

SEPUP Matters for Science Reform in the LAUSD
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Introduction

This report presents SAT-9 data that show the positive effects of the Los Angeles Systemic Initiative (LA-SI) high school science reform project. The core of the curriculum materials used by 9th and 10th grade teachers involved with this project are SEPUP products. The data indicate that all students in the LA-SI schools have made gains, while those students enrolled in the SEPUP-based ICS courses show even greater gains. In addition to increased SAT-9 scores, LA-SI students are also more likely to enroll in a third year of science than they were prior to the initiative. We were extremely pleased to have data that shows that even with a ten-fold increase in students, and an accompanying increase in teachers, there is no degradation in student performance. We attribute this consistency in grades to teacher leadership, the nature of the student and teacher materials, and the extensive training and planning that occurred both before and during implementation.

Background

In 1995 the Los Angeles Unified School District was awarded an Urban Systemic Initiative grant which became known as the Los Angeles Systemic Initiative (LA-SI). Major goals of this initiative were to increase the number of underrepresented minorities taking a third year of high school science and to improve student performance on norm-referenced tests. A group of teachers, called resource teachers, was selected by their peers and administrators to implement the grant's goals. The high school resource teachers devised a five-year plan for science reform in LAUSD's 50 comprehensive high schools. The plan included the phasing in of a three-year integrated science sequence (ICS) and was based on prior efforts funded by the National Science Foundation (The Scope, Sequence and Coordination of Secondary School Science) and the recently released *Benchmarks for Scientific Literacy*. Shortly thereafter the *National Science Education Standards* were published and together these documents formed the foundation for the reform effort during subsequent years.

LA-SI disseminated the plan district-wide and 17 high schools, which became known as Cohort I, volunteered to begin the long-term process of reform at their sites. During the winter and spring months of 1995, the lead teachers from the Cohort I schools undertook an intensive training and planning program before implementing the reform plan. The secondary resource teachers were familiar with SEPUP materials and as a result, SEPUP-based materials and instructional practices became a centerpiece for future trainings. The following summer, SEPUP hosted a weeklong leadership program and unveiled a new program called *Issues Evidence and You (IEY)*. In 1996/97 Cohort I teachers took advantage of this program during their first implementation year as did an additional 20 schools, known as Cohort II. These 37 schools are the core of LA-SI's voluntary reform effort for high schools and their students constitute the basis for evaluating the effectiveness of the ICS and SEPUP program. In subsequent years, lead teachers from both Cohorts conducted SEPUP-based ICS trainings at their school sites. In 1997/98 SEPUP developed *Science and Sustainability (S&S)* and during the following year

piloted the program in 10 of LA-SI's Cohort schools. Currently, for most of the Cohort schools, much, if not all, of the 9th grade ICS 1 course materials come from *IEY* and similarly, for the 10th grade ICS 2 course, from *S&S*.

Table 1 SEPUP-based ICS trainings funded by LA-SI

Number of teachers trained	Number of hours
143	2,576

Table 1 summarizes the LA-SI funded trainings over the past five years devoted to SEPUP-based materials and instructional practices. As a result of these trainings all 14 SEPUP kits that LA-SI purchased have been checked out to schools for the entire school year. Additionally, many of these schools conducted their own trainings using SEPUP materials received through participation in the *S&S* field test or purchased with non-LA-SI monies. Also, as part of the *S&S* field test, several lead teachers received many hours of intensive training from SEPUP during summer conferences. It should be noted that many of the teachers involved in the reform effort continue to teach one or more of the traditional science courses courses (biology, chemistry, physics, etc.) along with ICS classes. Therefore, many students enrolled in traditional science courses may have benefited from changes in instructional methods and materials introduced through the ICS trainings. It is likely that elements of reform-based instruction were incorporated into the curriculum of the traditional courses, thus impacting the success of non-ICS students as well as ICS students.

Program analysis

In 1997 the LAUSD mandated that all schools administer the Stanford 9 Achievement Test (SAT-9). The mean score for the norming population is 50 normal curve equivalents (NCEs).

Table 2 compares science SAT-9 NCEs from 1997 and 1999 for 1998-99 LAUSD 9th and 10th grade students who had scores from both 1997 and 1999. 9th graders' scores in 1999 are compared with their scores in 1997 when they were 7th graders and 10th graders' scores in 1999 are compared with their scores when they were 8th graders. The data show that between 1997 and 1999, the mean score of 40,492 ninth graders increased 5.3 NCEs and the mean score of 39,273 tenth graders increased 3.2 NCEs. Given the size of the sampled population, both of these increases are statistically significantly. We attribute these gains in part to innovations brought about by the LA-SI reform movement, which, as noted previously, effects all students, not just those enrolled in ICS.

Table 2 Changes in SAT-9 Scores from 1997-99: All Students

1998-99 Grade level		1997 Results	1999 Results	Difference
9th (n=40,492)	Mean	38.9	44.2	+5.3
	Std. Dev.	17.1	14.4	
10th (n=39,273)	Mean	41.7	44.9	+3.2
	Std. Dev.	18.0	16.9	

Table 3 shows data from the subset of students included in Table 2 that were enrolled in 9th grade ICS 1 and 10th grade ICS 2. As in Table 2, Table 3 reports data from only the matched cases—9th graders’ scores in 1999 with their 7th grade scores in 1997, 10th graders’ 1999 scores with their 8th grade scores in 1997. Comparing Tables 2 and 3 shows that the average gain for ICS students was equal to, or greater than, the average gain for all students.

Table 3 Changes in SAT-9 Scores from 1997-99: ICS Students

1998-99 Grade level		1997 Results	1999 Results	Difference
9 th ICS 1 (n=7,709)	Mean	36.9	42.9	+6.0
	Std. Dev.	15.8	13.5	
10 th ICS 2 (n=3,633)	Mean	39.0	42.1	+3.1
	Std. Dev.	15.0	14.7	

Although the ICS 2 students showed a gain of 3.1 NCEs compared to their 8th grade scores, their gains were not as great as those of the ICS 1 students. The greater gain shown by 9th graders compared to 10th graders is most likely influenced by the following factors:

1. Teachers have one year more experience teaching ICS 1 than 2.
2. Teachers have taught more ICS 1 students than ICS 2 students.
3. Teachers have had an additional year to work together to better understand, analyze, and modify the materials and their teaching approaches to ICS 1.
4. Many students who received an ‘A or B’ in ICS 1, were not enrolled in ICS 2, but were instead placed in Chemistry, Advanced Physical Science, or Biology

In Table 4 it should be noted that 9th graders enrolled in classes other than ICS 1 scored higher as 7th graders than did students enrolled in ICS 1. This is likely due to the tracking of high achieving 8th graders into 9th grade biology rather than 9th grade ICS 1. Remarkably, the ICS 1 students made larger gains than did their non ICS 1 counterparts, 6.0 compared to 5.1 respectively.

Table 4 Changes in SAT-9 Scores from 1997-99: Non-ICS Students

1998-99 Grade level		1997 Results	1999 Results	Difference
9 th non-ICS (n=32,351)	Mean	39.4	44.5	+5.1
	Std. Dev.	17.4	14.6	
10 th non-ICS (n=34,464)	Mean	42.3	45.5	+3.2
	Std. Dev.	18.3	17.2	

Table 5 compares students in the LA-SI Cohort schools with students in LAUSD schools not participating in the LA-SI. The data in Table 5 provide evidence to dispel the misconception held by some that major reform efforts, such as the NSF funded LA-SI, do not positively influence student achievement. The underlined scores have been chosen for primary comparison. Grade 9 students enrolled in Cohort Schools ICS 1 post considerably greater gains than students taking non-LA-SI 9th grade ICS or biology. Students completing ICS 1 and 2 in 10th grade also show greater gains than those for non-LA-SI biology and ICS students. The across-the-board gains in LA-SI schools are

attributed in part to the use of innovative materials and pedagogy produced and supported by SEPUP.

Table 5 Comparison of SAT-9 scores: Cohort schools vs Other schools.

Grade		Cohort I		Cohorts I and II		Other LAUSD Schools	
		n	diff.	n	diff.	n	diff.
9	Biology	638	3.9	2,805	5.4	1,817	<u>4.8</u>
	ICS 1	2,257	6.2	7,261	<u>6.1</u>	448	4.4
10	Biology	1,698	3.7	5,511	3.9	4,127	<u>2.8</u>
	ICS 1	360	3.9	1,142	<u>3.1</u>	134	1.7
	ICS 2	1,187	3.4	3,403	<u>3.2</u>	130	1.9

Students' grades and enrollment data

LAUSD only requires two years of science for graduation, therefore one of the benchmarks for evaluating the success of the ICS program is the extent to which students choose to take a third year of science. As shown in Table 6, 57.2% of the students who earned a 'C' or better in ICS 2 in 1996-97 chose to take a third year of science. In comparison with the most heavily enrolled traditional 2nd year courses, Advanced Physical Science (APS) and Chemistry, only 46.5% of the students who earned a 'C' or better in 1996-97 enrolled in a third year of science. In 1995 there were approximately 2,700 students enrolled in the ICS classes, in 1998, almost 30,000 students were enrolled. During this phase of extremely high growth, both the percentage of students earning a 'C' or better and the percentage of students taking a third year of science remained constant.

Table 6 Comparison of students who enroll in a third year of science

2 nd year course	Number of students earning a 'C' or better in 1996-97	Number of students who earned a 'C' or better in 1996-97 who enrolled in a third year science class in 1997-98	Percent earned : 97 who science
ICS 2	3,404	1,947	57.2%
APS and Chemistry	14,385	6,684	46.5%

Disaggregating enrollment data by ethnicity, as displayed in Table 7, shows that success in ICS 2 is particularly telling for traditionally underrepresented students in advanced science classes. These data show that a greater percentage of all students, particularly Hispanic and African-american students, who show increases of 17.9% and 16.1%, are entering advanced science classes through the ICS pathway than through the traditional portals of APS and Chemistry. Preliminary data also show huge increases in the numbers of Hispanic and African-american students enrolling in 3rd year AP courses.

Table 7 Disaggregation, by ethnicity, of data given in Table 6

Ethnicity	Percentage of students who earned a 'C' or better in ICS	Percentage of students who earned a 'C' or better in

	2 in 1996-97 who enrolled in a third year science class in 1997-98	APS and Chemistry in 1996-97 who enrolled in a third year science class in 1997-98
Hispanic	53.5%	35.6%
Black	49.4%	33.3%
Asian	68.8%	60.3%
White	50.9%	43.4%

Future directions

We look forward to continued collaboration with the developers and staff at SEPUP. In fact, ten high schools have started ICS 3 classes and we hope that SEPUP will consider developing materials for these advanced science classes.