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EDUCATIONAL EVALUATION AND POLICY ANALYSIS 1986 8: 253
DOI: 10.3102/01623737008003253

Educational Evaluation and Policy Analysis
Fall, Vol. 8, No. 3, 1986, pp. 253–266

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Pamela L. Grossman, Michael W. Kirst, and Jackie Schmidt-Posner
Stanford University

In this study we investigate curricular changes in California comprehensive high schools from 1982–83 to 1984–85. During this period a number of educational reforms occurred, all aimed at bolstering the academic demands of secondary schools. Senate Bill 813 mandated more extensive statewide graduation requirements for high schools, while California state universities and the University of California altered their entrance requirements. In addition, a number of national reports found America's high schools lacking in academic rigor. Although it is difficult to ascertain the precise causes of change, we find changes in the course offerings of a sample of 20 California comprehensive high schools. In almost all cases, our data mirror statewide curricular changes documented in California Basic Education Data System data. The general pattern in both sets of data involves increased offerings in academic areas, particularly in math, science, and advanced placement, and decreased offerings in industrial arts, home economics, and business education.

Recent efforts to reform education at the state level have provided evaluators with new problems and challenges. State legislatures have responded to the call for reform, heralded by reports such as *A Nation at Risk*, by creating omnibus bills such as Senate Bill (SB) 813 in California, which contain numerous provisions for reform at various levels of the educational system. These bills call to mind the image of an omnibeast, armed with a veritable arsenal of weapons with which to do battle against the forces of educational mediocrity. Included in the arsenal are longer school days, increased graduation requirements, and career ladder programs for teachers.

The Appendix provides a sense of the dimensions of one omnibeast as portrayed by a list of 80 reforms enacted simultaneously in California's SB813. Once the reforms are implemented, policymakers and the public are eager to discover whether or not the changes have been effective. Yet the very nature of these omnibus reforms makes them difficult to evaluate.

In this paper we describe our study of the effects of SB813 on the high school curriculum in California as one effort to evaluate one facet of reform and discuss some of the difficulties and opportunities we encountered trying to understand the aggregate effects of the omnibeast.

We would like to acknowledge the contributions of Michael S. Garet, who designed the statistical analysis for the study, and Worku Negash, who prepared the analyses of social studies, mathematics, and business education courses. We are also grateful for research support from the William and Flora Hewlett Foundation to Policy Analysis for California Education (PACE).

The face of educational reform in the mid-1980s is very different from that of the previous 15 years. In the late 1960s and 1970s, federal and state governments initiated educational reform that focused on the funding of categorical programs targeted to a range of special interest groups: handicapped, bilingual, gifted, and disadvantaged students. The task of evaluators in that era, while certainly difficult, was more circumscribed. Program evaluation involved assessing the nature of program implementation and whether or not the objectives of the program were being met. Program administrators and overseers of federal programs were the primary clients of the evaluator.

In this decade, the impetus for educational reform has shifted from the federal government to the states, except for the federal government's rhetorical role through the "bully pulpit" (Jung & Kirst, in press). A number of states have met this responsibility by crafting multifaceted reform bills. The educational reform legislation of the current decade has ushered in a host of new problems for the evaluator. Goals such as academic excellence have high symbolic appeal but often provide little in the way of measurable objectives for the evaluator. A smorgasbord of state-initiated solutions is offered, making it difficult to sort out the effects of specific measures. The state interventions are not linked to specific amounts of money or particular target groups; rather, a general state appropriation is made to cover a myriad of interventions.

As the purpose of evaluation moves from specific program evaluation to more broadly defined policy evaluation, corresponding shifts in the nature of evaluation research are required. Addressing this concern, Knapp and Stearns (in press) suggest that "neither the producers of evaluation research nor the consumers are well prepared to answer, or even ask, the kinds of questions that system-wide reform efforts raise" (p. 2). The tasks that Knapp and Stearns envision evaluators facing include:

> developing appropriate indicators of cumulative system change; making intelligent short-term estimates of long term reform trends; understanding how multiple, simultaneous reform measures interact and collectively contribute to educational improvement; developing comprehensive yet inexpensive information bases (e.g. that rely on non-traditional data sources) and imaginative ways of analyzing these; determining how statewide policy changes interact with varying local conditions; sorting among the numerous reform provisions to determine effective ones (p. 4).

Evaluators of statewide reform efforts must also answer to a wider audience. Clients of evaluation and assessment efforts are no longer limited to a few individuals or to a single level of government. Evaluation studies must now be understood by and accessible to an audience that includes legislators, parents, educational professionals, and the media. Cronbach (1982) suggests that the "policy shaping community" is a central consumer of evaluation studies and that evaluation efforts must serve a number of groups rather than a lone decisionmaker. He states, "Evaluation ordinarily speaks to diverse audiences through various channels, supplying each with political ammunition, and with food for thought" (p. 9).

Cronbach also suggests that evaluators must perform an educative role to speed up the process of learning from experience by "communicating what might otherwise be overlooked or wrongly perceived" (p. 8). As reforms are tied to state funding for education, both policymakers and the public may demand information about the effects of extra funding on school reform. Kirst (1986) argues that early assessments of reform initiatives and prompt feedback to the public and policymakers are vital to the continuation of public interest and financial support of educational reform.

Thus, evaluators and policy researchers need to find ways to assess the effects of large state reform efforts to increase the possibility of learning from experience, to highlight unanticipated consequences of reforms, to provide early warnings of emerging issues, and to keep the fickle spotlight of public interest focused on education, so that the momentum for reform continues.

A prototypical example of a multifaceted and system-wide state reform is provided by California's major educational

reform effort, SB813. Our study of the changes in the high school curriculum resulting from SB813 represents one attempt to assess some of its effects (Grossman, Kirst, Negash, & Schmidt-Posner, 1985). The study demonstrates both the challenges to evaluators engaged in evaluating multifaceted system-wide reforms and the limitations and benefits of such an evaluation.

Background of the Study

SB813 had the potential to affect the high school curriculum in numerous ways, including changes in the statewide requirements for high school graduation and the establishment of model curricula, new state tests, and textbook criteria. The number of years students are required to study certain subjects was increased and specific courses, such as courses in physical science, were added. At the same time, other levels of the educational system were also addressing the perceived lack of academic rigor in high schools. The state colleges and universities were engaged in specifying increased academic admissions requirements while local school boards reconsidered their curriculum standards. Other reforms at the state level included revisions of the state testing program, the development of model curriculum guidelines, and changes in secondary school accreditation and teacher evaluation. From the beginning, there were multiple forces aimed at changing the secondary school curriculum. Any evaluation of the curricular effects of SB813 would need to take account of these cumulative and multiple influences and recognize the difficulty of sorting out causal relationships.

A second issue facing potential evaluators of the effects of SB813 concerned the timetable for evaluation. Although SB813 was passed in 1983, the revised graduation requirements would first be in effect for the class of 1987. Thus, schools would still be involved in the process of responding to the new state requirements; some of the potential changes in the curriculum might not yet be evident in 1985. We decided that the need for short-term estimates of the effects of this facet of reform, however, outweighed the advantages of waiting a few more years to assess the impact of state reform efforts. Our study is not an attempt to evaluate the entire omnibeast, but only the part of it concerned with changes in the high school curriculum.

Description of the Study

The sample for the study consisted of 20 comprehensive high schools in California. Table I provides a demographic profile of our sample. Although the sample was designed to be representative of California comprehensive high schools in general, our sample differs from state means in several respects. The mean size of the sample schools is slightly larger than the state mean. In terms of minority enrollments, the sample schools show a slightly larger percentage of black and Asian students and a slightly smaller percentage of Hispanic students than the state means. In addition, the mean Parent Education Index (PEI) and California Assessment Program (CAP) scores of the sample schools are slightly above means for the state as a whole. This might indicate that our sample is skewed slightly in the direction of higher socioeconomic and perhaps more academically oriented schools. Our sample was constructed from the samples of earlier studies, which allowed us to take advantage of previously collected data on the curricula of these schools.

The primary source of data for this study was master schedules of courses offered in the schools during the years 1982–83 and 1984–85. Master schedules list the actual assignments of individual teachers to specific courses for each semester. We believe these documents provide more reliable data about actual changes in course offerings than do impressions of teachers or administrators. Data from master schedules allowed us to analyze both changes in actual numbers of sections taught and changes in course titles.

Using the master schedules, we tabulated the number of sections of each separate course taught in 1982–83 and 1984–85 in English, social studies, science, math, art, music, home economics, industrial arts, business, and foreign language. We also tabulated the numbers of Advanced Placement courses across depart-

TABLE I

Demographic Data on Sample Schools

School	1982–83 % Asian	1982–83 % Black	1982–83 % Hispanic	1982–83 % White	1983–84 Enroll	1983–84 PEI[a]	CAP Scores: % Correct 1983–84 Math	1983–84 Reading	1983–84 Writing
A	12.72	2.28	8.61	76.39	1536	3.54	72.9	67.0	68.1
B	3.12	18.89	18.61	59.38	2493	3.19	65.9	59.8	60.6
C	2.55	2.77	5.17	89.51	1530	3.62	73.4	68.5	68.8
D	0.29	98.59	0.53	.59	1401	2.67	54.1	55.5	56.6
E	68.00	19.14	2.45	10.41	2232	2.18	63.8	47.5	49.4
F	0.00	0.00	4.00	96.00	148	2.47	66.3	57.8	53.9
G	9.34	10.92	6.91	72.83	2686	3.53	73.6	66.6	66.5
H	4.94	27.21	13.63	54.22	2041	2.71	59.3	56.4	56.0
I	5.45	1.64	58.3	34.61	1331	2.65	61.5	56.8	56.0
J	9.49	3.34	8.34	78.83	1768	3.89	73.3	67.8	67.6
K	0.79	4.70	42.85	51.66	2427	2.50	62.0	55.7	57.1
L	5.09	22.8	6.52	65.59	1787	4.05	76.4	75.4	76.7
M	5.76	5.35	1.71	87.18	1772	4.34	82.1	73.7	75.3
N	0.28	0.00	5.57	94.15	377	3.05	68.3	69.0	64.3
O	19.6	2.99	59.07	18.34	1178	1.94	54.3	47.4	45.6
P	3.94	7.72	33.01	55.33	2418	2.71	64.9	61.1	59.0
Q	8.57	1.94	16.17	73.32	1587	2.95	70.3	62.9	68.1
R	0.71	4.89	12.1	82.30	1233	3.59	70.3	68.1	66.4
S	3.39	0.33	4.21	92.07	1640	3.72	75.9	69.5	68.6
T	44.67	22.57	11.33	21.43	2881	2.57	68.4	56.0	58.6
Mean	10.44	12.90	15.95	60.71	1723	3.09	67.85	62.13	62.16
Standard deviation	16.43	21.42	17.50	29.53	685	0.64	7.16	7.76	7.98

[a] PEI = Parent Education Index

ments. To control for enrollment changes in the schools from 1982 to 1984–85, one potential cause for changes in the numbers of sections offered, we adjusted the number of sections offered at each school to reflect changes in enrollment. For each department within a school, we divided the number of sections by the total school enrollment and then multiplied by 1,000. We then used these adjusted figures, the number of sections per 1,000 students, to compute the percentage change in the number of sections offered in each department. (A summary of these adjusted percentage changes appears in Table II.)

As a secondary source of data, we used information from the California Basic Educational Data System (CBEDS) (Sims, 1986). CBEDS is part of a multipurpose data system developed by the California State Department of Education. Information is collected annually from teachers, principals, and district administrators about course offerings, student enrollment, and teacher assignments. We compared our findings to the total number of sections of individual courses offered statewide and to total student enrollment in these courses.[1]

In addition to analyses of change in number of sections offered by departments, we conducted a subject matter analysis of the types of changes occurring within each department. Individual courses were coded into categories that constitute a particular subject matter. For example, science was categorized into life and general science, biology, physical and earth science, advanced science, and elective courses. Our categories proved to be very similar to those used in the CBEDS. This analysis of course titles and course categories within departments allowed us to get another perspective on the nature of curricular change in the schools.

In an exploratory secondary analysis of the data, we looked at the relationship between the socioeconomic status (SES) of the schools and curriculum change. As a proxy measure for SES, we used the PEI from the CAP data. According to California State Department of Education researchers, the correlation of PEI with other SES measures is above .75. The sample schools were then split into two groups, those with a mean PEI value that fell above the sample mean and those with PEI values that fell below the sample mean. We then analyzed changes in section numbers in each department for these sub-samples.

Findings

Although a great deal of variability exists among schools, as indicated by standard deviations, the overall pattern of findings revealed a trend toward a more academically oriented curriculum in the sample schools, with large increases in areas such as math, science, Advanced Placement, and foreign language courses, and decreases in home economics, industrial arts, and business courses. Advanced Placement courses showed the most dramatic increase, an adjusted percentage increase of 117 over the 3-year period of the study. While the small number of Advanced Placement courses makes the increase especially dramatic, it represents a movement toward more academic, college preparatory courses. Table II presents data on adjusted percentage change in the number of sections by department in each sample school.

Science courses increased 22% after adjusting for enrollment, whereas in math the adjusted increase was 19%. In math, the biggest percentage increases occurred in computer science and in more advanced courses such as calculus, analytic geometry, trigonometry, and geometry. Although all areas of math showed increases, the number of calculus and analytic geometry courses rose by 31%, whereas general math courses increased by 10%. Foreign language courses showed a more moderate increase of 12% after adjusting for enrollment change.

The increase in math and science offerings was accompanied by a substantial decline in vocational offerings. After adjusting for enrollment changes, the number of sections in home economics dropped 21%. Industrial arts offerings dropped by 16%. The number of business

[1] CBEDS statistics reflect information gathered from all high schools, including vocational high schools. Our study, however, is limited to comprehensive high schools. Thus, some discrepancy between our data and CBEDS data may be due to our narrower sample.

TABLE II

Overview of California Comprehensive High School Curricular Changes: Adjusted Percentage Change in Number of Sections Offered, 1982–83 to 1984–85

School	Adv Pl	Science	Math	Fr Lang	Home Ec	Ind Art	Bus Ed	Art	Music	English	Soc Studies
A	−12%	−19%	−5%	3%	−54%	13%	−19%	−9%	−25%	−19%	0%
B	0%	16%	27%	18%	4%	6%	2%	19%	−35%	0%	2%
C	85%	18%	−2%	−9%	−18%	−37%	−18%	1%	−9%	−16%	−8%
D	0%	37%	16%	−5%	−34%	−16%	0%	−40%	−6%	9%	2%
E	4%	22%	5%	15%	−51%	−17%	−19%	−6%	−4%	11%	15%
F	0%	44%	76%	3%	37%	−21%	3%	37%	105%	54%	−8%
G	1100%	26%	19%	29%	−20%	−8%	−8%	22%	−17%	17%	9%
H	−2%	48%	48%	4%	−67%	−27%	−25%	−16%	−34%	−8%	−14%
I	20%	0%	2%	1%	−40%	−64%	−28%	−20%	−47%	−13%	−11%
J	22%	34%	10%	30%	−7%	4%	−18%	−27%	13%	8%	5%
K	288%	0%	43%	10%	−3%	−5%	23%	−3%	70%	31%	49%
L	44%	−16%	−16%	−10%	−24%	−24%	−3%	−35%	−33%	−29%	−13%
M	11%	13%	18%	11%	48%	0%	−29%	48%	25%	25%	21%
N	0%	38%	4%	23%	−69%	−21%	−8%	84%	−8%	−29%	−8%
O	300%	59%	−2%	10%	−3%	24%	−19%	2%	118%	−23%	−18%
P	42%	40%	55%	20%	−12%	−17%	21%	29%	32%	23%	14%
Q	400%	65%	65%	35%	−37%	−4%	−4%	18%	−35%	16%	3%
R	0%	−2%	11%	9%	−100%	−20%	−27%	−8%	−29%	−5%	−8%
S	17%	19%	8%	24%	82%	−47%	−21%	−19%	−16%	1%	1%
T	17%	0%	−1%	18%	−53%	−30%	−18%	16%	−15%	−12%	−11%
Averages:	117%	22%	19%	12%	−21%	−16%	−11%	5%	3%	2%	1%
Standard deviation:	253%	23%	25%	13%	42%	20%	15%	29%	45%	21%	15%

Note. Percentages reported have been adjusted for enrollment changes. $n = 20$ high schools.

TABLE III

Total Enrollment by Subject Area in California High Schools: 1982–83 and 1984–85

Subject Area	1983–84	1984–85	% change
Art	320,269	294,888	−7.9%
Business	177,102	102,187	−42.3%
English	1,616,492	1,545,299	−4.4%
Foreign Language	401,551	143,873	−14.1%
Industrial Arts	304,008	241,809	−20.5%
Math (w/CompSci)	1,084,023	1,160,894	7.1%
Computer Science	51,481	135,664	163.5%
Music	481,853	231,026	−52.1%
Science	630,585	750,653	19.0%
Social Science	1,168,182	1,164,770	−0.3%
Total HS Enrollment	1,263,668	1,305,148	3.0%

Note. Data were provided by the California State Department of Education through the California Basic Educational Data System.

courses offered by the schools also declined, with sections decreasing by 11%. Curriculum areas that remained relatively stable included English, social studies, music, and art.

When we compared our findings to statewide CBEDS data on student enrollment in nine departments, we found similar trends in math, science, industrial arts, and business (see Table III). Contrary to our findings, the statewide data indicate declines in enrollment in music and art courses and a 14% decline in enrollment in foreign language. Although it is not clear why the two sources of data differ so radically in the areas of music and foreign language, the difference between student enrollment in courses and the number of sections offered by departments may account for some of the discrepancy. For example, the number of sections of music courses may have remained relatively stable, whereas the number of students in the sections declined. The CBEDS data, however, confirm our findings of significant increases in math and science and declines in vocational areas.[2]

The overall changes in sections may reveal broad trends in course offerings, but in some cases the lack of significant overall percentage change masks important shifts of emphasis within departments. To look at changes within departments we did a content analysis, using categories for each subject area to group course titles.

The most noticeable shift in science courses was the dramatic increase in the number of sections of physical science, reflecting the new state graduation requirement of one year of physical science. Our analysis showed a healthy increase in the number of science sections offered at both the beginning or general levels, such as life and general science, as well as at the more advanced levels. The only decrease was in sections of elective courses offered on topics such as oceanography, astronomy, and aerospace education (see Table IV).

In math, the biggest increases occurred in computer science and in more advanced courses such as calculus, analytic geometry, trigonometry, and geometry (see Table V). We recalculated the data, excluding computer science courses, to determine whether the addition of computer courses artificially inflated the increases in math sections. Without computer science courses, math sections still showed an overall increase of 13%.

English and social studies showed only small increases in the number of sections offered. The departmental analyses, however, showed that significant internal changes have occurred. Tables VI and VII present the data for these departments.

An analysis of English offerings dem-

[2] The reliability and validity of CBEDS data have been criticized in a recent review (Sims, 1986). We believe our use of schools' master schedules provides higher quality data.

TABLE IV

Aggregate Curricular Changes in Science: 1982–83 to 1984–85 (Adjusted for enrollment changes, AEC)[a]

Category	1982–83 Section	1982–83 AEC	1984–85 Section	1984–85 AEC	AEC % Change
Life/General	273	7.9	325	9.3	17.7
Billogy	412	11.9	432	12.4	4.2
Physical/Earth	64	1.8	173	4.9	172.2
Advanced	366	10.6	413	11.8	11.3
Electives	58	1.7	56	1.6	−5.9
Overall	1173	33.9	1397	40.0	18.0

[a] Aggregated enrollment in sample schools for 1982–83 was 34,540; for 1984–85 was 34,902.

TABLE V

Aggregate Curricular Changes in Math: 1982–83 to 1984–85 (Adjusted for enrollment changes, AEC)[a]

Category	1982–83 Section	1982–83 AEC	1984–85 Section	1984–85 AEC	AEC % Change
General Math	519	15.0	576	16.5	10.0
Algebra	617	17.9	694	19.9	11.0
Trig/Geometry	303	8.7	362	10.4	19.5
Analytic Geom/Calculus	54	1.6	72	2.1	31.0
Computer Science	67	1.9	128	3.7	94.7
Overall	1560	45.2	1832	52.5	16.2
Overall without computer science	1493	43.2	1704	48.8	13.0

[a] Aggregated enrollment in sample schools for 1982–83 was 34,540; for 1984–85 was 34,902.

TABLE VI

Aggregate Curricular Changes in English: 1982–83 to 1984–85 (Adjusted for enrollment changes, AEC)[a]

Category	1982–83 Section	1982–83 AEC	1984–85 Section	1984–85 AEC	AEC % Change
Drama	38	1.1	35	1.0	−8.9
Reading	143	4.1	96	2.8	−31.8
Am/Brit Lit.	132	3.8	153	4.4	15.8
Comprehensive	866	25.1	1045	29.9	19.1
Electives	236	6.8	179	5.1	−25.0
Adv. Courses	89	2.6	102	2.9	11.5
Journalism	49	1.4	38	1.1	−21.5
Writing	208	6.0	168	4.8	−20.0
Other	690	20.0	724	20.7	3.5
Overall	2451	71.0	2540	72.8	2.5

[a] Aggregated enrollment in sample schools for 1982–83 was 34,540; for 1984–85 was 34,902.

onstrated a substantial increase in comprehensive English courses, advanced courses, and American and British literature courses. Declines occurred in elective courses such as journalism and writing courses. The increase in required comprehensive courses and the declines in elective offerings may indicate a move toward a more standardized English curriculum. Social studies also showed internal change, with an increase in the number of world history courses being offered and a decline in social science electives such as psychology and anthropology.

Home economics courses demonstrated the greatest decline of all of the departments studied. The analysis of course titles in home economics revealed that this decrease was spread across all areas in the department except parent education, where a significant increase in one school skewed the results (see Table VIII). When that outlier was removed, parent education sections also showed a decline. In some cases, we found that courses in home economics were entirely eliminated; in other cases, courses were collapsed, so that Foods 1, 2, 3, for example, were offered in one class.

We found a 12% decrease in sections of business education courses, with declines in every category of course (see Table IX). The greatest drop occurred in shorthand classes. Typing was the only course that seemed to be fairly stable, with a 7.5% decrease. This may be explained by the

TABLE VII

Aggregate Curricular Changes in Social Studies: 1982–83 to 1984–85 (Adjusted for enrollment changes, AEC)[a]

	1982–83		1984–85		AEC %
Category	Section	AEC	Section	AEC	Change
U.S. History	581	16.8	556	15.9	−5.4
World History	325	9.4	422	12.1	28.7
Social Sciences	438	12.7	376	10.8	−15.0
Government	297	8.6	282	8.1	−5.8
Overall	1641	47.5	1636	46.9	−1.3

[a] Aggregate enrollment in sample schools for 1982–83 was 34,540; for 1984–85 was 34,802.

TABLE VIII

Aggregate Curricular Changes in Home Economics: 1982–83 to 1984–85 (Adjusted for enrollment changes, AEC)[a]

	1982–83		1984–85		AEC %
Category	Section	AEC	Section	AEC	Change
Foods	126	3.6	83	2.4	−33.3
Clothing	76	2.2	54	1.5	−31.8
Life Skills	40	1.2	26	0.7	−41.7
Parent Education	51	1.5	57	1.6	6.7
(Without Outlier)	41	1.2	34	1.0	−16.7
Other	64	1.9	55	1.6	−15.8
Overall	357	10.3	275	7.9	−23.4

[a] Aggregated enrollment in sample schools for 1982–83 was 34,540; for 1984–85 was 34,902.

TABLE IX

Curricular Changes in Business Education: 1982–83 to 1984–85 (Adjusted for enrollment changes, AEC)[a]

	1982–83		1984–85		AEC %
Category	Section	AEC	Section	AEC	Change
Typing	325	9.4	303	8.7	−7.5
Accounting	153	4.4	130	3.7	−15.9
Shorthand	41	1.2	31	0.9	−25.0
Office Work	183	5.3	150	4.3	−18.9
Business Law	65	1.9	53	1.5	−21.1
Overall	757	21.9	667	19.1	−12.8

[a] Aggregated enrollment in sample schools for 1982–83 was 34,540; for 1984–85 was 34,902.

fact that typing is a popular business course for students in both general and college preparatory tracks.

All of these changes in both the overall analysis and the departmental analyses follow a general pattern of increases in the more traditionally academic offerings and decreases in the areas associated with vocational education and the practical arts. To investigate whether this pattern varied according to the socioeconomic status of the school, we did a secondary analysis, using the PEI as a measure of SES. The results of the analysis are reported in Table X.

In the analysis we found that schools that fell below our sample mean for parent education showed substantially higher increases in math and science sections than did schools with a PEI above the sample mean. In math, schools below the mean showed an adjusted increase in the number of sections of 28%, whereas schools above the mean had a 7% increase in math sections. In science, schools below the mean had a 32% increase in the number of sections, whereas in schools above the mean, sections increased by 8%. Schools in both categories displayed dramatic losses in industrial arts and home economics. These results suggest that lower SES schools are making a significant effort to increase offerings in math and science. The curricular trade-

TABLE X

Summary of Section Changes by School Parent Education Level (indicated by Parent Education Index, PEI)

Category	1982–83		1984–85		AEC % Change[a]
	Section	AEC[a]	Section	AEC[a]	
Art					
High PEI schools	249	135	247	132	−2%
Low PEI schools	222	162	235	190	17%
Business					
High PEI schools	295	163	256	136	−17%
Low PEI schools	453	307	435	291	−5%
English					
High PEI schools	1201	663	1192	640	−3%
Low PEI schools	1280	872	1348	901	3%
Foreign Language					
High PEI schools	409	232	463	254	9%
Low PEI schools	389	260	444	291	12%
Home Economics					
High PEI schools	138	73	121	61	−16%
Low PEI schools	219	173	154	136	−21%
Industrial Arts					
High PEI schools	309	174	222	115	−34%
Low PEI schools	505	384	413	310	−19%
Math					
High PEI schools	868	479	952	511	7%
Low PEI schools	810	573	1019	734	28%
Music					
High PEI schools	140	79	122	68	−14%
Low PEI schools	161	144	162	150	4%
Science					
High PEI schools	612	350	681	377	8%
Low PEI schools	561	382	716	504	32%
Social Studies					
High PEI schools	876	479	899	484	1%
Low PEI schools	911	700	948	682	−3%

Note. Total enrollment in sub-samples for high PEI schools (N = 9) was 16,657 in 1982–83 and 16,799 in 1984–85; for low PEI schools (N = 11) was 17,883 in 1982–83 and 18,103 in 1984–85.

[a] AEC = adjusted for enrollment change.

offs, however, are still unclear and deserve further study.

Implications of the Study

The general pattern of findings in this study indicate that changes in the high school curriculum in California are consistent with the intentions of recent reform efforts. As our study represents an early attempt to assess the effects of reform on the curriculum, our results provide a conservative estimate of actual curricular change. As the class of 1987, the first class to whom the new requirements apply, moves through the high school curriculum, more changes are likely to occur.

The increases in academic areas can be attributed to several policy initiatives, including state high school graduation requirements, changes in admissions requirements for the University of California and California State University systems, and local efforts to increase the academic emphasis of their schools. The declines in vocational education and home economics are more difficult to explain. It is possible that schools deliberately decreased sections in these areas to make room for expanded offerings in the more academic offerings. An alternative explanation involves student choices and the limitations of their schedules; students may have had less room for these traditionally elective courses as graduation requirements in other areas increased. A recent nationwide survey of 181 vocational educators supports this interpretation (Hooper, 1985).

Although it is possible to speculate on the causes for the shifts in curricular offerings, we have no conclusive evidence to support any causal statements. As in most cases of curricular change, there are multiple causes at both the local and state level. For whatever reasons, it appears that changes are occurring in the direction desired by reformers—toward an emphasis on more traditional academic subjects. As our data consist entirely of course titles, the study cannot comment on any substantive change in actual course content or classroom instruction. Although it is not clear what the move to a more academic curriculum means for the schools, a recent study (Rock, Ekstrom, Goertz, & Pollack, 1985) suggests that the academic emphasis of a school is related to higher achievement gains.

Two major implications arise from the findings of this study; one concerns students and the other concerns teachers. The changes in the curriculum pose clear implications for students' curricular choices in high school. Our data show an increase in the academic offerings available to more advanced students and an erosion of nonacademic electives available for general track students. A recent study of curriculum change over 25 years (Walker, in press) suggested that changes are more likely to benefit students at either end of the academic spectrum than those in the middle. How these changes have affected general track students in California schools is still unclear, although it is probable that the shifts in the curriculum may force general track students to take more academic courses. This a particularly important concern given the recent PATHS study (Sanders & Stone, 1984), which demonstrated that students in the general track receive the least curricular guidance and take programs of study with the least coherence.

A second implication arises from the dramatic increases in math and science sections. Ironically, this desired increase occurs at a time of serious teacher shortages in these areas (Guthrie & Zusman, 1982; Institute for School Development, 1982; Rumberger, 1984). Given this shortage, it becomes important to investigate who is teaching these new sections of math and science. Are home economics teachers being prepared to teach the new sections of physical science? As many of the increases have occurred at the more advanced levels of math and science, it becomes even more critical to ensure that the teachers teaching these courses have sufficient background in and knowledge of their subject areas.

Limitations and Benefits

The limitations of this form of short-term evaluation of state reform are balanced by a number of benefits. The data used to measure curriculum change were relatively inexpensive to collect and analyze, yet they provided greater reliability than surveys of impressions of school administrators. Because the data had al-

ready been collected by the schools in the form of master schedules, the study permitted relatively quick feedback on early effects of the new policies. The use of master course schedules also allows for future longitudinal studies of our sample schools to track further curricular change. The corroboration of the data from sample schools with statewide CBEDS data increased the validity of our findings, while again drawing upon previously collected data. This study demonstrates the benefits of drawing upon pre-existing data sources for short-term analysis of early policy effects.

The study also provided information directly to policymakers through a presentation to the State Board of Education and briefings to State Department of Education administrators and to legislators. Although the data cannot enlighten us on the actual content taught in California classrooms, the changes in numbers of course sections demonstrate to policymakers and to the public that schools are responding to reform efforts in some aspects of curriculum. Follow-up studies could build on these data to investigate how students are affected by changes in the number of course sections offered by their schools.

Another benefit of a short-term evaluation of policy effects lies in its ability to examine unanticipated consequences of policies and to provide for mid-course correction. Our study revealed unanticipated and serious declines in vocational education. The data on declines challenged administrators' and policymakers' beliefs that the extra funding provided by SB813 would result in additions to the academic curriculum without the need for cutbacks in other areas. Our data on declines in vocational education confirmed forecasts by vocational educators and allowed policymakers to consider the implications of these declines before too much time had elapsed.

Knapp and Stearns (in press) note that early responses to reform efforts may differ from mature responses. Initially, changes that occur may be more superficial than substantive. They argue that,

> at first, the effects of reform will appear at the "input" side of the equation: changed teacher retention rates, increased hours spent in class or doing homework, different course choices, etc. Consequently, evaluation research should concentrate at first on these aspects of reform; little should be expected in the short term from educational outcomes, such as student achievement measures which may require the combined effect of various reforms over time." (pp. 8–9)

In looking at changes in the number of sections offered in various departments in secondary schools, our study concentrated on the first level of possible change. Before student test scores in academic areas can be expected to rise, students must be enrolled in academic courses. By focusing on early indicators of change, evaluators can avoid premature predictions of the failure of reforms and indicate the outcomes that can be reasonably expected to change over time. Evaluators can then establish a timetable for evaluative efforts, with early studies looking at relatively superficial indicators of change and later studies focusing on more substantive educational outcomes.

Limitations of this form of short-term evaluation include limitations in the data and problems in determining causation. Master course schedules reveal fairly accurately the numbers and titles of courses being offered in the schools; they cannot reveal the content of these courses or the quality of instruction. Our data cannot distinguish between courses that may have been simply renamed to meet new graduation requirements and courses that have actually been restructured. Further research would be required to investigate whether or not changes in course offerings have an effect on what students learn in high school, on the substantive content of the curriculum. The data from this study cannot answer this question, nor can they link changes in course offerings to changes in educational outcomes.

A second limitation of this study, which derives partly from the nature of the reforms themselves, concerns the difficulty of attributing the exact cause of the curricular changes. Some of the changes, such as the increase in physical science classes, seem directly attributable to changes in state graduation requirements as mandated by SB813. Others, such as the rise in Advanced Placement and hon-

ors courses, might be due to changes in admission requirements for the University of California and California State University systems. Other changes may have been more idiosyncratic, occurring because of personnel issues or local conditions. As all of these factors contribute to curricular change, it is impossible to single out SB813 as the single cause of the move toward a more academic curriculum.

The impact of these reforms on schools is similar to a patient taking a number of different medications that interact in the body. Although the patient responds, the exact effect of each individual medicine may be unclear. Policymakers might need to content themselves with the fact that the curriculum seems to be moving in the intended direction for a variety of reasons. Strict proof of cause and effect may be neither possible nor necessary in the case of multifaceted, system-wide reform efforts.

Conclusion

Changes in the context and nature of educational reform in the current decade necessarily involve changes in roles and responsibilities of evaluators. Evaluators will need to adapt their skills to meet current demands and to increase the flexibility of their repertoires. The multifaceted nature of many state reforms imposes the need for a variety of approaches to the task of evaluation and for large-scale funding. The demand for relatively quick feedback on the effectiveness of reforms in turn requires that evaluators look for new and multiple sources of data. Collaborative efforts may be necessary to evaluate effectively the effects of state policies.

We recommend that evaluation of omnibus reforms focus on a state sample of schools and follow them longitudinally. This bottom-up view can be used to construct a wholistic view of a school and explore the effects of reform on many of its components, including financial allocations, curriculum policy, teacher morale, administrative behavior, and pupil outcomes. Targeting the school as the unit of analysis is more promising than trying to track the impact of each state reform or even clusters of reforms with similar objectives from the state to the local level. The omnibeast is not a single animal, but rather a composite beast, made up of a menagerie of loosely connected and often unrelated parts. Their impact will merge at the school level. Our effort to look at changes in the California high school curriculum represents only a first attempt to track the omnibeast to the school level.

APPENDIX

80 Reforms Enacted in California in 1983 through SB 813[a]

- Improvement of Administrators
  - Notice for Termination
  - Pilot Projects
  - Senior Management (Classified)
  - Seniority and Transfer
  - Training and Evaluation
- Adult Education
- Agricultural Vocational Education
- Apprentice Program
- Bilingual Exit Criteria
- CAP Tests
- California Academic Partnership Program
- Categorical Funds
- Commission on School Governance and Management
- Classroom Teacher Instructional Improvement Program
- Computer Curriculum
- Continuation Schools
- Counseling for 10th Graders
- Curriculum Standards
- Economic Impact Aid in High Schools
- Education Improvement Incentive Program
- Facilities/Property
- Golden State Examination Program
- Graduation Requirements
- High School Accreditation
- Innovative Local Experiments to Strengthen Personnel and Management
- Instructional Materials
- Instructional Time
- Longer School Year
- Mentor Teacher Program
- Minimum Day
- Minimum Teacher's Salary
- Opportunity Classes/Programs
- Regional Occupational Centers/Programs
- Revenue Limits
- School Improvement Program
- Small School District Funding

[a] Source: California Coalition for Fair School Finance, Menlo Park, California, 1983. *(continued)*

APPENDIX—Continued

- Small School District Transportation
- Special Education
- Specialized High Schools
- State Department of Education
  - Guidelines
- Students
  - Counseling for 10th Graders
  - Discipline (Suspension/Expulsion)
  - Graduation Requirements
  - Minimum Day
  - Number of Courses, Seniors
  - Promotion/Retention
  - Truancy
  - Unexcused Absences
- Summer School
- Teacher Education and Computer (TEC) Centers
- Teacher Shortage Loan Assumption
- Teacher Trainee
- Teachers
  - Collective Bargaining
  - Credentials
  - Dismissal/Suspension
  - Evaluation
  - Evaluators
  - Layoff
  - Probationary
  - Seniority
  - Staff Development
  - Test Before Reassignment
- Transportation
- Urban Impact Aid
- Waiver of Education Code for Counties
- Work Experience

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Authors

PAMELA L. GROSSMAN, Ph.D. candidate, School of Education, Stanford University, Stanford, CA 93405. *Specializations:* Research on teaching and teacher education, curriculum, evaluation.

MICHAEL W. KIRST, Professor of Education, School of Education, Stanford University, Stanford, CA 94305. *Specializations:* Politics of education, federal and state policymaking for education.

JACKIE A. SCHMIDT-POSNER, Ph.D. candidate, School of Education, Stanford University, Stanford, CA 94205. *Specializations:* Organizational theory, impact of computers in organizations, higher education.