182.507	23384.75	1788.480255	8.311940583
1197.56	23495.47	1742.479661	8.098153372
1213.674	23656.03	1800.27127	8.366739182
1235.386	23884.38	1879.079051	8.732997404
1288.222	24148.8	1930.81807	8.973453875
1330.627	24451.03	1986.94924	9.234322813
1393.811	24761.9	2016.546472	9.371875597
		19536.64547	

Current (1997) FTE Teachers in County 21517

Appendix Table 3.

Actual and Forecast Enrollment, Selected Grades, 1996-97 - 2007-08

Year	K	1st Grade	2nd Grade	3rd Grade	Total K-3	9th Grade	Total K-3 & 9
1996-97	469965	491159	463864	452225	1877213	450820	2328033
1997-98	463684	488429	489070	463034	1904217	458650	2362867
1998-99	456030	487640	485643	488604	1917917	465809	2383726
1999-00	447335	480577	484747	485580	1898239	477154	2375393
2000-01	439482	472156	477762	485207	1874607	480314	2354921
2001-02	433528	464554	469439	478392	1845913	488718	2334631
2002-03	425967	458904	461930	470253	1817054	507731	2324785
2003-04	432512	451572	456304	462912	1803300	521577	2324877
2004-05	441368	459311	449061	457390	1807130	551314	2358444
2005-06	451326	469481	456775	450273	1827855	548692	2376547
2006-07	461939	480842	466922	458175	1867878	549152	2417030
2007-08	474362	492907	478261	468534	1914064	542145	2456209

Index of Actual and Forecast Enrollment, Selected Grades, 1996-97 - 2007-08 (1996-97=100)

Year	Index K	Index 1st Grade	Index 2nd Grade	Index 3rd Grade	Index K through 3	Index 9th Grade	Index K-3 & 9
1996-97	100	100	100	100	100	100	100
1997-98	98.6635175	99.44417185	105.4339203	102.3901819	101.4385155	101.7368351	101.4962846
1998-99	97.03488558	99.2835314	104.6951262	108.0444469	102.1683208	103.3248303	102.3922771
1999-00	95.1847478	97.84550421	104.5019661	107.3757532	101.1200647	105.8413558	102.0343354
2000-01	93.5137723	96.13098813	102.9961368	107.2932722	99.86117718	106.5423007	101.1549664
2001-02	92.24686945	94.5832205	101.2018609	105.786279	98.3326346	108.4064593	100.2834152
2002-03	90.63802624	93.43288019	99.58306745	103.9865111	96.7953024	112.6238854	99.86048308
2003-04	92.03068314	91.94008458	98.37021196	102.3632042	96.06262049	115.6951777	99.86443491
2004-05	93.91507878	93.51574541	96.80876291	101.1421306	96.26664635	122.2913802	101.3062959
2005-06	96.03395998	95.58635798	98.47175034	99.56835646	97.37067664	121.7097733	102.0839052
2006-07	98.29221325	97.89945822	100.659245	101.3157167	99.50272026	121.8118096	103.822841
2007-08	100.9356016	100.3558929	103.1037114	103.6063906	101.9630697	120.2575307	105.5057639

Appendix Table 3 (continued).

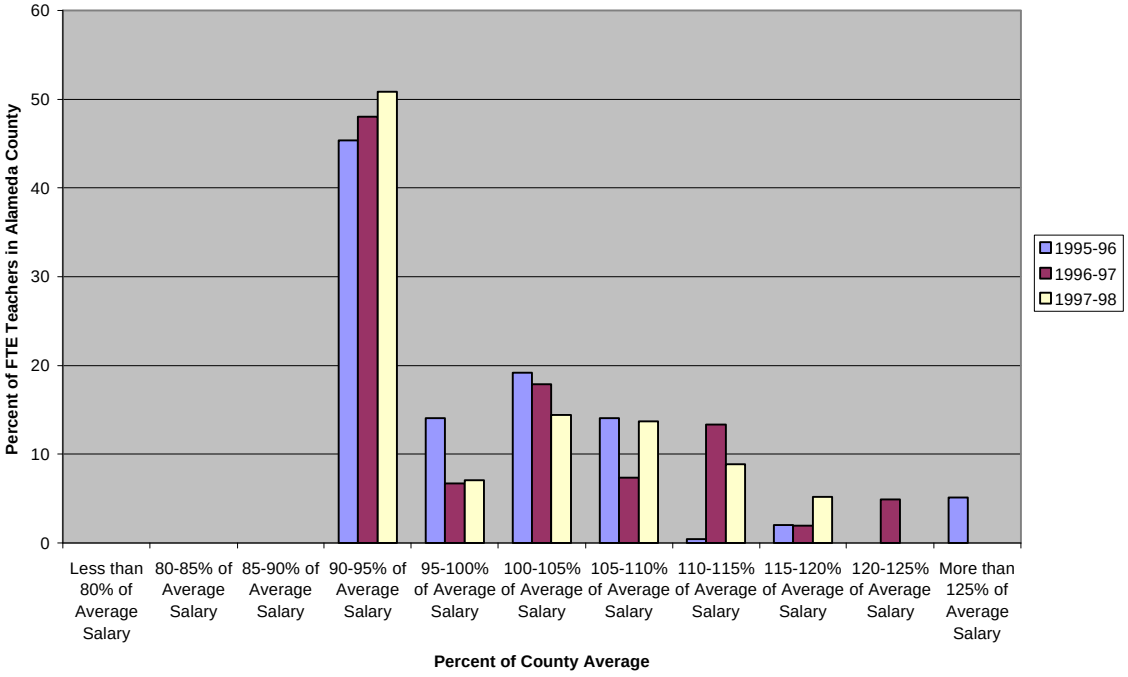
Actual and Forecast Enrollment, Selected Grades, 1996-97 - 2007-08

Year	Total 4-12	Total 4-12 minus 9
1996-97	3634942	3184122
1997-98	3729429	3270779
1998-99	3815664	3349855
1999-00	3913779	3436625
2000-01	4000405	3520091
2001-02	4080189	3591471
2002-03	4148569	3640838
2003-04	4200065	3678488
2004-05	4242854	3691540
2005-06	4269416	3720724
2006-07	4271340	3722188
2007-08	4266857	3724712

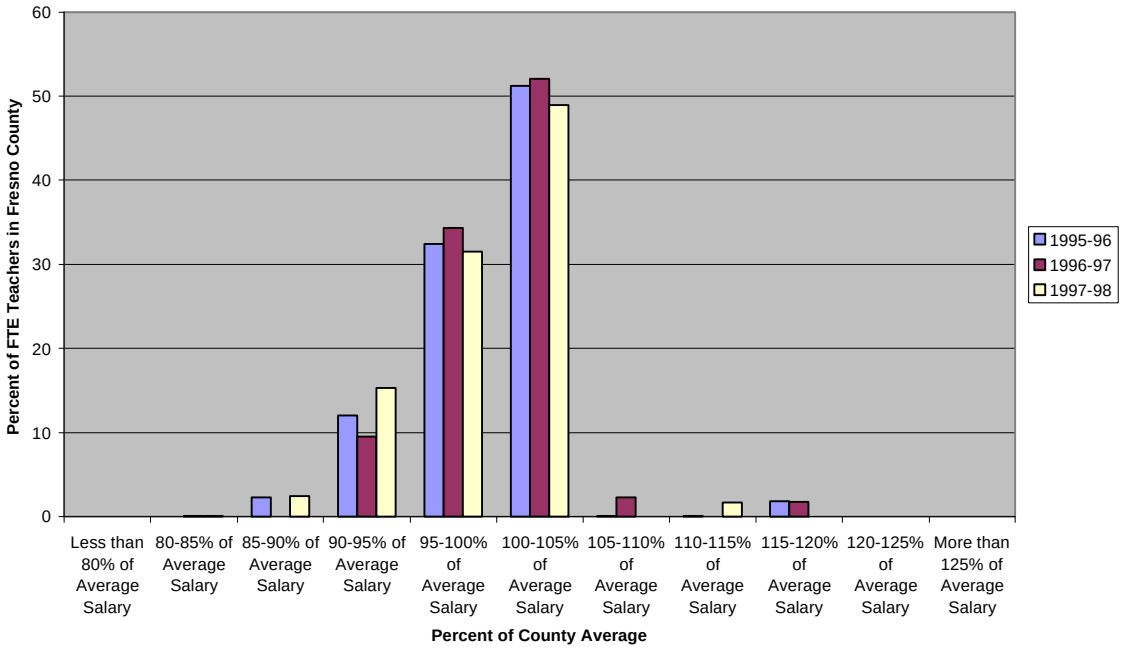
Index of Actual and Forecast Enrollment, Selected Grades, 1996-97 - 2007-08 (1996-97=100)

Year	Index 4-12	Index 4-12 minus 9
1996-97	100	100
1997-98	102.5994087	102.7215352
1998-99	104.9717987	105.2049827
1999-00	107.6710165	107.9300667
2000-01	110.0541632	110.5513859
2001-02	112.2490813	112.7931342
2002-03	114.1302667	114.3435459
2003-04	115.5469606	115.5259754
2004-05	116.7241183	115.9358844
2005-06	117.454859	116.8524322
2006-07	117.5077897	116.8984103
2007-08	117.384459	116.9776786

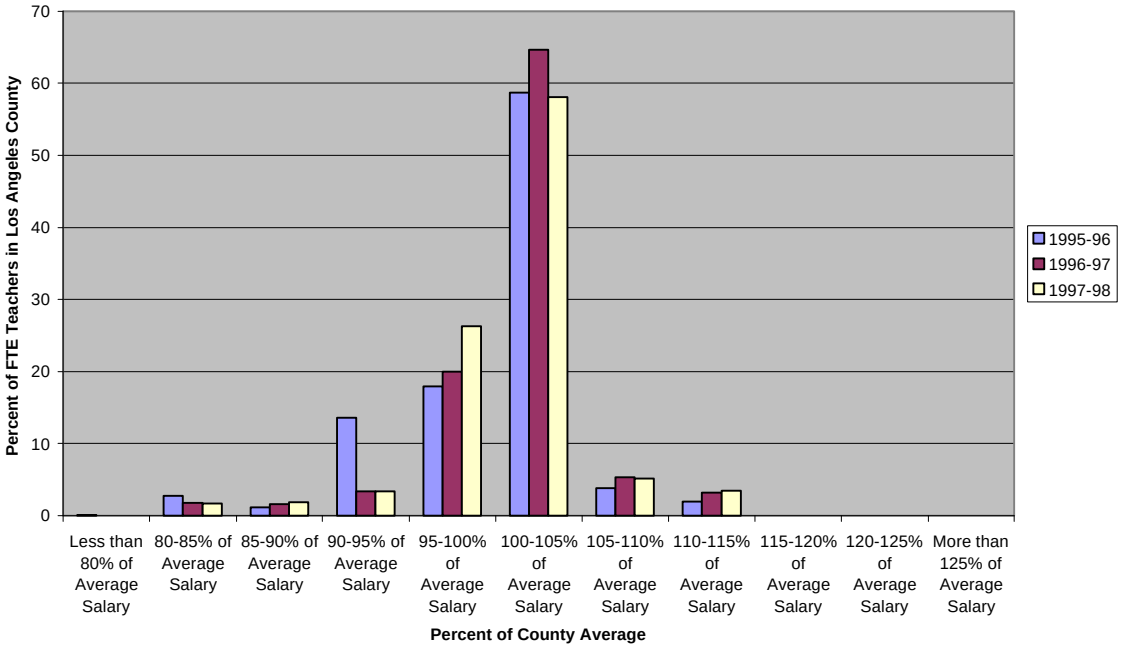
Appendix Figure 4a.
Disrtibution of Real Average Per Diem Teachers' Salaries, Alameda County



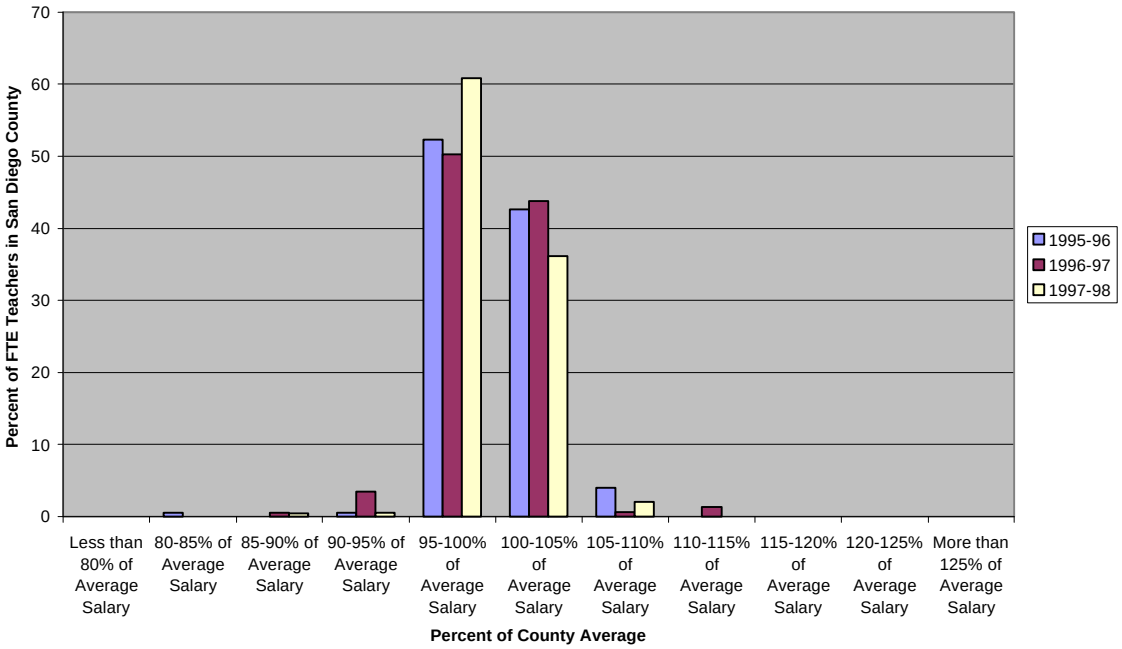
Appendix Figure 4b.
Distribution of Real Average Per Diem Teachers' Salaries, Fresno County



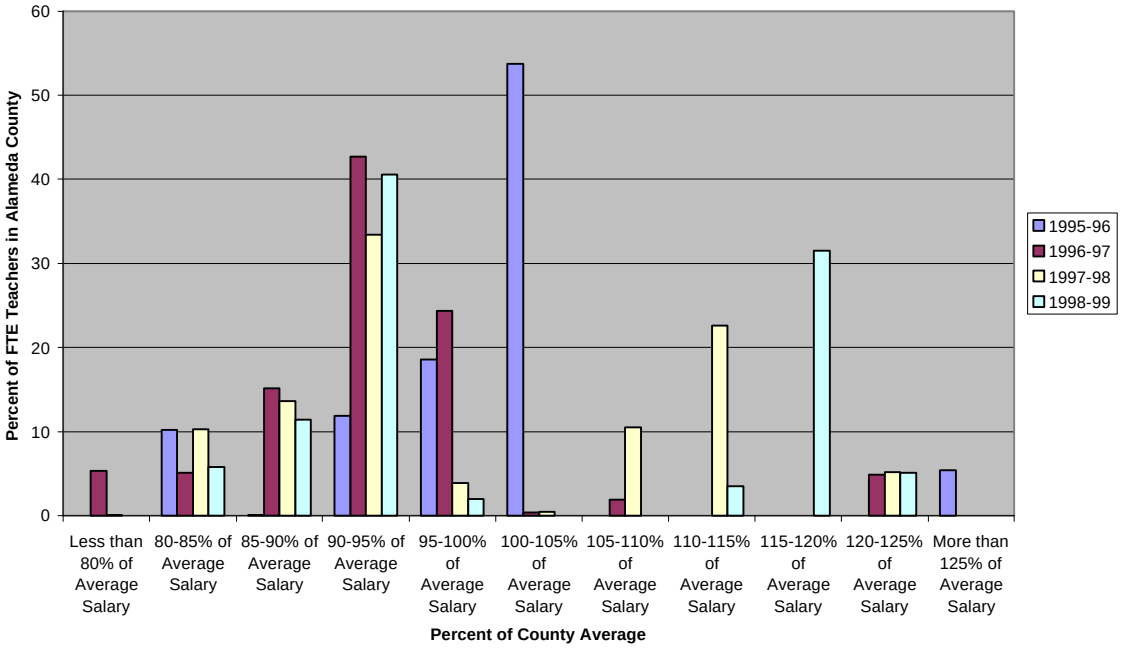
Appendix Figure 4c.
Distribution of Real Average Per Diem Teachers' Salaries, Los Angeles County



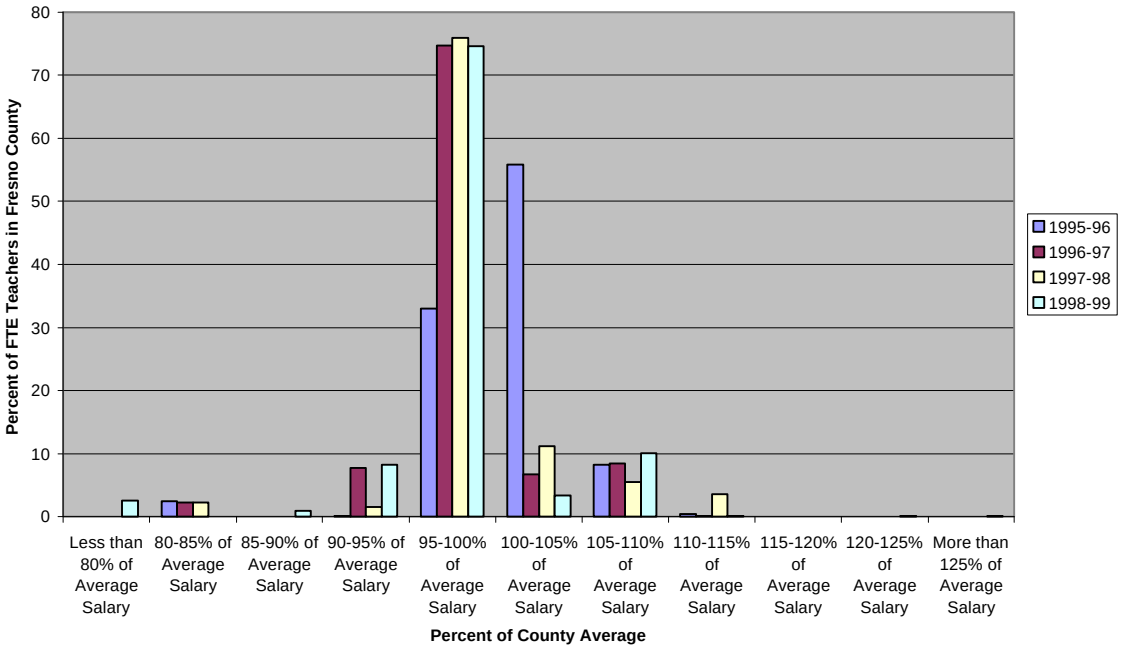
Appendix Figure 4d.
Distribution of Real Average Per Diem Teachers' Salaries, San Diego County



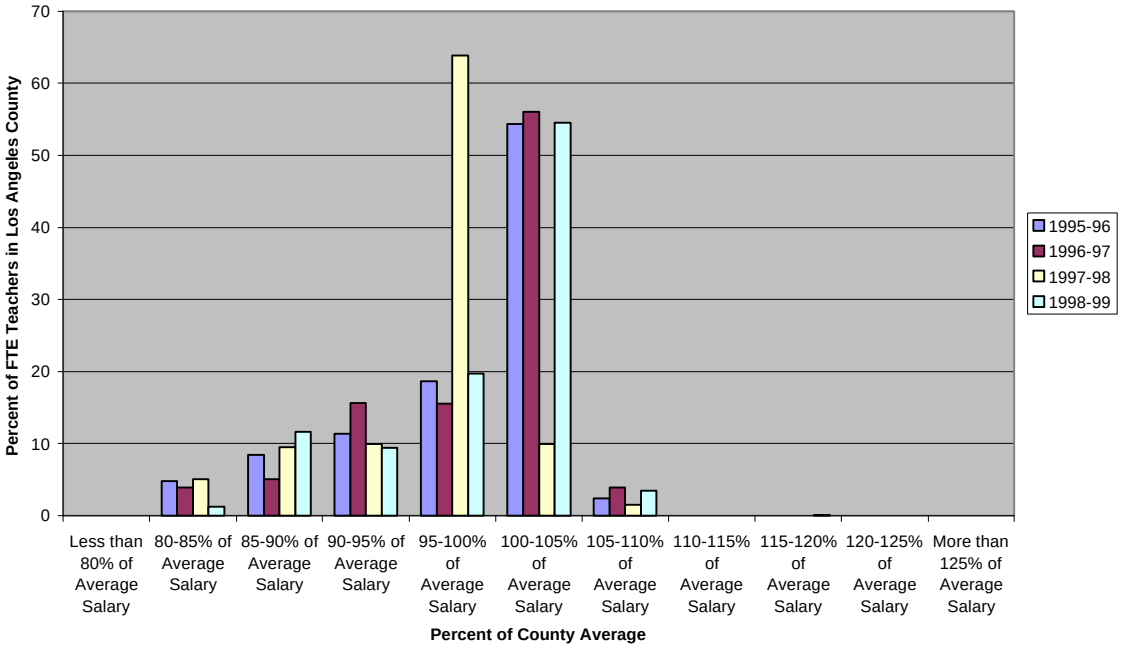
Appendix Figure 5a.
Distribution of Real Minimum Per Diem Teachers' Salaries, Alameda County



Appendix Figure 5b.
Distribution of Real Minimum Per Diem Teachers' Salaries, Fresno County



Appendix Figure 5c.
Distribution of Real Minimum Per Diem Teachers' Salaries, Los Angeles County



Appendix Figure 5d.
Distribution of Real Minimum Per Diem Teachers' Salaries, San Diego County