

# California's Charter Schools: Measuring Their Performance

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## TECHNICAL APPENDIX

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### Research methodology and analysis

In June 2007, EdSource published *California's Charter Schools: Measuring Their Performance*, the third in a series of studies of the performance of California's charter schools. The publicly available data files from the California Department of Education were essential to this study. From these files, the study team constructed a database of 9,945 public schools that were open in the 2005-06 school year. There are 574 charter schools and 9,371 noncharters in the database.

### Rules for including schools in the performance analyses

The study reflects multiple analyses of performance on a specific subset of schools. The schools included shared the following characteristics:

- The school was open in the 2005–06 school year;
- The school had Academic Performance Index (API) and School Characteristics Index (SCI) information in the 2006 Base API;
- The school had percent proficient reported in English/language arts and mathematics for 2005–06 AYP;
- The school reported a CST mean scale score in English language arts for at least one of the following grades in 2005–06: 3, 7, or 10;
- If the school was an elementary or middle school, it reported a CST mean scale score in mathematics for at least one of the following grades in 2005–06: 3 or 7; and
- If the school was a high school, it reported 10th grade CAHSEE scale scores in English language arts and mathematics in 2005–06.

Most of the schools that dropped out of the database and were excluded from the performance analyses lack API and SCI information in the 2006 Base API. Figure 1 summarizes the reasons that schools were excluded from performance analyses.

Figure 1. Reasons that schools were excluded from the performance analyses<sup>1</sup>

	Charter	Noncharter
Schools open in the 2005-06 school year	574	9,371
Lacked API/SCI	218	2,163
Lacked percent proficient in ELA or mathematics	1	2
Lacked CST mean scale score in ELA	5	83
Lacked CST mean scale score in mathematics	0	0
Lacked CAHSEE scale score in ELA or mathematics	4	1
Schools included in the performance analyses	346	7,122

### Regression approach

To analyze the performance of the remaining 7,468 schools, the study team used ordinary least squares (OLS) regression. This technique can help to overcome some of the challenges presented by the absence of an experimental design. In a researcher’s ideal world, students and teachers would randomly choose schools. Indeed, in an ideal experiment, the researchers might randomly choose which schools would be able to operate as charter schools. Then researchers would study differences in performance, and assuming that the students in charter schools were of a sufficiently large number and were sufficiently representative of the state’s student population, researchers could better attribute performance differences to charter status. Such features of experimental design are not possible in an examination of California’s charter schools.<sup>2</sup>

This study uses OLS regression to account and control for the effect of observable, measurable factors that are associated with academic performance. Each regression was run with data from a single year. The generic model used is:

$$y = \beta_0 + \beta_1 \text{CHARTER} + \beta_2 \text{SCI} + \beta_3 \ln(\text{ENROLLMENT}) + \varepsilon$$

where:

<sup>1</sup> Any schools that have more than one of these reasons are reflected only once in the table, in whichever reason is closest to the top of the table.

<sup>2</sup> A few smaller studies have tracked the progress of students who either were admitted or denied admission to a charter school by a lottery. Because such studies compare students who are similar in most respects—including having parents motivated to *choose* a school for their child—their claims about the role of the school in student outcomes are more valid (Betts & Hill, 2006).

- $y$  = academic performance measure, such as API, CAHSEE scale score, or CST scale score;
- $CHARTER$  = 1 for all charter schools, 0 otherwise (other contrasts, such as CMO/EMO member versus nonmember, would also be substituted here);
- $SCI$  and  $ENROLLMENT$  are untransformed values from CDE data files;
- $\ln$  denotes the natural logarithm; and
- $\varepsilon$  denotes the error term.

When the dependent variable is percent proficient for adequate yearly progress (AYP), OLS regression is used with a transformed dependent variable: the logit, or log odds, of the percent proficient. Applying this transformation avoids the violation of linear regression assumptions that would otherwise ensue when using a proportion as the dependent variable.

$$\ln(PCTPROF/(1-PCTPROF)) = \beta_0 + \beta_1 CHARTER + \beta_2 SCI + \beta_3 \ln(ENROLLMENT) + \varepsilon$$

Effect size and statistical significance were calculated from the transformed variable, but effects were presented in the percent proficient metric. Even with statistical controls for differences in student and school characteristics, it must be emphasized that conclusions in this report are tentative in that they do not reflect the rigor of a randomized experiment.

### Extent of explained variation from SCI and size

The high proportion of explained variation, or  $R^2$ , is evidence that the school characteristics index and size provide a strong statistical control. In fact, the SCI explains most of the variance in performance measures, and size adds little new information. Page 5 of the report shows the proportion of variation explained by SCI and size in models that include charters and noncharters. Figure 2 shows that  $R^2$  is more moderate for models that include only charter schools.

Figure 2. Proportion of explained variation— $R^2$ —in models including only SCI and size: charter schools only

Outcome Measure	Elementary	Middle	High
Base API	65%	40%	60%
AYP English	69%	52%	59%
AYP Math	46%	25%	51%
CST English	56%	37%	56%
CST Math	31%	22%	N/A
CAHSEE English	N/A	N/A	64%
CAHSEE Math	N/A	N/A	56%

### Correlated outcome measures

As the report indicates, the available outcome measures are strongly correlated. Figures 3.1 through 3.3 show the (school-level) product-moment correlation coefficients for the outcome measures, by school type.

Figure 3.1. Correlations between elementary school measures

	Base API	AYP English	AYP Math	CST English	CST Math
Base API	1.000				
AYP English	0.975	1.000			
AYP Math	0.953	0.932	1.000		
CST English	0.935	0.940	0.887	1.000	
CST Math	0.891	0.866	0.894	0.926	1.000

Figure 3.2. Correlations between middle school measures

	Base API	AYP English	AYP Math	CST English	CST Math
Base API	1.000				
AYP English	0.983	1.000			
AYP Math	0.959	0.937	1.000		
CST English	0.971	0.977	0.925	1.000	
CST Math	0.946	0.928	0.957	0.941	1.000

Figure 3.3. Correlations between high school measures

	Base API	AYP English	AYP Math	CST English	CAHSEE English	CAHSEE Math
Base API	1.000					
AYP English	0.932	1.000				
AYP Math	0.912	0.922	1.000			
CST English	0.957	0.938	0.885	1.000		
CAHSEE English	0.945	0.958	0.898	0.960	1.000	
CAHSEE Math	0.930	0.918	0.969	0.919	0.938	1.000

### Performance comparison of conversion and start-up charter schools in 2006

When reporting performance results for conversion and start-up charter schools, the report displays results only for elementary schools because that level has the only statistically significant results. Figure 4 shows the results for all three grade-span levels.

Figure 4. Summary of start-up and conversion charter school measures in 2006

2006 Outcome Measure	Average Score for Conversions (N = 84)	How Start-up Charters' Scores Differed (N = 262)	Start-up Effect, After Adjusting for School Characteristics <sup>‡</sup>	Effect Size (in standard units)
<b>Elementary school only, conversion (N = 62) and start-up (N = 121)</b>				
Base 2006 API	772.8	-13.3 API points	-9.7 API points	-0.11
AYP English, percent proficient	48.8%	+1.1 percentage points	+2.9 percentage points	+0.13
AYP math, percent proficient	56.9%	-7.5 percentage points***	-7.3 percentage points***	-0.36
CST English, Gr 3 – mean scale score	332.8	-1.1 scale score points	+0.9 scale score points	+0.03
CST math, Gr 3 – mean scale score	371.6	-12.9 scale score points**	-11.2 scale score points*	-0.27
<b>Middle school only, conversion (N = 13) and start-up (N = 41)</b>				
Base 2006 API	770.1	-22.5 API points	+1.3 API points	+0.01
AYP English, percent proficient	53.8%	-6.8 percentage points	-0.1 percentage points	-0.00
AYP math, percent proficient	49.4%	-6.9 percentage points	-2.2 percentage points	-0.09
CST English, Gr 7 – mean scale score	353.9	-1.5 scale score points	+5.0 scale score points	+0.18
CST math, Gr 7 – mean scale score	352.1	-4.2 scale score points	+2.6 scale score points	+0.08
<b>High school only, conversion (N = 9) and start-up (N = 100)</b>				
Base 2006 API	729.7	-49.6 API points	-14.8 API points	-0.16
AYP English, percent proficient	57.5%	-10.2 percentage points	-1.7 percentage points	-0.07
AYP math, percent proficient	48.2%	-12.1 percentage points*	-5.8 percentage points	-0.25
CST English, Gr 10 – mean scale score	346.1	-18.3 scale score points*	-7.9 scale score points	-0.27
CAHSEE English, Gr 10 – mean scale score	386.2	-8.5 scale score points	-1.6 scale score points	-0.09
CAHSEE math, Gr 10 – mean scale score	380.1	-9.3 scale score points	-3.0 scale score points	-0.16
<sup>‡</sup> How start-up charter schools' scores would have differed from conversion charters if start-ups had had the same enrollments and school characteristics as the conversions. * Difference is significant at .10 level. ** Difference is significant at .05 level. *** Difference is significant at .01 level. Note: If no asterisk is present, the result is not statistically significant.				

Data: California Department of Education (CDE)

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## **How the California Department of Education classifies schools for the API**

The report separates performance analyses in several ways, including by grade-span type—elementary, middle and high. Schools were classified in the same way that the California Department of Education (CDE) categorizes schools for state and federal accountability programs (the API and AYP, respectively).

The CDE generally classifies schools based on the number of grades a school has in the “core” grade spans of K–5, 7–8, and 9–12. That is, a K–8 school (a common charter school grade configuration) would be considered an elementary school because it has six grades in the K–5 span and two in the 7–8 span. However, if a school has grades in all three spans, it is classified according to the largest enrollment in a core span served. For example, a school serving all K–12 grades (another common configuration among charters) would be classified as a high school if most of its students were in grades 9–12. (There are exceptions to these rules, however. For more details, see [www.edsource.org/pdf/schltypedef06b.pdf](http://www.edsource.org/pdf/schltypedef06b.pdf))

## **Charter schools belonging to charter management organizations (CMOs) or educational management organizations (EMOs) that were included in the performance analyses**

The following CMOs/EMOs and schools were reflected in the performance analyses:

### **Alliance for College Ready Public Schools**

- Gertz-Ressler Academy High

### **Aspire Public Schools**

- Antonio Maria Lugo Academy
- Benjamin Holt College Preparatory Academy
- Berkley Maynard Academy
- East Palo Alto Charter
- Millsmont Academy
- Monarch Academy
- River Oaks Charter
- Rosa Parks Academy
- Summit Charter Academy
- University Charter
- University Public
- Wilson (Lionel) College Preparatory Academy

### **California Virtual Academy**

- California Virtual Academy @ Kern
- California Virtual Academy @ San Diego
- California Virtual Academy @ San Mateo
- California Virtual Academy @ Sonoma

### **Connections Academy**

- Capistrano Connections Academy Charter

**Edison Schools**

- Edison-Bethune Charter Academy
- Edison-Ronald McNair Intermediate
- Edison Charter Academy
- Feaster-Edison Charter
- Phillips-Edison Partnership
- San Jose-Edison Academy

**Envision Schools**

- City Arts and Tech High
- Marin School of Arts and Technology

**Green Dot Public Schools**

- Animo Inglewood Charter High
- Animo Leadership High
- Animo South Los Angeles Charter
- Animo Venice Charter High
- Oscar De La Hoya Animo Charter High

**High Tech High**

- Explorer Elementary
- High Tech Middle
- High Tech Middle Media Arts

**Inner-City Education Foundation**

- View Park Preparatory Accelerated Charter
- View Park Preparatory Accelerated Charter Middle
- View Park Preparatory Accelerated High

**Innovative Educational Management**

- Connecting Waters Charter School
- Ocean Grove Charter School

**Knowledge is Power Program (KIPP)**

- KIPP Academy of Opportunity
- KIPP Adelante College Preparatory
- KIPP Bayview Academy
- KIPP Los Angeles College Preparatory
- KIPP San Francisco Bay Academy
- KIPP Summit Academy

**Leadership Public Schools**

- Leadership Public Schools - San Jose
- Leadership Public Schools - Richmond

**Options for Youth/Opportunities for Learning**

- Options for Youth - San Gabriel
- Options for Youth - Burbank
- Options for Youth - San Juan
- Opportunities for Learning - Santa Clarita
- Opportunities for Learning - Baldwin Park

**Partnerships to Uplift Communities**

- CA Academy for Liberal Studies Early College High
- California Academy for Liberal Studies
- Community Charter Early College High
- Community Charter Middle
- Lakeview Charter Academy

**St. HOPE**

- PS 7
- Sacramento High School