MEMORANDUM

TO: Pia Saenswang, Dan Katzir
FROM: Dr. Denise D. Quigley
DATE: October 21, 2003
SUBJECT: Children’s Scholarship Fund – Los Angeles: SAT 9 Trend Analysis Results

This memo briefly describes the CSF program, the data collected, sample size adequacy, generalizability, the analyses and the results. Findings are reported for SAT-9 scores and grade point averages for a partially representative sample of CSF students. Schools and students for which we collected SAT-9 data tended to be concentrated in Catholic Schools and have a slightly higher income level on average although the average levels of income both fell into the same CSF scholarship range of 50% tuition. Importantly, this potential bias does not affect the t-tests pertaining to student achievement growth overtime; it only could affect the comparison of student achievement levels at a given point in time. Some comparisons are also made to mean LAUSD scores. The graphs and data tables of the SAT 9 trends are included.
Synopsis of Children’s Scholarship Fund – Los Angeles

The Children’s Scholarship Fund provides tuition scholarships for students with demonstrated need who wish to attend private schools. In subsequent years, funds are used to continue supporting scholarship recipients as they move through elementary, middle, and high school.

Data and Sample

Data Collected

In the summer of 2003 CSF staff identified from the CSF-LA program database, schools with 6 or more CSF students in grades 5 through 8 that had been in the CSF program for 3 years or more. In October 2003, staff requested these schools to fill out a form for each identified CSF recipient child. The data collected on each CSF recipient was the following: the previous school attended, gender, ethnicity, primary home language, SAT-9 test percentile and Normal Curve Equivalent scores in Reading and Math for 2000/01, 2001/02, and 2002/03, grade level information, grade point average and grades in Reading and Math for 2000/01, 2001/02, and 2002/03, and grades for Algebra if taken in 8th grade, for pre-Algebra if taken in 7th or 8th grade.

In the end, SAT-9 test results were obtained for 284 students in 41 schools covering the three-year time frame from 2000/01 to 2002/03. This is an average of 6.9 students per school, ranging from 1 to 14 students in a school.

The LAUSD SAT-9 data are from the CA department of education website. Data from 2000/01 and 2001/02 was available; data for 2002/03 was not available.

Sample Size

Based on the current number of active students in Spring 2003 for Broad and Non-Broad recipients and making several assumptions (re: number of CSF recipients at a given school, needing three data points to establish a trend, students changing schools, and student attrition), we had estimated that a final sample size of 80 CSF recipients across a minimum of 16 private schools could detect small effect sizes of 0.12 or larger from pre to post, which is very adequate. The final data set of 284 students in 41 schools is therefore adequate to detect small effect sizes from pre to post.

By design the data set also represents four cohorts of students over the three-year timeframe. The cohorts are:

- **3rd Grade Cohort**: (N=65 across 35 schools) -- Students starting in 3rd grade and tracked to 5th grade
- **4th Grade Cohort**: (N=65 across 32 schools) -- Students starting in 4th grade and tracked to 6th grade
- **5th Grade Cohort**: (N=74 across 34 schools) -- Students starting in the 5th grade and tracked to 7th grade
- **6th Grade Cohort**: (N=80 across 37 schools) -- Students starting in the 6th grade and tracked to 8th grade
The sample sizes of four individual cohorts are also adequate to detect small effect sizes from pre to post. Given that the 65 to 80 CSF students are spread out across 32 to 37 schools, there is no clustering effect to consider. The detectable effect size is 0.12 or larger, which is a small effect size for a single cohort. This indicates that the cohorts are very adequate in sample size to detect small effect sizes from pre to post covering the three year timeframe.

**Brief Description of the CSF Student Population**

Given that the CSF sample under study collected background characteristics that are not collected regularly by the CSF program, we were limited in our ability to determine if the study sample is representative of all CSF recipients. However, we were able to compare whether the schools that provided SAT-9 data were similar to those schools that did not provide SAT-9 data. Specifically, we compared school averages for all students K-8 CSF students as well as for only CSF students in grades 5-8, which are the grades included in the study sample.

Overall, schools that provided SAT-9 data are slightly different than schools that did not provide SAT-9 data:

- **SAT-9 data schools were more often Catholic:** 78 percent of SAT-9 schools were Catholic and 46.4 percent of Non-SAT-9 schools were Catholic; SAT-9 schools were also 4.8 percent Jewish, 7.3 percent Christian schools, 2.4 percent Baptist and 2.4 percent other religious affiliation.

- **CSF Students in Non-SAT-9 schools have a slightly lower average family income** of approximately $3000 ($24,500 vs. $21,500) but make a higher contribution per child of approximately $500 because the average school tuition for Non-SAT-9 schools is higher by approximately $700 as compared to the SAT-9 CSF students. NOTE: The income levels of $24,500 and $21,500, both fall within the CSP's range of providing "50% tuition".

- **SAT-9 schools were the same average enrollment** of Non-SAT-9 schools, although SAT-9 schools had on average 6 more CSF recipients than Non-SAT-9 schools (This was by design. We sought out schools with 6 or more CSF recipients to avoid clustering effects in the sample design).

- **SAT-9 and Non-SAT-9 schools have similar number of student per CSF family**

In general, the study sample of CSF students for which SAT-9 data was collected have the following characteristics:

- 61.3 percent are Hispanic, 25.7 percent are African American, 6.3 percent are White and 2.1 percent are Asian/Pacific Islander and 2.5 percent are Other and 2 percent were missing ethnicity.

- 52.8 percent Female

- 50.7 percent have a home language of English, 43.3 percent Spanish, 1.8 percent Armenian, and 4.2 percent had missing home language.
17.3 percent were awarded up to 25 percent tuition, 38 percent were awarded up to a 50 percent tuition, and 44.7 percent were awarded up to a 75 percent tuition.

The CSF recipient students grades 5-8 in schools that provided SAT-9 data have the following characteristics:

- 50.8 percent Female
- 16.8 percent were awarded up to 25 percent tuition, 39 percent were awarded up to a 50 percent tuition, and 44.1 percent were awarded up to a 75 percent tuition

In addition, Broad started funding CSF students in October 2001 and added students every year; however the majority of CSF recipients in grades 3-8 are not funded by Broad. This is confirmed in our dataset. The study sample of CSF students are:

- 11.3 percent Broad students (N=33) and 88.4 percent were Non-Broad students (N=251)

Also the proportion of Broad students was similar across those schools that provided SAT-9 data and those that did not provide SAT-9 data: 66 percent of student were non-Broad CSF recipients and 33.5 percent were CSF Broad recipients.

The findings in this memo are therefore generalizable to the entire CSF recipient population with the caveat that the SAT-9 CSF population is more concentrated at Catholic schools and has a slightly higher income level but is eligible for the same CSF scholarship range of 50%. The income difference between the SAT-9 and Non-SAT-9 populations both fall within the CSF's range of providing "50% tuition". The potential income bias, given that a lower income generally means lower achievement levels, would mean that our study sample of SAT-9 data students is achieving at levels that are slightly higher than the overall CSF population. The difference however is slight and should not be statistically significant. Importantly, the slight difference in the level does not affect the t-tests pertaining to student achievement growth overtime. Note there may be non-detectable, unobservable differences between families that chose to send their child(ren)/student(s) to other religiously affiliated private schools, and not Catholic schools, but we do not know in what direction these differences might affect student achievement levels.

**Analyses**

Given that we did not have a Non-CSF comparison group or a comparable cohort of longitudinal students within LAUSD or the State for comparison, we constructed adequate sample sizes of CSF students overall, and in 4 cohorts to test the individual growth of SAT-9 NCE scores over a three year time frame – 2000/01 to 2002/03. Longitudinal growth of achievement within an individual is an important metric for understanding increases in student achievement.
The primary analyses conducted on the longitudinal cohorts of data were paired t-tests of the overtime growth of SAT-9 NCE scores from 2000/01 to 2002/03. Given the adequate sample sizes, we should be able to detect small effect sizes.

In addition, we compared the 2000/01 achievement levels of CSF recipients to LAUSD students. We specifically compared the 3rd, 4th, 5th and 6th grade CSF recipients to all LAUSD students and to economically disadvantaged LAUSD students in 2000/01 in reading and math.

Importantly, analyses were conducted to test whether the composition of the four cohorts were significantly different from each other. We found that there were no significant differences in population composition of the four cohorts (or across the Broad and Non-Broad students), indicating that the cohorts have the same composition of students according to ethnicity, gender, home language, household size, and percentage of tuition awarded based on income. This indicates that the CSF selection criteria (based on income and family size) selects students with similar characteristics, i.e. primarily Hispanics and African Americans, an even mix of female and male children, and an even mix of children’s home language being English vs. another language (primarily Spanish).

The limitations of these analyses are that without knowing how representative our sample is, we cannot generalize to the entire CSF population. Also given that we do not have a comparison group to measure the CSF individual growth against, we do not know that the overtime growth (or decline) in CSF student achievement is more or less than other students of similar backgrounds who are not receiving CSF scholarships. Moreover, we cannot attribute the growth to the CSF support/recipiency.

In sum, these analyses basically document the overtime achievement growth of the CSF recipients.
Analysis of CSF cohorts and the available LAUSD SAT 9 data for 2000/01 and 2001/02 for the given LAUSD grade equivalent groups.

Below are graphs that include SAT 9 data on the CSF cohorts and the available LAUSD SAT 9 data for 2000/01 and 2001/02 for the given LAUSD grade equivalent groups. Note that SAT 9 data was not available for LAUSD students in 2002/03; the test was not administered that year.

An LAUSD grade equivalent group corresponds to the grade level of the CSF cohort in a given year, i.e. if the “CSF 3rd grade cohort” is in 4th grade in 2001/02, then the LAUSD grade equivalent is the mean NCE SAT 9 score for all 4th graders in LAUSD in 2001/02. For the LAUSD students this is not a true cohort design because it does not take into account the students who leave and enter any given grade in a given year. This comparison establishes how well the CSF cohort has performed against the entire grade level of LAUSD students in a given year.

There are four graphs total. There are two graphs for math: one with 3rd and 4th grade CSF cohorts and one with 5th and 6th grade CSF cohorts. There are two graphs for reading: one with 3rd and 4th grade CSF cohorts and one with 5th and 6th grade CSF cohorts. All of the math or all of the reading are not on one graph because the graph lines are then not readable.

The graphs indicate the following trends by grade equivalent group and cohort:

In mathematics,
- LAUSD students outperformed CSF students in the 3rd grade cohort in 2000/01 and 2001/02
- CSF students in the 4th grade cohort started out performing better than the average LAUSD 4th grade, but by 5th grade in 2001/02 CSF students had fallen behind LAUSD
- CSF 5th grade cohort students outperformed the average LAUSD students in the 5th and 6th grade in 2000/01 and 2001/02
- LAUSD students in the 6th grade started out performing better than the CSF 6th grade cohort, but by 7th grade in 2001/02 the CSF students had outperformed the average LAUSD 7th grader

In reading,
- CSF 3rd grade cohort students outperformed the average LAUSD students in the 3rd and 4th grade in 2000/01 and 2001/02; however in 5th grade it is hard to tell if this would be the case because the CSF trend is downward and the LAUSD trend was flat to upward
- CSF 4th grade cohort students outperformed the average LAUSD students in the 4th and 5th grade in 2000/01 and 2001/02. If there was data for 2002/03, it would
appear that CSF students would still outperform LAUSD students because the CSF trend is upward and at a higher level than the LAUSD trend. CSF 5th grade cohort students outperformed the average LAUSD students in the 5th and 6th grade in 2000/01 and 2001/02. If there was data for 2002/03, it would appear that CSF students would still outperform LAUSD students because the CSF trend is upward and at a higher level than the LAUSD trend. CSF 6th grade cohort students outperformed the average LAUSD students in the 6th grade and 7th grade in 2000/01 and 2001/02. If there was data for 2002/03, it would appear that CSF students would still outperform LAUSD students because the CSF trend is upward and at a higher level than the LAUSD trend.

In sum, CSF students have performed higher on the SAT 9 in reading than the average LAUSD student in the equivalent grades across 3rd, 4th, 5th, 6th and 7th grades. However, it is not possible to test whether these higher differences are statistically different. Moreover in mathematics, only the 5th grade CSF cohort of students performed higher than the average LAUSD student in the 5th, 6th, and 7th grades. However, the other CSF cohorts had differing and undistinguishable patterns in math compared to the LAUSD equivalent groups.
Graphs:

SAT 8 Normal Curve Equivalent Score in Math:
CSF 3rd & 4th Grade Cohorts and LAUSD Grade Equivalent Groups

SAT 8 Normal Curve Equivalent in Math:
CSF 5th & 6th Cohorts and LAUSD Equivalent Groups

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October 21, 2003
SAT 9 Normal Curve Equivalent Score in Reading:
CSF 3rd & 4th Grade Cohorts and LAUSD Equivalent Groups

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October 21, 2003
Findings
We constructed adequate sample sizes of CSF students overall, and in 4 cohorts and tested the individual overtime growth of SAT-9 NCE scores over a three year time frame – 2000/01 to 2002/03.

The groups analyzed are as follows:

- Overall Group: N=284 across 41 schools
- 3rd Grade Cohort: (N=65 across 35 schools) -- Students starting in 3rd grade and tracked to 5th grade
- 4th Grade Cohort: (N=65 across 32 schools) -- Students starting in 4th grade and tracked to 6th grade
- 5th Grade Cohort: (N=74 across 34 schools) -- Students starting in the 5 grade and tracked to 7th
- 6th Grade Cohort: (N=80 across 37 schools) -- Students starting in the 6th grade and tracked to 8th

Grade Point Average
We found no differences in overtime growth in grade point averages for the CSF recipients as a whole or those in the 3rd, 5th or 6th grade cohorts. The 3rd grade cohort tended to have a slightly higher grade point average over the three years as well as had a slightly higher cumulative g.p.a. in 2002/03. The 4th grade cohort, however, had a statistically significant decline in their grade point average from 4th to 6th grade.

Course Patterns
The cohorts of students who reached 7th or 8th grade had the following course patterns in pre-Algebra and Algebra:

- In the 6th grade cohort,
  - 11.25 percent (9/80) took pre-Algebra in 7th grade with an average course grade of 2.23 (C+ equivalent, ranging from D to A-).
  - 17.5 percent (14/80) took pre-Algebra in 8th grade with an average course grade of 2.55 (B- equivalent), ranging from D to A-.
  - 18.75 percent (15/80) took Algebra 1 in 8th grade with an average course grade of 2.55 (B - equivalent), ranging from D- to A+

- In the 5th grade cohort,
  - 10.8 percent (8/74) took pre-Algebra in 7th grade with an average course grade of 1.95 (B equivalent), ranging from C- to A+

There is no direct data source to compare these statistics to LAUSD students. However, completing Algebra with a B or better in 8th grade is a primary determinant of a student completing the A-G requirements for admission into the University of California system.

SAT-9 Trends
First we compared achievement levels of the 3rd, 4th, 5th and 6th grade CSF recipients to all LAUSD students and to economically disadvantaged LAUSD students in 2000/01 in reading and math. We found:

- In reading in 2000/01,
All four of the cohorts -- 3rd, 4th, 5th, and the 6th grade cohort of CSF recipients had statistically significant higher scores than all LAUSD students and economically disadvantaged LAUSD students.

- In math in 2000/01:
  - 3rd grade CSF recipients scored statistically lower than all LAUSD students and economically disadvantaged LAUSD students.
  - 4th and 5th grade CSF recipients scored higher (but not statistically significant) than all LAUSD students and economically disadvantaged LAUSD students.
  - 6th grade CSF recipients scored lower (but not statistically significant) than all LAUSD students and higher than the LAUSD economically disadvantaged students.

In sum, CSF recipients across the four cohorts scored significantly higher in 2000/01 on the SAT-9 reading. In math, the pattern is mixed. The 4th and 5th grade cohorts scored statistically similar in math while the 6th grade cohort scored between all of LAUSD students and the economically disadvantaged students and the 3rd grade cohort scored statistically lower in math than LAUSD students, as a whole, or who are economically disadvantaged.

Moreover, we found statistically significant overtime growth in SAT-9 reading scores for the CSF recipients as a whole and those students in the 5th and 6th grade cohorts, and we found a significant decline in the SAT-9 reading scores for the 3rd grade cohort, and no significant change in the 4th grade cohort. Furthermore, we did not find significant growth or decline in the SAT-9 Math scores for any of the cohorts or the CSF recipient group as a whole.

The graphs and data tables that demonstrate these findings are below, follow the Summary.

Summary
These analyses can be summarized as follows:

Data and Methodology
- The final data set of 284 students in 41 schools is adequate to detect small effect sizes from pre to post in the whole group and across the four cohorts.
- By design the data set represents four cohorts of students over the three-year timeframe – a 3rd, 4th, 5th and 6th grade cohort.
- The population composition of the four cohorts (or across the Broad and Non-Broad students) are statistically similar according to ethnicity, gender, home language, household size, and percentage of tuition awarded based on income.
- These findings can be generalized to the entire CSF population of students with the caveat that the students are concentrate in Catholic schools and have a slightly higher income level but does not change the amount of CSF scholarship awarded – 50% tuition.
- If there is any bias by the population differences in income it would be that the CSF study sample students have slightly higher levels of achievement than the entire CSF population. The difference however is slight and should not be statistically significant. Importantly, it does not affect the t-tests pertaining to student achievement growth overtime.
These findings cannot be attributed to CSF financial support, however these findings basically document the overtime achievement growth of CSF recipients for which SAT-9 data was available.

Results and Conclusions

- CSF recipients in the four cohorts scored significantly higher than LAUSD students as a whole in 2000/01 on the SAT-9 in reading.
- In math, the comparison of LAUSD and CSF students in 2000/01 is mixed: 3rd grade cohort scored lower, 4th and 5th grade were similar, and the 6th grade cohort scored between all LAUSD and the economically disadvantaged student average.
- CSF recipients as a whole and those students in the 5th and 6th grade cohorts had statistically significant overtime growth in SAT-9 reading scores.
- The 3rd grade cohort had a statistically significant decline in SAT-9 reading scores and the 4th grade cohort had no significant change in reading.
- There was no significant growth or decline in the SAT-9 Math scores for any of the cohorts or the CSF recipient group as a whole.
- Grade point averages of the CSF recipients as a whole and those in the 3rd, 5th or 6th grade cohorts did not have any statistically significant growth or decline.
- The 4th grade cohort had a statistically significant decline in their grade point average from 4th to 6th grade.

Overall, CSF recipients had higher reading achievement on the SAT-9 in 2000/01 than the average LAUSD student. The CSF recipients in the upper grades 5th – 8th grade had statistically significant individual growth in their reading scores from 2000/01 to 2002/03. In the lower grades, 3rd – 5th grade CSF recipients did have higher reading achievement in 2000/01 than the average LAUSD student, but 2002/03 the CSF 3rd graders who were in 5th grade had had a statistically significant decline in their individual reading achievement over the three year period and the CSF 4th graders who were in 6th grade in 2002/03 had had no growth or decline in their reading achievement. This suggests that CSF recipients have higher reading levels than other LAUSD students, however, the CSF recipients have little growth in their reading achievement during 3rd – 5th grade and have statistically significant individual growth in their reading achievement from 5th through 8th grade.

In terms of mathematics, in 2000/01 CSF recipients in the 3rd grade scored lower than the average LAUSD student. The 4th and 5th grade CSF recipients had statistically significant higher math achievement compared to the average LAUSD student. And the 6th grade CSF recipients had lower math achievement than the average LAUSD student, but higher than the average economically disadvantaged LAUSD student. However, the CSF recipients did not demonstrate statistically significant individual growth in math achievement over the three year period, suggesting that they would be ranked in similar in 2002/03 as compared to other LAUSD students.

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October 21, 2003
### SAT-9 Normal Curve Equivalent Score in Math:

All CSF students & by 4 cohorts

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Note: * indicates p-value<=0.05; ** indicates p-value<=0.01; *** indicates p-value of <=0.001
Sat-9 Normal Curve Equivalent Score in Reading:
All CSF students & by 4 Cohorts

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Note: * indicates p-value<=0.05; ** indicates p-value<=0.01; *** indicates p-value of <=0.001
Grade Point Averages from 2000/01 to 2002/03
& Cumulative Grade Point Average for 2002/03:
All CSF Students and by 4 Cohorts

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Note: * indicates p-value<=0.05; ** indicates p-value<=0.01; *** indicates p-value of <=0.001

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