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Staffing Up and Dropping Out: Unintended Consequences of High Demand for Teachers

[Mark Fetler](#)

Abstract

Growing public school enrollment and the need to maintain or improve service to students has increased the demand for teachers, perhaps more rapidly than existing sources can accommodate. While some schools recruit well qualified teachers by offering higher salaries or better working conditions, others may satisfy their need for staff by relaxing hiring standards or assigning novice teachers to difficult classrooms. Schools' hiring policies have consequences for student success. Dropout rates tend to be higher where faculties include a greater percentage of minimally educated teachers or teachers with little experience. The relationship between dropout rate and teacher qualifications is independent of student poverty, school size, and location. A proposed strategy to reduce dropout rates is to encourage higher preparation and employment standards, and to provide appropriate classroom assignments, mentoring, and support for new teachers.

A systemic view of public schools, while looking for stable recurring processes, also recognizes the law of unintended consequences. For example, public school enrollment growth has stimulated the need to prepare and hire more teachers. Given compulsory school attendance laws, parent expectations, desired

student-teacher ratios, and contractual limits on work loads, schools must hire enough teachers to keep pace with growing enrollment. Schools may respond to increased need either by offering incentives or by relaxing standards. Of course, schools that successfully entice more desirable candidates with attractive salaries or good working conditions make hiring more difficult for others. Similarly, state agencies face pressure to ease the standards and regulations for teacher preparation and credentialing when confronted with lobbying from school boards, administrator groups, and teacher organizations. State agencies, schools, colleges, and universities interact, in a loosely defined supply system which operates to staff schools. One goal of the system is to maintain traditionally expected or legally required student-teacher ratios. Although the quality of preparation programs is an important aspect of the supply system, meeting school demands for an adequate number of classroom teachers, arguably is a primary goal.

The price of preparation tends to constrain the number and quality of teachers produced by the supply system. Significant increases in the number of teachers prepared entail greater outlays for training, facilities, and administration, particularly in public universities and schools where the bulk of teacher training takes place. The additional coursework and field experience associated with more rigorous and thorough teacher preparation generally requires increased costs. Understandably, there is resistance from prospective teachers and policymakers to paying more for teacher preparation if it requires spending less on competing priorities.

Educators have long debated systems for instruction in relation to indicators of instructional context, processes, and outcomes. (Levin, 1974; Murnane, 1987; Office of Educational Research and Improvement, 1988; Shavelson, McDonnell and Oakes, 1989; and Porter, 1991) These systems sometimes underlie proposals for structural reforms of public education which aim at particular goals. Conventional goals for student success include academic achievement, citizenship, or job preparation. Persistence in school to a diploma is a minimum goal for at-risk students. The teacher is an essential component of these instructional systems. If it is true that more skilled teachers contribute more effectively to student success, then the education and experience of teachers available for hire is an important aspect of instructional systems.

While relaxing employment standards at the state or local level in response to high demand addresses reduces tension caused by shortages, it raises the likelihood of hiring less well qualified teachers, with possibly less desirable consequences for student success. This paper examines teacher education and experience in relation to student dropout rates. It reviews the relationship between student enrollment and teacher demand. It briefly surveys existing research on the influence of teacher experience and education on student achievement, and on factors influencing student decisions to drop out of school. Actual California high school dropout rates are analyzed and discussed in relation to measures of school size, location, growth, student poverty, teacher education, and experience.

Teacher Supply and Demand

Burgeoning student enrollment is an issue for public schools, influencing not only the need for adequate facilities, but perhaps even more importantly the need for well-qualified teachers. Nationally, NCES (1996) estimates that total K-12 enrollment will grow about 10 percent from 49.8 million in 1994 to 54.6 million by

2006. In California public school enrollment will rise over 18 percent from 5.4 million students in 1995 to 6.4 million ten years later. (See Note 1 in the Appendix.) California's enrollment growth, coupled with statewide efforts to reduce class sizes, is spurring the demand for teachers. An estimated 300,000 teachers will be working in 2005, compared to 232,000 actually employed in 1996, an expansion of 29 percent.

One facet of teacher supply and demand relates to the skills and abilities expected of teachers. (Darling-Hammond and Hudson, 1990; Reynolds, 1991; National Commission on Teaching and America's Future, 1996; Ashton, 1996; Education Week, 1997) The institutional and personal resources needed to develop those skills influence the rate at which teachers can be prepared. While teaching expertise is a goal of preparation, usually a credential requires an academic degree and coursework. Although satisfying the requirements may not guarantee competent performance, it is intended to provide assurance that a teacher is prepared for the classroom. Virtually all public school teachers in the United States have at least a bachelor's degree, and a majority possess an advanced degree. (NCES 1995b) The trend is toward higher levels of education. In 1971 28 percent of public school teachers possessed a master's, specialist, or doctoral degree. Twenty years later 53 percent of teachers had an advanced degree.

California's degree and coursework requirements for a preliminary teaching credential generally resemble those of many other states. (National Association of State Directors of Teacher Education and Certification, 1996). Unlike a number of states, California requires a Bachelor's degree in a subject other than professional education. Additionally, California teachers complete a one year preparation program, which provides training in educational principles and teaching strategies. Those who seek a clear credential must fulfill additional course requirements and a fifth year of educationally related study after the Bachelor's. California's requirements allow several routes to a credential. Some candidates complete the Bachelor's degree first, then complete the preparation program as a graduate student. Others work the preparation program and course requirements into their Bachelor's degree in order to receive a preliminary credential. These teachers complete the fifth year of study and remaining requirements within the next five years. Most teachers who transfer from outside of California receive a temporary credential based on completion of a Bachelor's degree and a professional preparation program. Career changers with at least a Bachelor's degree and competence in their subject of instruction may work as paid teaching interns while they receive support and training in pedagogy from school districts or universities.

A second facet of an analysis of teacher supply and demand is the flow of people into and out of public school employment. Sources of credentialed teachers include college and university preparation programs and re entrants from the reserve pool of previously employed teachers. Other sources are school district and university programs to facilitate the mid career transition of people into teaching from jobs in other industries or the military. Nationally, schools are filling an increasing proportion of vacancies with inexperienced applicants. (NCES 1995b) From 1988 to 1991 public schools hired more first-time teachers and fewer reentrants or transfers. Reentrants comprised 33 percent of hires in 1988, compared to 24 percent in 1991. First-time teachers made up 31 percent of hires in 1988, compared to 42 percent in 1991. Teachers who transfer from other schools or return to a school have more experience, but receive higher salaries than first-time teachers. First-time teachers earn less, but are more likely to leave the profession.

Drains on the pool of employed teachers include retirement and migration into other occupations. Nationwide, between 1990-91 and 1991-92 about 5 percent of teachers left teaching, including retirees. (NCES 1995a) Teachers with less full-time teaching experience were more likely to leave. Some 17 percent of those with less than one year of full-time left teaching, compared to 8 percent of those with one year of experience, 7 percent of those with two years of experience, and 6 percent of those with three years of experience.

Some schools have more turnover than others. (NCES 1995c) Smaller schools experience higher teacher attrition. Based on 1990-91 data, schools with less than 300 enrollment had 10.3 percent turnover, compared to 8.2 percent for those with 300-599 enrollment, and 7.7 percent for those with over 600 enrolled students. Lower salaries and benefits may be a factor in this relationship. Small schools offer teachers less compensation than larger schools. For example, small public schools paid teachers an average salary of \$35,317, compared to \$42,421 paid by large schools. Student poverty is associated with teacher turnover. Schools with over 50 percent of students receiving free or reduced price lunches had teacher turnover rate of about 10 percent, compared to an 8 percent rate for schools with lower proportions of such students.

Interaction of Preparation and Flow

The relationship between teacher preparation and flow is complex. Credential requirements restrict access to the teaching profession. Other conditions remaining equal, higher standards reduce the number of teachers available for work. One way to meet increased demand is to relax the requirements, reducing the time and cost required to become a teacher. For example, when there are too few credentialed applicants, California school districts use emergency permits to hire individuals who lack some requirements for a credential, usually proof of competence in their subject(s) of instruction or pedagogy. (Hart and Burr, 1996) In recent years emergency permits have become more popular. A risk of this increased popularity is that less well prepared teachers may be less effective in their jobs or more prone to attrition.

States have sought to increase the supply of teachers by setting up alternatives to traditional training programs. Zumwalt (1996) describes alternative certification as easing entry requirements, minimizing preparation needed prior to paid teaching, and emphasizing on-the-job training. Proponents portray these programs as attracting higher-ability, more diverse, experienced people with subject matter majors. (Ashton, 1991; Dill 1996; Feistritzer, 1994; Haberman, 1992) Zumwalt cautions that it is difficult to generalize about the success of alternative programs. The recruitment, preparation and retention of teachers is complex. The underlying assumptions are debatable that the knowledge base of teaching is minimal, that schools can supply the needed mentoring, and that teaching is a craft best learned on the job. Alternative approaches assume that school staffs, already criticized for not meeting the needs of students, have the time, energy, and resources, to support unprepared novice teachers. Plausibly, the success of alternative approaches depends on the extent to which novice teachers actually receive needed support and obtain classroom assignments appropriate to their abilities.

Student Performance

Teacher skills and ability influence student achievement. Greenwald, Hedges and Lane (1996) reviewed a number of studies of the relationship between school inputs and student outcomes. School resource variables which described teacher ability, teacher education, and teacher experience were strongly related to student achievement. On the other hand, Hanushek's (1996) synthesis of research studies found mixed support for a relationship between school resources and achievement. Although Hanushek did not detect a clear pattern, measures of teacher experience were more consistently related to achievement than measures of teacher education. Ashton (1996) notes that teachers with regular state certification receive higher supervisor ratings and student achievement than teachers who do not meet standards. Teachers without preparation have trouble anticipating and overcoming barriers to student learning, and are likely to hold low expectations for low-income children. Ashton suggests that states which reduce certification requirements or permit the hiring of teachers who do not meet certification standards, worsen inequities in the quality of education offered to low income children. For example, some alternative certification programs have minimal training requirements with most teachers placed in economically disadvantaged urban schools.

Student decisions to drop out, thereby delaying or precluding a high school diploma, represent a facet of performance distinguishable from achievement. While high school graduation is a student attainment, it is not a measure of learning. Similarly, while dropping out represents a kind of failure, neither is it a direct measure of achievement. Educators have speculated on the relationship between instructional systems and student dropout rates. During the 1980s California and other states implemented broad curricular and structural reforms aimed at more rigorous academic standards. McDill, Natriello, and Pallas (1985) and Hamilton (1986), among others, speculated that higher standards might result in higher achievement for some students, at the cost of a narrower curriculum and increased chances of dropping out for at-risk students. Although individuals make decisions to leave school in response to particular circumstances (Ekstrom, Goertz, Pollack, and Rock, 1986; Rumberger, 1987; Venezky, Kaestle, and Sum, 1987), they do so under the influence of a school environment. For example, school size and poverty are correlated with dropout rates. (Cibulka, 1986; Toles, Schulz, and Rice, 1986; Pittman and Haughwout, 1987; Fetler, 1989) Overall, the national dropout rate is declining, but is higher in large urban districts. (Schwartz, 1995; Coley, 1995)

In California Guthrie and Kirst (1988) found that school reforms resulted in a narrowing of the curriculum without an increased risk of dropping out. Between 1981 and 1986 there were statewide increases in academic enrollments, balanced by declines in remedial courses and electives. Schools that successfully implemented the reforms tended to focus on an improved learning environment, heightened concern for all students, teacher collegiality, and teacher and site administrator participation in designing reform implementation activities. Most of these schools took steps to help at-risk students, and did not experience increased dropout rates.

There is large variation in educational attainment in California's adult population. According to the 1990 U.S. Census, 25 percent of Californians 18 or older did not graduate from high school, and 23 percent have just a high school degree. (California Postsecondary Education Commission, 1996) This figure is likely related to California's high rates of immigration compared to many other states, as well as school dropout rates. Annual dropout rates for grades 9 through

12 declined in California from 5.2 percent in 1991 to 4.4 percent in 1994. A comparable national dropout rate was 5.3 percent in 1994.

Method

The unit of analysis was the school. The three types of information analyzed related to schools, teachers, and students. The data were collected from mandated annual surveys administered by the California Department of Education. (See Note 2 in the Appendix for details.) Even in large high schools, employment needs and actions can vary considerably from year to year. In order to obtain relatively stable estimates of teacher education and employment, four year averages of the study measures were computed using data collected from 1993 through 1996. All analyses were weighted by the average number of teachers employed in the school in order to accommodate variation in the size. California had 805 regular high schools serving an average 1.3 million students per year. The majority (N = 749) of these schools offered instruction in grades 9 through 12, although various other grade configurations were represented, most commonly 10-12, or 7-12.

Approximately 600 alternative high schools serving about 100,000 students per year were excluded from the study. Typically, these alternative schools have small enrollments and do not offer the academic curriculum needed to attend California's public universities. Reasons for referral to an alternative school could include an unstable home environment, emotional difficulties, pregnancy, etc. Alternative schools diverge from regular schools in serving a population of students with different needs and providing different kinds of services.

Measured school characteristics included enrollment and location. The average student enrollment was an indicator of school size. Federally derived categories of school location provided the basis for categorizing school location as Large City, Medium City, Urban Fringe, or Rural. The research literature links both of these measures with school dropout rates, and they are included primarily as controls for the teacher education and employment variables.

The school level measures of teacher characteristics included annual growth in the number of employed teachers, the percent of new first-time teachers, the percent of teachers with only a Bachelor's degree, the average number of years of education, and the estimated number of years of experience of the teaching staff. Schools with increasing or declining student enrollment adjust the number of teachers they employ in order to meet the actual need for instruction. High growth schools experience relatively high demand for teachers both through the need to replace teachers who might ordinarily leave or retire, and the need to augment their teaching staff to accommodate added students. The average net annual growth in the size of the teaching staff is an indicator of the stability of the faculty. The percent of new first-time teachers and the average years of experience are indicators of teacher experience. The percent of teachers with only a Bachelor's degree and the estimated number of years of education are indicators of teacher educational background.

The two measures of student characteristics are the percent of students covered by the federal Aid to Families with Dependent Children (AFDC) program, and the annual dropout rate. AFDC is the percentage of students in the school's attendance area who are enrolled in either public or private schools and who are from families receiving aid. As an indicator of poverty AFDC often correlates with student achievement (White, 1982), and functions in this study as a control

variable. The annual dropout rate is an indicator of student performance. The annual dropout rate estimates the percent of students who leave during the course of a year, and is smaller than a cumulative rate which estimates the percent of a cohort leaving over a period of years. Student achievement uniformly measured by an objective test is another possible measure of student performance, but is not currently available in California. One other performance measure was investigated, the percent of students completing the academic course sequence needed to attend a public university. Unfortunately the coursework measure lacked sufficient reliability to warrant further analysis. One reason for the unreliability may be that the course content associated with a specific title can vary from school to school.

The descriptive and correlational techniques used in this study permit informed speculation about relationships among the phenomena measured by the study variables. Of course, these techniques by themselves do not justify conclusions regarding cause and effect. Although the data describe a span of four years, the analyses are cross-sectional, and do not permit the examination of change over time, which is often needed to support causal inference.

Results

Table 1 illustrates the differences among schools in various locations. Perhaps the most striking result is the contrast between schools located in large cities and those in rural areas. Rural school dropout rates are less than a third of large city schools, while student enrollment, the percent of teachers with only a Bachelor's degree, and the percent of students in poverty is less than a half of large city schools. Compared to the others, large city schools have higher dropout rates, larger student enrollments, a higher percent of students in AFDC families, and a larger percentage of teachers with only a Bachelor's degree. Rural schools differed from the others, although not so consistently or greatly as the large city schools. Rural schools had teachers with fewer years of experience, and smaller student enrollments. Rural schools also had teachers with fewer years of education than the medium city and urban fringe schools. The findings with regard to teacher experience and education in rural schools could produce an expectation that rural schools would also have a larger percentage of teachers with only a Bachelor's degree. Contrary to this expectation, teachers who possess only a Bachelor's degree make up a smaller percentage of the faculty in rural locations than in other areas.

Table 1

Profile of Schools by Location

| Measure | Large City | Medium City | Urban Fringe | Rural |
|-----------------------------|-------------------|--------------------|---------------------|--------------|
| Number of Schools | 145 | 106 | 418 | 136 |
| Dropout Rate | 7.6(b) | 3.3(a) | 2.5(a) | 1.9(a) |
| Enrollment | 2,347(b) | 2,025(a,b) | 1,945(a,b) | 912(a) |
| Faculty Growth | 1.4 | 0.6 | 0.9 | 0.9 |
| Percent New Teachers | 5.7 | 5.0 | 5.0(a) | 5.4 |
| Years of Education | 5.5 | 5.6(a,b) | 5.7(a,b) | 5.4 |

| | | | | |
|----------------------------|---------|---------|---------|---------|
| Percent B.A. | 18.6(b) | 9.4(a) | 9.4(a) | 8.0(a) |
| Years of Experience | 16.2(b) | 16.5(b) | 16.5(b) | 15.0(a) |
| AFDC | 23.2(b) | 15.6(a) | 12.4(a) | 11.5(a) |

Note: Values denoted by (a) differ from those of large city schools, and values denoted by (b) differ from those of rural schools, ($p < .05$), using the Tukey-Kramer HSD comparison method.

Table 2 displays statewide means, medians, and standard deviations. Evidence that three measures are skewed is the difference between the mean and median of the percent of faculty with only a Bachelor's, the percent AFDC, and the dropout rate. These differences indicate that the distributions of schools are skewed so that more schools have lower values of these measures than higher values. The lopsided shape of these distributions probably contributes to lowering the related correlations and regression coefficients obtained in the following analyses. The positive mean and median of the faculty growth indicator is consistent with the overall growth in California's enrollments. Even so, about one third of high schools reduced the size of their faculty over the four years covered by this study.

Table 2

Means, medians, and standard deviations of student, school and teacher measures.

| Measure | Median | Mean | Standard Deviation |
|-----------------------------------|---------------|-------------|---------------------------|
| Student Enrollment (ENR) | 2,112 | 1,983 | 853 |
| Urban Location (URB) | 0 | 0.23 | 3.4 |
| Faculty Growth (FGR) | 0.6 | 1.0 | 3.2 |
| Percent New Teachers (PNT) | 4.7 | 5.2 | 3.2 |
| Years of Education (YED) | 5.6 | 5.6 | 0.3 |
| Percent Bachelor's (PBA) | 6.6 | 11.4 | 11.5 |
| Years of Experience (YEX) | 16.1 | 16.3 | 2.9 |
| Percent AFDC | 11.4 | 15.3 | 12.3 |
| Dropout Rate (DOR) | 2.1 | 3.8 | 3.7 |

Table 3 shows that school average dropout rates are moderately correlated with all study variables, except the annual growth of the number of faculty. A variable reflecting the urban location of a school was coded with a value of one if the school was situated in an urban setting and coded zero otherwise. Traditionally, school size

and poverty are correlated with dropout rates, which is replicated in this study. The average number of years of teacher education and experience are negatively correlated with the dropout rate, so that schools with more highly educated and experienced teachers tend to have fewer dropouts. The percent of teachers with only a Bachelor's degree and the percent of new teachers are positively correlated with the dropout rate, suggesting that schools with minimally educated, novice teachers tend to have more dropouts. Consistent with expectation, years of teacher experience and education are positively associated with one another, and negatively associated with the percent of new teachers and percent of teachers with only a Bachelor's. That is, schools with more highly educated and experienced teachers tend to have fewer novice and minimally educated faculty.

Table 3

Correlations of student, school and teacher measures.

| | ENR | FGR | PNT | YED | PBA | YEX | AFDC | DOR |
|-------------|------------|------------|------------|------------|------------|------------|-------------|------------|
| URB | .25 | .07 | .10 | -.21 | .34 | -.03 | .34 | .51 |
| ENR | | .16 | .02 | .04 | .21 | -.10 | .26 | .39 |
| FGR | | | .26 | .08 | .13 | -.18 | -.09 | .10 |
| PNT | | | | -.23 | .33 | -.43 | .09 | .26 |
| YED | | | | | -.57 | .36 | -.14 | -.25 |
| PBA | | | | | | -.21 | .19 | .44 |
| YEX | | | | | | | -.21 | -.20 |
| AFDC | | | | | | | | .51 |

Note: Correlations with an absolute value greater than .10 are statistically significant, ($p < .01$).

Even though the indicators of teacher education and experience are significantly correlated with the dropout rate, it is conceivable that school size, location, and AFDC account for both the teacher characteristics and the dropout rate. For example, larger schools appear both to hire more teachers with only a Bachelor's degree and to have higher dropout rates. Perhaps school size mediates the relationship between teacher education level and the dropout rate. AFDC is correlated with the teacher education and experience variables, except for percent of new teachers, and could mediate those relationships. If poverty and school size can explain teacher education and experience as well as dropout rates, it may be that teacher characteristics have little effect of their own.

The multiple regression analysis in Table 4 helps to assess the influence of each indicator on the dropout rate independently of the influence of other measures. A stepwise regression analysis identified four variables which contributed significantly to an explanation of dropout rate. In order of entry these variables were: AFDC, urban location, the percent of teachers with only a Bachelor's, school enrollment, and the percent of new teachers. R-square for this analysis was .50, which represents the proportion of variance in school dropout rates that can be accounted for by the four predictors. While this value of R-square is statistically significant, it is possible that greater values could be obtained by using additional or more precise information about students, teachers, or schools in the analysis. The standardized

betas permit a comparison of the importance of these variables in predicting dropouts. AFDC appears to have the greatest impact, with a change of one standard deviation in AFDC related to a change of 2.6 standard deviations in the predicted dropout rate. Urban location of the school trailed AFDC as a predictor of dropout rates. Percent of teachers with only a Bachelor's degree and enrollment were about equally important, followed by the percent of new teachers.

Table 4
Regression Analysis of Dropout Rate

| Measure | Parameter Estimate | Standardized Beta |
|-----------------------------|---------------------------|--------------------------|
| Intercept | -2.21* | 0 |
| AFDC | 0.11* | 2.6 |
| Urban Location | 2.64* | 2.2 |
| Percent B.A. | 0.07* | 1.6 |
| Enrollment | 0.001* | 1.6 |
| Percent New Teachers | 0.19* | 1.1 |

*Significant ($p < .001$). R-square = 0.50

Table 5 displays a profile of two groups of schools identified as in either the top or bottom ten percent with regard to dropout rates. There were 80 schools in each group. The dropout rate of schools in the low group was about one-fortieth of those in the high group. The two groups differed markedly in terms of enrollment and AFDC, consistent with earlier results. The profiles show statistically significant differences between the two groups for the percent of teachers with only a Bachelor's and the percent of new teachers. The percent of teachers with only a Bachelor's was about three times larger in the high dropout group compared to the low dropout group.

Table 5
Profile of Schools with High and Low Dropout Rates

| Measure | Low Ten Percent | High Ten Percent |
|------------------------------|------------------------|-------------------------|
| Dropout Rate* | 0.3 | 12.6 |
| Enrollment* | 1579 | 2733 |
| Teacher Annual Growth | 2.1 | 2.0 |
| Percent New Teachers* | 4.6 | 7.0 |
| Years of Education* | 5.7 | 5.4 |
| Percent B.A.* | 8.5 | 24.4 |
| Years of Experience | 17.1 | 15.5 |
| AFDC* | 6.1 | 26.9 |

* Differences between means are significant, ($p < .001$).

Discussion

This study replicates traditional findings that higher dropout rates are more likely in larger schools and in poor or urban areas. The relationship between poverty and student performance has long been documented. (White, 1982) The correlates of poverty, perhaps including childhood neglect, lack of family or peer support for education, neighborhood crime, etc. work to decrease the chances of success in school. People who are struggling to meet more basic, short term needs of food, shelter, and physical safety probably attend less to academic development, however much it is in their long term interest. Despite cases of exceptionally effective schools and teachers, or determined parents and students, a substantial performance gap persists between schools with disadvantaged and those with more affluent students.

An argument for larger schools is that economies of scale permit more extensive curricula, as well as more efficient use of facilities and equipment than would be possible with smaller enrollments. On the other hand schools are complex institutions and greater size may tend to make schools seem more intimidating, less welcoming, and less supportive to students. Larger organizations may face greater administrative challenges to deliver student services, provide teacher support, insure discipline, and maintain facilities. Large school size may affect more and less advantaged students differently. Those students who are at-risk of failure and dropping out may become discouraged in larger, more impersonal situations, without sufficient guidance and support. High achieving, more advantaged students may be more able to benefit on their own from the offerings of larger schools.

One facet of research on effective schools is to identify factors which help students overcome disadvantages. This study confirms prior findings that teacher experience and education are two such factors. While earlier research emphasized student academic achievement, this study goes further by looking at students who are at-risk of dropping out. Teacher education and experience appear to influence dropout rates. The smaller the proportion of inexperienced teachers who are new to a school, the lower the dropout rate. The smaller the percent of teachers with only a Bachelor's degree, the lower the dropout rate. This influence appears to hold independently of poverty, and school size, and location.

The stepwise procedure did not identify faculty growth, years of teaching, or overall years of education, so that these variables were excluded from the regression analysis. The results of a regression analysis can be sensitive to the inclusion of highly correlated pairs of variables, a situation described as multicollinearity. For example, the percent of teachers with only a Bachelor's and overall years of education are correlated with each other. However, preliminary analyses which included overall years of education in the model did not appreciably change the results for the other variables, suggesting that multicollinearity is not an issue. Conceptually, it appears that these two resource variables, the overall years of education and the percent of teachers with only a Bachelor's, represent distinguishable characteristics of a school faculty.

Notably, years of teaching and years of education are less strongly associated with the dropout rate than the percent of new teachers or the percent with only a Bachelor's degree. One possible reason for the difference may exist in the assignments that some schools typically give new teachers. It is commonly thought that more experienced teachers with seniority usually obtain more desirable classroom assignments with well behaved, higher achieving students. Novice teachers lacking seniority receive less desirable, more difficult classrooms with lower achieving,

at-risk students. Novice teachers are more likely to have minimum levels of education, particularly if the school district has lowered its hiring standards to maintain staffing levels. Arguably, at-risk students are most in need of intensive, skilled instruction, counseling, and support. Less well educated novice teachers are the least capable members of faculty able to provide the services and support needed to forestall student dropout. Ironically, as novice teachers gain experience and education, they also gain the seniority which enables them to opt out of the difficult assignments. While this pattern of assigning classrooms could exist in many schools, the effects are probably more severe in hard to staff schools with a high proportion of disadvantaged, at-risk students. Such unpopular schools probably have difficulty in retaining their more experienced and educated staff who move on to more attractive work sites. With lower levels of education and experience at a school there is less capability to support and train new teachers. The results of the analyses suggest that this assignment pattern and negative consequences may be more prevalent in urban settings.

Conclusion

Schools are complex institutions comprised of distinct yet interdependent systems. These systems can work in alignment to support student success. To the extent the systems are out of alignment they will be less supportive. Of course, some parts of these systems are beyond the control of schools so that perfect alignment is an unrealistic goal. The system which supplies teachers, depends not only on school administration and personnel offices, but also on employee organizations, state regulatory agencies, college and university teacher training programs, and on the labor market decisions of individuals who choose jobs according to their own interests. The instructional system includes not only teachers, curriculum, classrooms, textbooks, and materials, but also the community social and economic context. Parents and peers may support academic values and activities, or undermine them.

Despite the unruly nature of these systems, educators and policy makers at schools, colleges and in government can strive to work together toward a common vision of student success. Ideally, new teachers who are hired to maintain or improve student teacher ratios will have the experience and education needed to support the success of all students, including the disadvantaged and those who are at-risk of dropping out. If new teachers lack some these skills, they should receive appropriate classroom assignments, mentoring, and support. Maintaining a student teacher ratio by accepting lower standards for experience and education does not optimally support student success. Assigning difficult classrooms to unprepared, unsupported, novice teachers additionally threatens at-risk students. While accepting lower standards may be expedient in the short term, there are indirect costs including the personal costs to an individual of a decision to drop out and the burden imposed by dropouts on the public. In the long run, students, educators, and the public are better served by insisting on higher standards, and by providing the resources and the will to implement them.

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Appendix

Note 1. Enrollment and Teachers

The actual graded K-12 enrollment and numbers of teachers shown in Table 6 are from the California Basic Educational Data System (CBEDS) of the California Department of Education. Enrollments are published annually in a document entitled "California Public Schools Enrollment." Counts of teachers are published annually in a document entitled "Count of Certificated and Classified Staff in California Public School Districts." The teacher counts reflect certificated staff with classroom assignments, and exclude administrators and pupil services staff.

Table 6

Actual and Projected Enrollment and Teaching Staff

| School Year | Graded K-12 Enrollment | Teachers | Class Size Reduction Program |
|-------------|------------------------|----------|------------------------------|
| 1991-92 | 5,001,670 | 219,353 | |
| 1992-93 | 5,089,808 | 220,871 | |
| 1993-94 | 5,166,261 | 223,932 | |
| 1994-95 | 5,242,078 | 228,204 | |
| 1995-96 | 5,367,926 | 232,488 | |
| 1996-97 | 5,495,075 | 238,951 | 259,000 |

| | | | |
|---------|-----------|---------|---------|
| 1997-98 | 5,623,422 | 244,532 | 266,000 |
| 1998-99 | 5,737,874 | 249,509 | 269,000 |
| 1999-00 | 5,841,535 | 254,017 | 274,000 |
| 2000-01 | 5,945,067 | 258,519 | 279,000 |
| 2001-02 | 6,052,242 | 263,179 | 284,000 |
| 2002-03 | 6,160,231 | 267,875 | 289,000 |
| 2003-04 | 6,271,881 | 272,730 | 295,000 |
| 2004-05 | 6,392,367 | 277,969 | 300,000 |

The projections of graded public school enrollment are published by the California Department of Finance Demographic Research Unit in a document entitled "K-12 Graded Public School Enrollment by Ethnicity, History, and Projection - 1995 Series." The projections are based on a grade-progression ratio (or cohort survival) projection method and the most recent ten years of historical enrollment data from CBEDS.

The actual average ratio of K-12 pupils to classroom teachers from 1991-92 through 1995-96 is 23 to 1. The projected numbers of teachers from 1996-97 onward assume continuation of the 23 to 1 student teacher ratio. During the fall of 1996 the California Legislature enacted a program, which gives incentives to school districts to reduce class size in three elementary grades. Under this program there is a limit of twenty students in a "class." An estimated 20,000 additional teachers are needed to fully implement this program, which represents about an eight percent increase in the size of the work force. The projected number of teachers under the Class Size Reduction Program is calculated by applying an eight percent increase to the original projections. Over the next ten years, with class size reduction, the teaching workforce should increase in size by 68,000, which is about 30 percent growth. [Fetler \(1997\)](#) provides a more detailed discussion of enrollment growth in relation to the supply of teachers.

Note 2. Sources of Data

The annual Professional Assignment Information Form (PAIF), administered as a part of California Basic Educational Data System, was the source of teacher descriptive measures for each school, including: number of teachers, years of experience, percent new teachers, teacher educational level, percent of teachers with only a Bachelors degree, and growth in teacher staffing levels. School level personnel actions can vary from year to year, depending on local policies, resources, and needs. In order to improve the stability of the employment related measures, four year averages (1993 through 1996) of these measures were computed.

- Years of experience is defined as the total years of public and/or private educational service.
- Percent new teachers is computed as the number of teachers with no previous educational service divided by the total number of teachers in the school.
- Teacher years of education is a computed index. Teachers' responses were coded as follows: Bachelors degree = 4, Bachelors plus 30 semester hours = 5, Masters degree = 6, Masters plus 30 semester hours = 7, and Doctorate = 8. The coded responses were averaged to produce the index.
- The percent of teachers with only a Bachelors degree is computed as the

number of teachers with only a Bachelors degree divided by the total number of teachers in the school.

- The growth in the number of teachers was computed as the value of the slope coefficient of a four year linear trend. This coefficient is interpreted as the average yearly change in the number of teachers employed at the school.

CBEDS high school profile data sets were the source of measures of school characteristics, including the school dropout rate and the proportion of graduates meeting the public university course requirements, and the percent of students receiving Aid to Families with Dependent Children. Four year averages (1993 through 1996) of these measures were computed in order to improve stability. These school summary files are available at the web site hosted by the California Department of Education:

<http://goldmine.cde.ca.gov/ftpbranch/retdiv/demographics/Demohome.html>

The school dropout rate is computed as the number of reported dropouts in grades 9 through 12 divided by the eligible number enrolled. According to CBEDS (1996) a dropout is a person who meets the following criteria:-

- was formerly enrolled in grades 7, 8, 9, 10, 11, or 12-
- has left school for 45 consecutive school days and has not enrolled in another public or private educational institution or school program-
- has not re-enrolled in the school-
- has not received a high school diploma or its equivalent-
- was under twenty-one years of age-
- was formerly enrolled in a school or program leading to a high school diploma or its equivalent.

The percent receiving AFDC is the percentage of students in the school's attendance area who are enrolled in either public or private schools and who are from families receiving Aid to Families with Dependent Children (AFDC). This measure was taken from the high school performance data sets available at the same web address.

The classification of schools into demographic regions was derived from information contained in the 1994-95 Public School Name and Address File disseminated by the National Center for Education Statistics (1996).

<http://www.ed.gov/NCES/ccd/index.html>

This file contains the names and addresses of the 89,151 public schools in the 50 states, District of Columbia, and five outlying areas for 1994-95. Also included on each record is the School's enrollment (membership) and various other codes. These codes comprise school type, lowest and highest grades taught, and school locale.

The locale code is a definition of how the school is situated in a particular location relative to populous areas, based on the school's mailing address. The Code translations are as follows:

- 1= Large Central City
- 2= Mid-size Central City
- 3= Urban Fringe of Large City
- 4= Urban Fringe of Mid-Size City
- 5= Large Town

6= Small Town

7= Rural

The definitions for locales are:

- Large City: Central city of a Metropolitan Statistical Area (MSA) with a population greater than or equal to 400,000 or population density greater than or equal to 6,000 people per square mile.
- Mid-size City: Central City of an MSA with a population less than 400,000 and a population density less than 6,000 people per square mile.
- Urban Fringe of Large City: Place within an MSA of a Large Central City and defined as urban by the Census Bureau.
- Urban Fringe of Mid-size City: Place within an MSA of a Mid-size Central City and defined as urban by the Census Bureau.
- Large Town: Town not within an MSA, with a population greater than or equal to 25,000.
- Small Town: Town not within an MSA and with a population less than 25,000 and greater than or equal to 2,500 people.
- Rural: A place with less than 2,500 people and coded rural by the Census Bureau.

Only a small number of high-schools were in the "Small Town" category, which was therefore merged into the "Rural" category. The two "Urban Fringe" categories were also combined as were the "Large City" and "Large Town" categories after verifying that they were similar in terms of the other study variables.

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Employment Experience

- Consultant. California Department of Education. 1997 - present. Coordinate the development statewide assessment standards and tests administered under the Golden State Examination Program.
- Consultant. California Commission on Teacher Credentialing. 1995 - 1997. Plan, organize and conduct research on teacher credential examinations and teacher supply and demand.
- Director. Planning, Effectiveness and Accountability Unit, Chancellor's Office, California Community Colleges. 1990 - 1995. Manage accountability task force. Develop federal and state accountability programs.
- Administrator. Educational Planning and Information Center, California

Department of Education. 1984 - 1990. Manage and develop K-12 accountability policies and programs.

- Consultant. California Assessment Program, California Department of Education. 1980 - 1984. Conduct research and assessment projects.
- Evaluation Specialist. Northwest Regional Educational Laboratory, Portland, Oregon. 1979 - 1980. Deliver evaluation technical assistance and training to state education agencies.
- Senior Staff Associate. Western Interstate Commission for Higher Education, Boulder, Colorado, 1978 - 1979. Evaluate research instruments.

Education

B.A., Psychology, Colorado College, 1972

Ph.D., Psychology, University of Colorado, 1978

Study abroad in Germany at the Universities of Göttingen and Bielefeld

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Community Service

Volunteer for Elk Grove Unified School District, Board member of the Elk Grove Community Planning Advisory Council, fund raiser for the Strauss Festival of Elk Grove, and member of the Elk Grove Rotary Club.

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