



A COMMITMENT
TO EDUCATIONAL
EQUITY & EXCELLENCE

The Preuss School at UC San Diego:
Academic Performance
Classes of 2012 and 2013

June 4, 2015

Monica A. Sweet, Ph.D.

Larry McClure, Ph.D.

The Center for Research on Educational Equity,
Assessment and Teaching Excellence
University of California, San Diego
La Jolla, CA 92024-0036
<http://create.ucsd.edu/>

TABLE OF CONTENTS

Section	Page(s)
Executive Summary.....	3—4
Section 1: 2012 & 2013 School and Graduating Class Characteristics.....	5—13
Section 2: Preuss Lottery; Preuss and Comparison Groups.....	14—18
Section 3: Preuss vs. Comparison: CST Test-Taking Patterns & Performance.....	19—21
Section 4: Preuss vs. Comparison: Grade Point Averages & AP Classes.....	22—23
Section 5: Preuss vs. Comparison: CAHSEE & A-G Completion Rates.....	24—25

Executive Summary

This report presents information on the composition of The Preuss School in 2012 and 2013, including academic achievements of the graduating classes at Preuss in 2012 and 2013. This report also presents a study of the academic ‘effect’ of attending The Preuss School on students, in which students who entered Preuss in 6th grade and graduated from Preuss were compared to those waitlisted students who never entered Preuss but did go through the application and screening process. These two groups were compared on the academic indicators of CST test-taking patterns and scores, GPA, number of AP classes taken, high school exit exam (CAHSEE) pass rates, and A-G completion rates.

A summary of the findings detailed in this report:

- In the 2011/2012 academic year, 817 students were enrolled at The Preuss School in the fall of 2011. In 2012/2013, 826 students were enrolled. Students were primarily Hispanic or Latino, Asian, or African American. In comparison to the larger district (SDUSD), students from Preuss were more likely to be Hispanic or Latino and Asian, and less likely to be White.
- Class sizes at The Preuss School in 2011/2012 and 2012/2013 were larger than those reported in SDUSD, by as little as 3 and as many as 9 students per class type.
- In 2012, 89 seniors graduated from The Preuss School with an average weighted GPA of 3.44; in 2013, 96 seniors graduated with an average weighted GPA of 3.47. All passed the high school exit exam, all met A-G requirements, and almost all reported plans to attend college the subsequent year (with about 80% planning to attend a four-year college or university each year).
- The classes of 2012 and 2013 took a large number of AP courses—an average of 14.71 and 15.46 semester-long courses, respectively (or about 7 to 7.5 year-long courses). In addition, they took an average of about 8 AP exams each. Students performed best on the Spanish Language AP exam, with between 82% and 92% of students earning a score high enough to earn college course credit. Summed over all of the AP exams taken, between 17% and 18% of scores were high enough for students to earn college credit for their exam scores.
- 2012 and 2013 students from The Preuss School were far more likely than their counterparts in SDUSD, San Diego County, or in the state of CA to take one or more AP exams. Perhaps because of this increased AP test-taking rate, Preuss students were less likely to score a 4 or 5 on the AP exams they took than were students from the larger district, county, or state who earned AP exam scores.
- Students from The Preuss School were also much more likely to take the SAT exam than were students from SDUSD, San Diego County, and the state of CA. In addition, from 2011 to 2013, between 65% and 70% of Preuss students earned a score of 1,500 or above on the SAT; these percentages were at least 20% higher than comparable percentages for SDUSD, county, and state students earning a 1,500 or above.
- Academic achievements of The Preuss School students were compared to those of a comparable group of students who had applied for admission to Preuss but were not selected as part of the random lottery. Students who remained at Preuss from 6th grade

through 12th grade¹ were compared to students from SDUSD who were not selected and who had remained in SDUSD from 6th through 12th grade.² The 2012 study cohort included 79 Preuss students and 87 comparison students; the 2013 study cohort included 80 Preuss students and 95 comparison students.

- CST: More variability in test-taking patterns was observed in comparison group students, and more variability in test-taking patterns was observed for both groups overall in math CST test-taking patterns.
- CST: Average differences between the Preuss and comparison group scaled scores were statistically significant on many examinations in both cohorts, and Preuss students were the higher performing group in almost every instance where a statistically significant result was found. The 'effect' of attending The Preuss School was particularly positive in English Language Arts and History, with robust differences also observed in 8th grade Science, Physics when taken in 11th grade, and HS Math when taken in 10th and 11th grade. The results for math exams in general were the most ambiguous and difficult to interpret.
- GPA: Average weighted cumulative GPAs were significantly higher for Preuss students than for comparison group students: 3.46 vs. 3.21 in the 2012 cohort, and 3.48 vs. 3.33 in the 2013 cohort. Differences between unweighted and weighted cumulative GPAs indicate that while Preuss and comparison students were taking AP, IB, and Honors courses at the same rates in the 2012 cohort, 2013 cohort Preuss students were taking more AP, IB, and Honors courses than were their comparison group counterparts.
- AP courses taken and passed: Preuss students in both the 2012 and 2013 cohort took significantly more AP courses than did comparison students—three times more on average (~14 on average vs. ~4 on average). Preuss and comparison students passed their AP courses at similar rates, although the 2013 comparison students were more likely to earn 'A's in their AP classes and less likely to earn 'C's than were Preuss students.
- CAHSEE timing and pass rates: The Preuss and comparison groups in the 2012 and 2013 cohorts passed both the Math and English sections of this high school exit exam at very high rates, and the vast majority in 10th grade. All students in both groups in both cohorts passed both CAHSEE sections by 11th grade, with the exception of one 2013 comparison group student, who did not pass either section by the end of 12th grade.
- A-G completion: All Preuss students in both the 2012 and 2013 cohorts successfully met A-G requirements. The comparison group students did not fare as well overall—in the 2012 cohort 64.86% of these students met A-G requirements, and 60.47% in the 2013 cohort. Comparison group students in both cohorts had particular difficulty with meeting English and Math requirements, and about 20-30% of each group did not meet requirements in two or more of the A-G categories.

¹ We considered only students who remained at Preuss from 6th through 12th grade, as they received the most consistent and long-term Preuss 'program' which would allow for the best understanding of the 'effect' of attending The Preuss School.

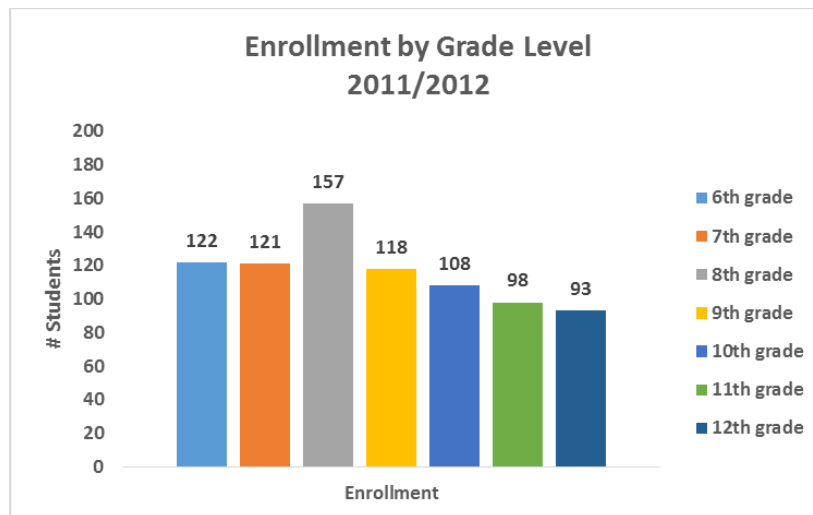
² This restriction was put in place because we received data from SDUSD, and could not track students who were never a part of SDUSD or had moved out of SDUSD at any point between 5th and 12th grade.

Section 1: 2012 & 2013 School and Graduating Class Characteristics

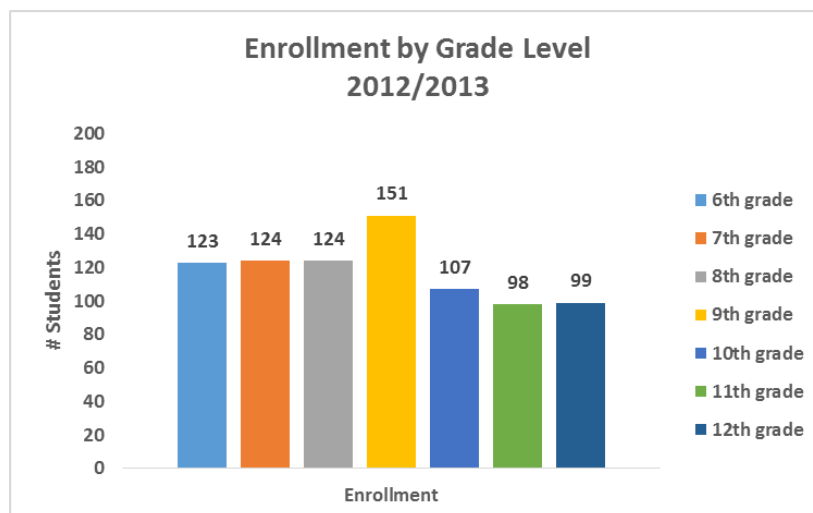
The Preuss School is located on the campus of the University of California, San Diego, and is a charter middle and high school (grades 6—12) within the San Diego Unified School District (SDUSD) catchment area. The Preuss School was created specifically to expand educational opportunities and college readiness for students from low-income households whose parents had not attended college. The School offers all students a rigorous college-preparatory academic curriculum bolstered by both academic and social supports, including a longer school day, a longer school year, intensive tutoring, mentoring, counseling, and parent education opportunities.

The Preuss School Characteristics, 2011/2012 and 2012/2013 School Years

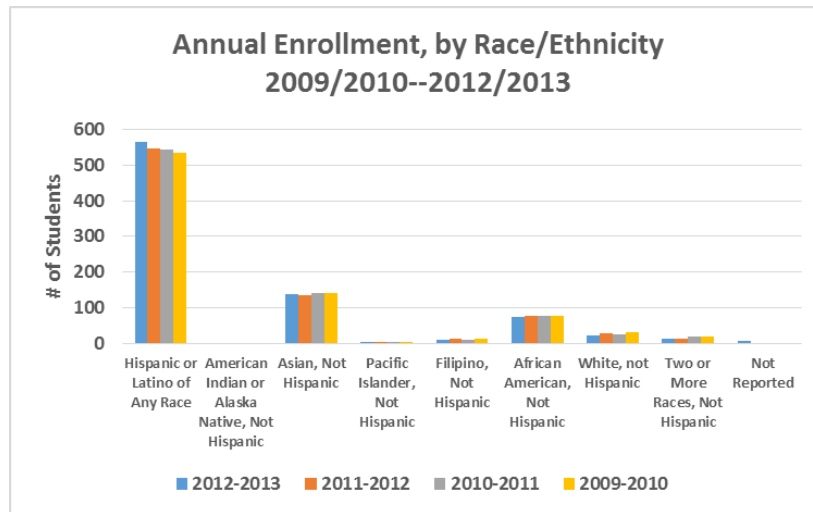
Enrollments by grade level for the Preuss School for the 2011/2012 school year, as reported by *California Department of Education, Educational Demographics Office (CBEDS)*, are depicted below. A total of 817 students were enrolled at the school, with grade-level percentage of totals ranging from 11% to 19%.



Enrollments by grade level for the subsequent school year, 2012/2013, look similar, as depicted below. For this school year, a total of 826 students were enrolled at The Preuss School, with grade-level percentage of totals ranging from 11% to just over 18%.

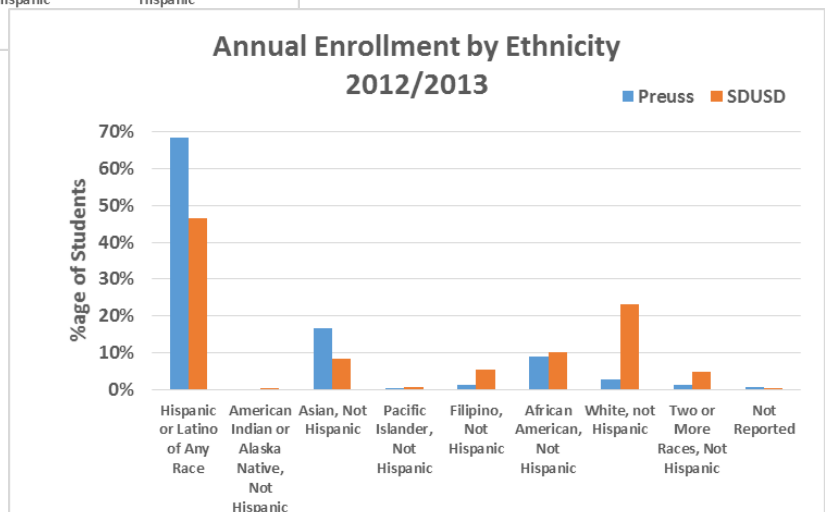
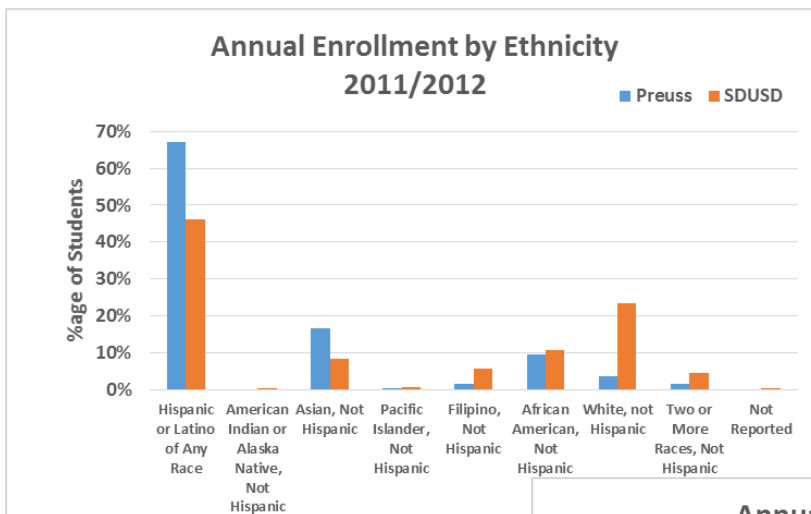


Student enrollment, broken down by student ethnicity, is depicted below. Data from four school years are presented to show the stability of the ethnicity composition of The Preuss School students; students at The Preuss School are primarily Hispanic or Latino (65.56—68.52%), Asian (16.59%—17.28%), or African American (8.84%—9.56%).

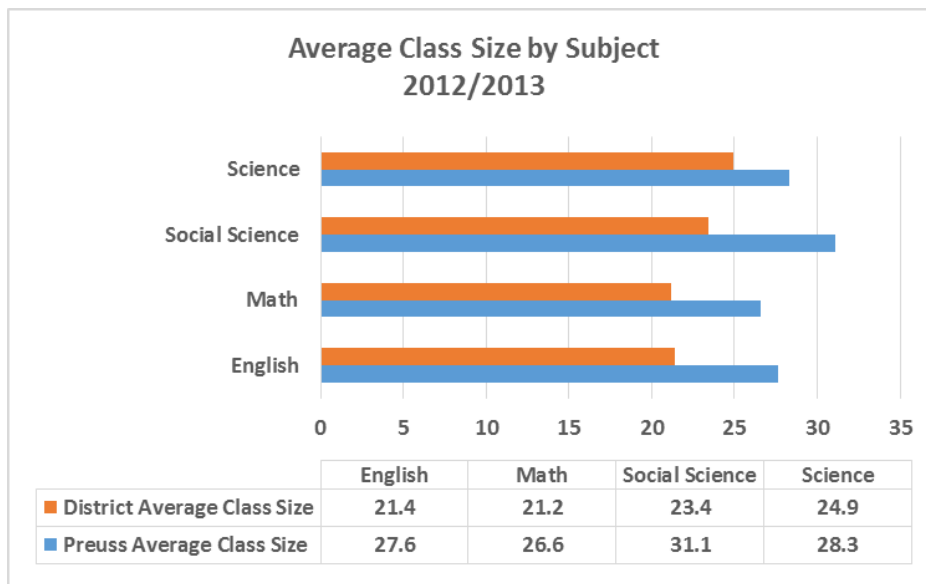
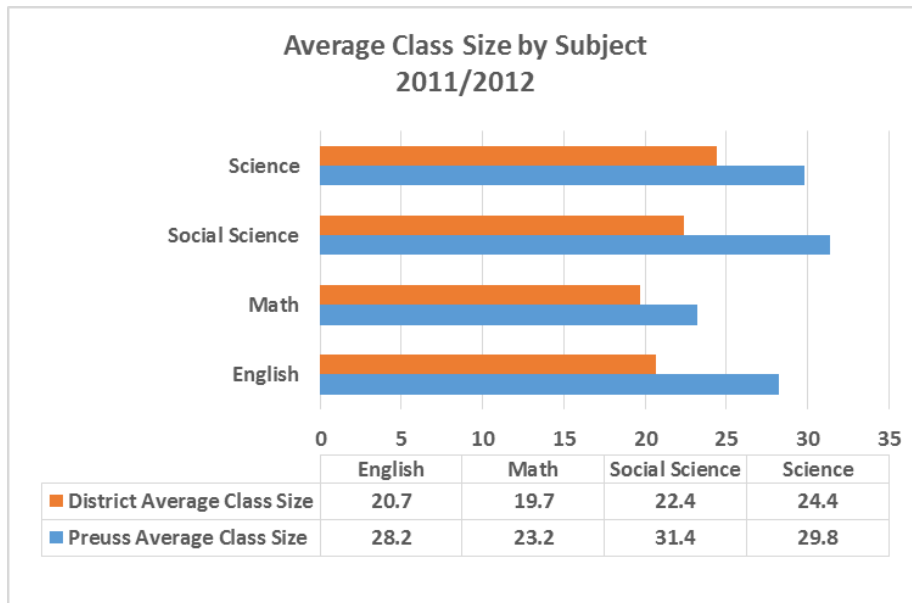


Source: California Department of Education, Educational Demographics Office <http://www.eddata.k12.ca.us/>

The 2011/2012 and 2012/2013 school year breakdowns of enrollment by ethnicity are depicted as relative frequencies side-by-side with SDUSD as a whole in the figures below. In comparison to the district, The Preuss School proportionally enrolls more Hispanic or Latino students, more Asian students, and fewer White students.

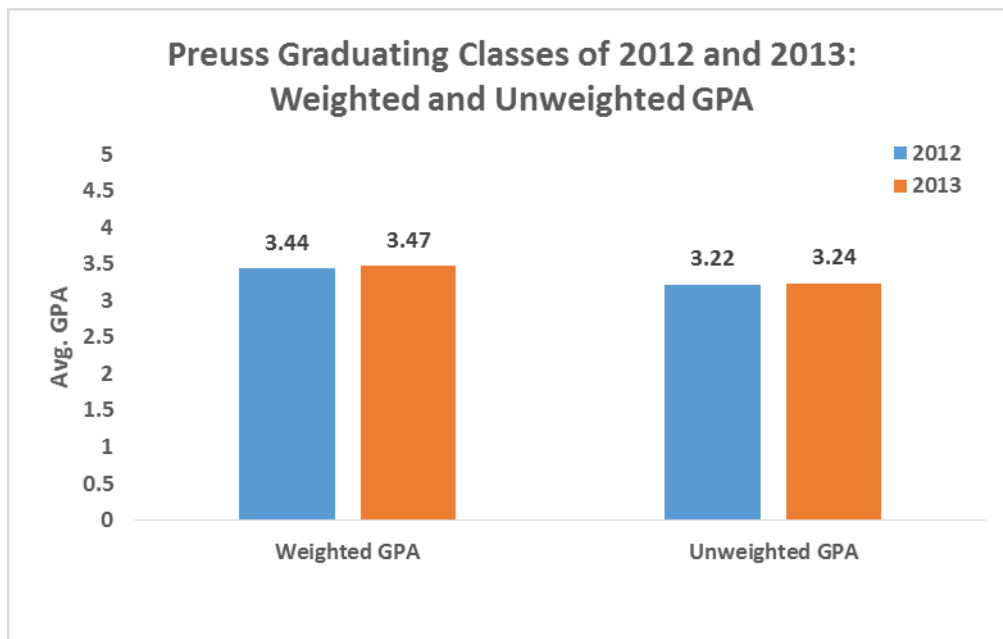


Average class sizes at The Preuss School, broken down by subject, are presented next to average class sizes in SDUSD as a whole in the figures below. For both school years, average English, Math, Social Science, and Science class sizes at The Preuss School were larger than district averages (by about 3 to 9 students)—English classes by about 7 students in 2011/2012 and 5 students in 2012/2013; Math classes by about 3 students in 2011/2012 and 5 students in 2012/2013; Social Science classes by about 9 students in 2011/2012 and about 8 students in 2012/2013; and Science classes by about 5 students in 2011/2012 and 3 students in 2012/2013.



Academic Characteristics of Preuss Graduates, 2011/2012 and 2012/2013 School Years

In 2012, 89 students graduated from The Preuss School.³ In 2013, 96 students graduated. In both years, all graduating students completed 100% of A-G requirements and 100% passed both the Mathematics and English sections of the California High School Exit Exam (CAHSEE). Cumulative weighted and unweighted GPAs are presented for both graduating classes in the following figure. On average, Preuss graduates earned between an ‘A’ and a ‘B’ overall, with average weighted GPAs in the mid-three range: students averaged 3.44 in 2012 (SD= 0.53), with weighted GPAs ranging from 2.27 to 4.28, and students averaged 3.47 in 2013 (SD= 0.53), with weighted GPAs ranging from 2.2 to 4.3.



Graduating students in both 2012 and 2013 self-reported a very high frequency of planning to attend college the following year (as recorded by Student Intent to Register Forms (SIR) on file at The Preuss School). In 2012, just over 80% planned to attend a four-year college or university, with 26.97% planning to attend local CSUs (SDSU or CSUSM) and 7.86% planning to attend UC San Diego. In 2013, an even larger percentage (88.5%) planned to attend a four-year college or university, with 18.75% planning to attend local CSUs (SDSU or CSUSM) and another 18.75% planning to attend UC San Diego. The following tables provide more detail on students’ choices for post-secondary education.

Preuss Class of 2012 SIR

	NUMBER OF STUDENTS	PERCENT OF CLASS
UC	24	26.97%
CSU	32	35.95%
Private or out of State public	16	17.98%
Community College	15	16.85%
Unknown	2	2.25%
Total	98	100.00%
Total 4-Year College or University	72	80.90%

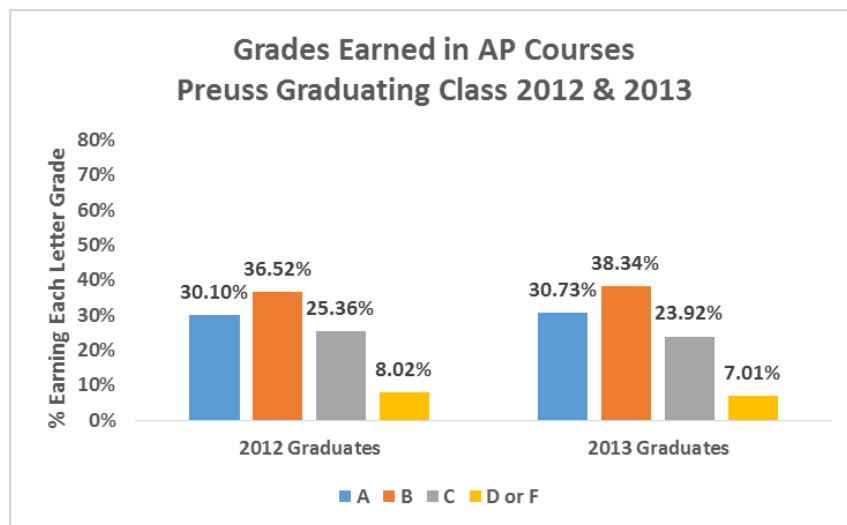
³ Note that one additional student did not graduate that year.

Preuss Class of 2013 SIR

	NUMBER OF STUDENTS	PERCENT OF CLASS
UC	31	32.3%
CSU	35	36.5%
Private or out of State public	19	19.0%
Community College	10	10.4%
Unknown	1	1.0%
Total	96	100.00%
Total 4-Year College or University	85	88.5%

--AP Courses Taken and Passed

The classes of 2012 and 2013 took a large number of AP courses between 9th grade and graduation: 2012 students took an average of 14.71 AP courses (measured in semesters) and 2013 students took an average of 15.46 AP courses. All Preuss students took at least several AP courses, and some took multiples every semester. The grade distributions for the set of AP courses graded is depicted for the classes of 2012 and 2013 in the figure below. The distribution of grades was remarkably similar across both graduating classes: slightly more than a third of AP coursework was graded as a 'B' and slightly less than a third was graded as an 'A.'



--AP Exams Taken and AP Exam Scores

The Class of 2012 attempted 688 AP exams, total: 1 in 2009 (15%), 112 in 2010 (16.28%), 299 in 2011 (43.46%), and 276 in 2012 (40.12%). Of all of the AP exams taken by this graduating class, 124 were scored a 4 or 5 (18.02% of total # AP exams), and an additional 162 (23.55%) were scored as a 3. Of the 89 students who graduated from The Preuss School in 2012, 86 (96.63%) took AP exams, with the average number of exams taken at 8 (SD= 2.45) and an observed range of 5 to 24 AP exams taken per student.

The following table details the type of AP exams taken by school year for the graduating class of 2012⁴ and includes averages per exam type as well as the percentage of students earning

⁴ AP exam data for each graduating class, including the number and types of AP exams taken by year and by student, were provided to us by The Preuss School. We chose not to present descriptive statistics for groups of less than 10 individuals.

scores of 3 and scores of 4 or 5.⁵ Note that although students were on average taking a large number of AP exams, they were not as frequently earning scores of 4 or 5 on those exams—for the class of 2012, the only exam where more than 50% of students who took it earned a 4 or a 5 was the Spanish Language exam taken by students in 2010, when they were in 10th grade (92.31% earned a 4 or 5). No students earned a 4 or 5 on either the Biology AP exam or the Environmental Science AP exam, and fewer than 10% of test-takers earned a 4 or 5 on the European History and English Literature exams.

Preuss Class of 2012 AP Scores by Academic Year and Exam

YEAR	AP TEST	# TESTS	AVG SCORE	% EARNED = 3	% EARNED = 4 OR 5
2009	European History	1			
2010	Art History	1			
	European History	85	1.81	23.53%	5.88%
	Spanish Language	26	4.54	3.85%	92.31%
2011	Art History	39	2.38	33.33%	12.82%
	Calculus	2			
	English Language	90	2.57	31.11%	17.77%
	Spanish Language	49	2.35	10.20%	26.53%
	Spanish Literature	15	3.53	40.00%	46.67%
	Statistics	14	2.57	35.71%	21.43%
	US History	90	2.47	20.00%	22.22%
2012	Art History	3			
	Biology	22	1.32	9.09%	0%
	Calculus	1			
	Chemistry	21	1.90	9.52%	14.28%
	English Literature	90	2.33	25.56%	8.89%
	Environmental Science	26	1.27	3.85%	0%
	Spanish Language	7			
	Spanish Literature	11	3.36	54.55%	36.36%
	Statistics	6			
US Govt. & Politics	89	2.57	35.96%	15.73%	

The Class of 2013 attempted 756 AP exams, total: 1 in 2008 (0.13%), 2 in 2009 (0.26%) 135 in 2011 (17.86%), 342 in 2012 (45.24%) and 276 in 2013 (36.51%). Of all of the AP exams taken, 131 were scored as a 4 or 5 (17.32% of total # of AP exams) and an additional 198 (26.19%) were scored as a 3. Of the 96 students who graduated from The Preuss School in 2013, 90 (93.75%) took AP exams—as few as 5 and as many as 27, with an average number of AP exams taken of 8.48 (SD= 3.14).

The following table details the type of AP exams taken by school year for the graduating class of 2013⁶ and includes averages per exam type as well as the percentage of students earning scores of 3 and scores of 4 or 5.⁷ Students in this graduating class also took a large number of AP exams and had similar distributions of scores at or above 4. As with the 2012 graduating class, the only exam where more than 50% of students who took it earned a 4 or a 5 was the Spanish Language exam taken by students when they were in 10th grade (82.50% earned a 4 or 5). No students earned a 4 or 5 on either the Environmental Science AP exam or the AP Art

⁵ This distinction was made because although a 3 or above is considered passing, most colleges and universities do not give course credit for an AP score below 4.

⁶ AP exam data for each graduating class, including the number and types of AP exams taken by year and by student, were provided to us by The Preuss School. We chose not to present descriptive statistics for groups of less than 10 individuals.

⁷ This distinction was made because although a 3 or above is considered passing, most colleges and universities do not give course credit for an AP score below 4.

History exam, and fewer than 10% of test-takers earned a 4 or 5 on the European History and Statistics exams.

Preuss Class of 2013 AP Scores by Academic Year and Exam

YEAR	AP TEST	# TESTS	AVG SCORE	% EARNED = 3	% EARNED = 4 OR 5
2008	Spanish Language	1			
2009	European History	1			
	Spanish Literature	1			
2011	European History	95	2.24	40%	7.37%
	Spanish Language	40	4.08	10%	82.50%
2012	Art History	77	1.88	28.57%	0%
	English Language	95	2.67	34.74%	22.10%
	Spanish Language	35	2.51	5.71%	31.43%
	Spanish Literature	20	3.45	25%	55%
	Statistics	20	2.10	25%	5%
	US Govt. & Politics	3			
	US History	92	2.42	22.83%	19.57%
2013	Art History	1			
	Biology	23	2.30	26.09%	4.35%
	Calculus	3			
	Chemistry	29	2.03	20.69%	10.35%
	English Literature	92	2.34	27.17%	10.87%
	Environmental Science	19	1.58	15.79%	0%
	Spanish Language	12	1.92	8.33%	16.67%
	Spanish Literature	5			
	US Govt. & Politics	92	2.12	26.09%	8.70%

As a reference against which to compare Preuss students' AP exam-taking rates and scores earned, we pulled data from the California Department of Education website (CDE/Dataquest). Because CDE reports AP data differently, we include their representation of 2012 and 2013 Preuss data in the comparisons presented, and not the Preuss data presented above.⁸ The numbers of Preuss students who took AP exams in 2012 and 2013 (as reported by the CA Department of Education) are presented in the following tables, along with frequencies of AP exam scores in each score category. Three groups are provided as a comparison: SDUSD, San Diego County as a whole, and the state of California. These tables indicate that the majority of Preuss students took at least one AP exam—if we use 11th and 12th grade enrollments as a rough proxy for the population potentially taking an AP exam (as the CA Department of Education does), then all Preuss juniors and seniors, plus a large proportion of sophomores, took at least one AP exam in both 2012 and 2013. Note that in comparison, less than 40% of the 11th and 12th grade students enrolled in the broader area took at least one AP exam in 2012 and 2013.

Preuss Class of 2012 AP Exams Taken and Scores

School	Grade 12 Enroll	Grades 11 + 12 Enroll	# of Exam Takers	Exams Scr=1	Exams Scr=2	Exams Scr=3	Exams Scr=4	Exams Scr=5

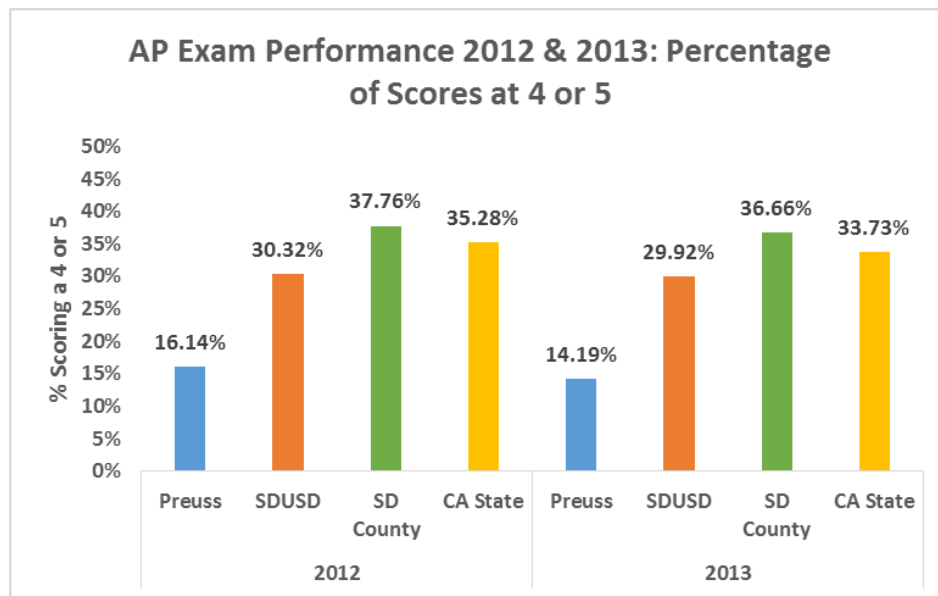
⁸ We chose to do this in an attempt to make more of an apples-to-apples comparison, as opposed to an oranges-to-apples comparison, and when in an ideal situation we would have been able to provide an oranges-to-oranges comparison. Since SDUSD does not collect and store AP exam data, we were unable to provide such a comparison. Note that we extracted this data from CDE's data website, Dataquest: <http://data1.cde.ca.gov/dataquest/>.

Preuss School	93	191	283	228	225	181	81	41
District (SDUSD)	9,385	18,627	6,432	2,455	2,664	2,778	2,102	1,334
County: (SD)	42,615	81,459	28,510	7,792	11,195	14,002	11,349	8,667
Statewide	493,947	980,182	282,682	101,579	112,178	123,260	102,569	81,170

Preuss Class of 2013 AP Exams Taken and Scores

School	Grade 12 Enroll	Grades 11 + 12 Enroll	# of Exam Takers	Exams Scr=1	Exams Scr=2	Exams Scr=3	Exams Scr=4	Exams Scr=5
Preuss School	99	197	295	237	220	160	65	37
District (SDUSD)	9,406	18,213	6,458	2,255	2,848	2,983	2,225	1,227
County: (SD)	42,766	81,213	29,667	7870	12,639	15,213	12,166	8,505
Statewide	496,859	976,904	299,779	107,151	127,713	136,321	108,895	80,004

The above tables also detail the number of AP exam scores in each category, 1—5. Students potentially earn college credit for scores of 4 or 5, and the percentage of AP exams earning scores in these two categories are presented in the figure below. While Preuss students were less likely to earn a 4 or 5 on their AP exams, it should be noted that a much higher percentage of Preuss students took AP exams relative to SDUSD, SD County, and the state of CA—including more students in earlier grade levels.



--SAT Exams

Students generally take the SAT I the spring of their junior year and again in fall of their senior year. Their highest scores are generally used by colleges for admissions decisions. We looked to the California Department of Education’s Dataquest system⁹ for SAT scores recorded for The Preuss School in 2012 and 2013, so that we could compare SAT performance of students at The Preuss School to students in SDUSD, San Diego County, and the state of CA for tests

⁹ CDE’s data website, Dataquest: <http://data1.cde.ca.gov/dataquest/>.

taken in 2011, 2012, and 2013. Summary statistics presented in the tables below.¹⁰ Please note that because of the way that these data are reported by CDE, interpretation of these statistics is at best suggestive of SAT performance of the graduating classes of 2012 and 2013 at The Preuss School relative to SDUSD, San Diego County, and the state of CA.

Preuss 2011 SAT Scores

School	Grade 12 Enrollment	Number Tested	Percent Tested	Critical Reading Average	Math Average	Writing Average	Total >= 1,500 Number	Total >= 1,500 Percent
Preuss School	98	98	100.00	526	540	541	67	68.4
District: (SDUSD)	9,459	4,547	48.07	491	504	483	2,075	45.63
County: (SD)	42,429	16,658	39.26	507	522	502	8,722	52.36
Statewide:	486,549	184,627	37.95	495	513	494	89,075	48.25

Preuss 2012 SAT Scores

School	Grade 12 Enrollment	Number Tested	Percent Tested	Critical Reading Average	Math Average	Writing Average	Total >= 1,500 Number	Total >= 1,500 Percent
Preuss School	93	91	97.85	510	537	530	60	65.9
District: (SDUSD)	9,385	4,833	51.50	480	495	475	2,066	42.75
County: (SD)	42,615	16,985	39.86	503	519	499	8,681	51.11
Statewide:	493,947	194,191	39.31	491	510	491	90,624	46.67

Preuss 2013 SAT Scores

School	Grade 12 Enrollment	Number Tested	Percent Tested	Critical Reading Average	Math Average	Writing Average	Total >= 1,500 Number	Total >= 1,500 Percent
Preuss School	99	100	100	517	545	518	70	70
District: (SDUSD)	9,406	4,809	51.13	484	500	475	2,092	43.5
County: (SD)	42,766	17,271	40.38	506	520	497	8,905	51.56
Statewide:	496,859	200,543	40.36	492	508	489	91,136	46.44

The above tables indicate that students from The Preuss School took the SAT exam at higher rates than did students in SDUSD, San Diego County, and the state of CA between 2011 and 2013; while virtually all Preuss students took the SAT, between 39% and 52% of students in the district, county, and state took the SAT in these years. Average scores in math, writing, and critical reading were higher for Preuss students, relatively, in all three years, and perhaps more importantly, a much higher percentage of Preuss students scored at or above 1,500, relative to students in the district, county, and state across the three years. For example, 22.77% more students from Preuss scored at or above 1,500 on the SAT in comparison to SDUSD as a whole in 2011, 23.15% more in 2012, and 26.5% more in 2013 (see last column in above tables).

¹⁰ We present data for three years, since data reported by CDE is isolated by school year and not by student grade level within each school, and thus it was not possible to separate juniors' SAT scores from those of seniors. In order to capture all of the graduating classes of 2012 and 2013 we decided to look to CDE's reports of 2011, 2012, and 2013.

Section 2: Preuss Lottery; Preuss and Comparison Groups

The Preuss School Application Process and Lottery, 2011/2012 and 2012/2013 School Years

Interested students and their parents must complete an application to be considered for The Preuss School. In order to pass an initial screening process, applicants must demonstrate that they qualify for federal meal assistance at the time of application and that neither of their parents has graduated from a four-year college or university. In addition, The Preuss School specifically seeks students who show academic promise but who may not have lived up to their full potential.¹¹ Applicants are not screened on the basis of GPA or any test or standardized test scores.

Applications are screened by trained readers to determine whether or not applicants meet these eligibility criteria, with at least two readers screening each application. If the resulting pool of eligible applicants exceeds the number of spaces available in the 6th grade class, a lottery (or random drawing) is held to determine which students will receive an offer of admission.¹² Students who are not randomly selected by the lottery are placed on a waitlist and are admitted to the school as space becomes available, if they are still interested and eligible. The lottery process has an added benefit besides fairly selecting students for admission from the eligible pool of applicants—it provides a comparison group of equally interested and motivated students against which to compare students from The Preuss School, over the years to graduation. This quasi-experimental design is stronger than simply comparing Preuss students against other students with similar demographic profiles in that it accounts for the additional motivational aspects involved in making the decision to apply to The Preuss School, completing the application process, and parent and student willingness to comply with The Preuss School program.

As part of this report, we were able to measure academic progress of students who began at Preuss in 6th grade (after ‘winning’ a spot in the lottery) and graduated from The Preuss School in 2012 and 2013 against their respective comparison group’s academic progress on outcomes including annual standardized test performance (CST), GPA, # of AP courses taken and passed, completion of A-G requirements, and pass rates on the California High School Exit Exam (CAHSEE).^{13,14}

Preliminary Analysis of the Composition of Preuss Groups and Comparison Groups

The primary purpose for measuring Preuss students against comparison group students is to better understand the effect of attending The Preuss School. This means following these students over time as they progress from 6th grade through 12th grade. As a consequence, for this set of analyses we selected only Preuss students who began at Preuss in the 6th grade and subsequently graduated from Preuss. This subset of Preuss attendees will be labelled ‘Preuss persisters’ for analysis purposes. While the comparison group students were selected for analysis even if they moved from one school to another, we were not able to follow them if

¹¹ Personnel at The Preuss School have told us that the criteria used to determine “academic potential” were not restrictive. Applicants were not required to demonstrate high academic achievement, only potential, as evidenced by letters of support from teachers or personal statements.

¹² Note that this has been the case for most application years and because of publicized success of The Preuss School and increased parental awareness of and interest in The Preuss School, it is virtually guaranteed that a lottery will be necessary into the foreseeable future.

¹³ We are grateful to the San Diego Unified School District, which has generously granted access to academic data for the students in the comparison group, allowing us to perform the analyses presented. Only students in the comparison group who attended one of the San Diego City Schools from 6th—12th grade are included in this report.

¹⁴ Note that we selected academic indicators from the data we had available from both The Preuss School and SDUSD. SAT and AP exam scores for comparison group students were not available to us.

they moved out of SDUSD or if they were never in SDUSD; therefore, we included students in the comparison group only if they did not attend Preuss and if they remained in SDUSD from 5th through 12th grade. This set of comparison group students will be labelled 'Comparison SDUSD' for analysis purposes. The breakdowns of these two groups by graduation year:

--2012 Cohort; 2005 Lottery:

- Of the original 121 lottery winners who began attending The Preuss School as 6th graders in 2005/2006, 79 (65.3%) remained at Preuss continuously until graduation in 2012. These 79 students are the 2012 'Preuss persisters'.
- Of the original 142 waitlisted students, 4 (2.8%) went to Preuss at some point, and 13 (9.2%) applied from outside SDUSD and as such we have no data for them. Of the resulting 125 students, 38 (30.4%) left the district at one point or another, while 87 (69.6%) of them remained in SDUSD continuously from 6th grade through graduation. These 87 are the 2012 'Comparison SDUSD' students.

--2013 Cohort; 2006 Lottery:

- Of the original 115 lottery winners who began attending The Preuss School as 6th graders in 2006/2007, 80 (69.6%) remained at Preuss continuously until graduation in 2013. These 80 students are the 2013 'Preuss persisters'.
- Of the original 158 waitlisted students, 8 (5.1%) went to Preuss at some point, and 15 (9.5%) applied from outside SDUSD and as such we have no data for them. An additional student (0.63%) was found to be ineligible and later removed from consideration. Of the resulting 134 students, 39 (29.1%) left the district at one point or another, while 95 (70.9%) of them remained in SDUSD continuously from 6th grade through graduation. These 95 are the 2013 'Comparison SDUSD' students.

While comparing groups generated by random selection is the best available way to understand the impact of students attending The Preuss School, it does have potential associated problems. Each is defined below, with preliminary analyses included to define and describe the likelihood of each associated problem.

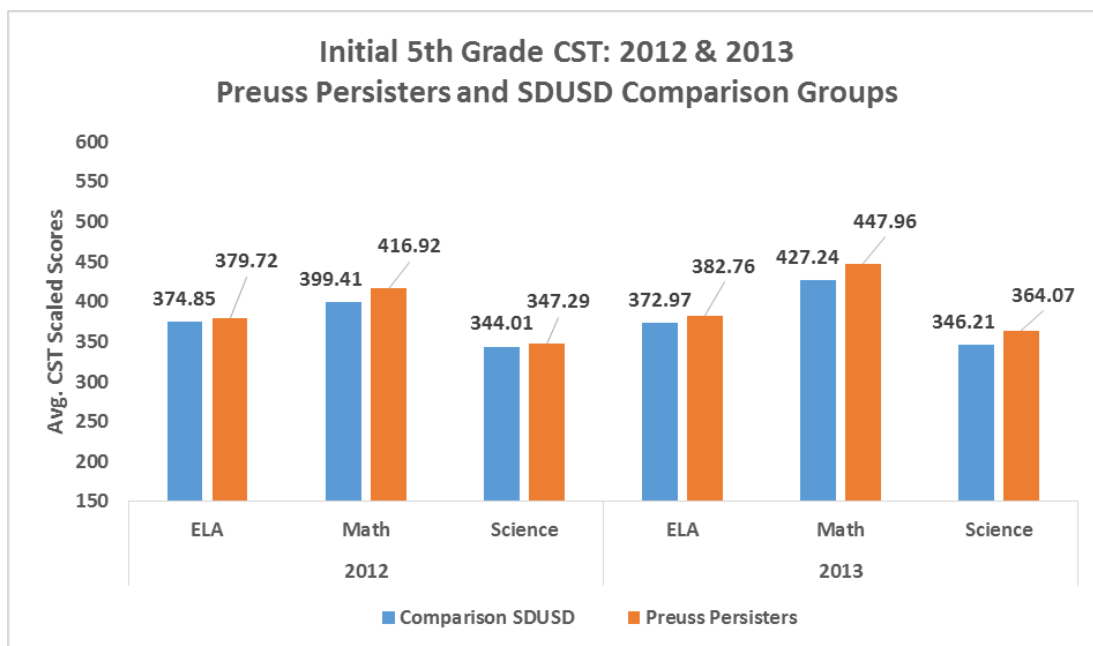
--Did The Lottery Result in Two 'Equal' Groups?

Although random selection of eligible applicants via a lottery ensures the fairest means of selecting students to attend The Preuss School and the highest likelihood that selected students will be equal to non-selected students initially, random selection does not guarantee equal groups at the outset. Much like one might by chance flip a coin 20 times and come up with 'heads' all 20 times (although it is very unlikely), it is possible that a random selection process might result in an initially uneven distribution of academic talent between the Preuss and comparison groups. It is important to consider this when interpreting differences between these two groups. For example, if the group of students randomly selected to attend The Preuss School happens to have significantly higher math standardized test scores than the comparison group at the outset, any subsequent Preuss 'gains' might be at least partially explained by these initial differences and not solely by a positive impact of attending The Preuss School.

A preliminary analysis of standardized test scores (CST ELA, math, and science) achieved by students immediately prior to the lottery¹⁵ allowed us to determine if this issue would be a

¹⁵ Note that no other objective measure was consistently available across the variety of schools that applicants attended. Since applicants were in 5th grade at the time of their application, GPA was especially not a good baseline indicator—cross-school standards are very different for this grade and some schools do not calculate GPA for this grade at all.

concern for subsequent ‘Preuss persisters’ vs. ‘Comparison SDUSD’ group analyses for the 2012 and 2013 cohorts. The following figure depicts average scaled scores for 5th grade CST subtests taken by the 2012 and 2013 ‘Preuss persisters’ and ‘Comparison SDUSD’ groups. The 2012 ‘Preuss persisters’ and ‘Comparison SDUSD’ students did not differ significantly on ELA, math, or science subtests of the 5th grade CST (p s= 0.42, 0.16, and 0.51, respectively). The 2013 ‘Preuss persisters’ and ‘Comparison SDUSD’ students did not differ significantly on the ELA subtest (p = .10) or the math subtest (p = .08), although there was a trend for ‘Preuss persisters’ to have higher 5th grade CST scores, relative to the ‘Comparison SDUSD’ group, on these subtests. The 2013 ‘Preuss persisters’ did have significantly higher 5th grade science CST scores than did ‘Comparison SDUSD’ students, scoring an average of 17.86 points higher. This could be a concern for analysis of differences in subsequent years’ academic indicators for these groups, and will be discussed as needed in interpretation of those analyses.

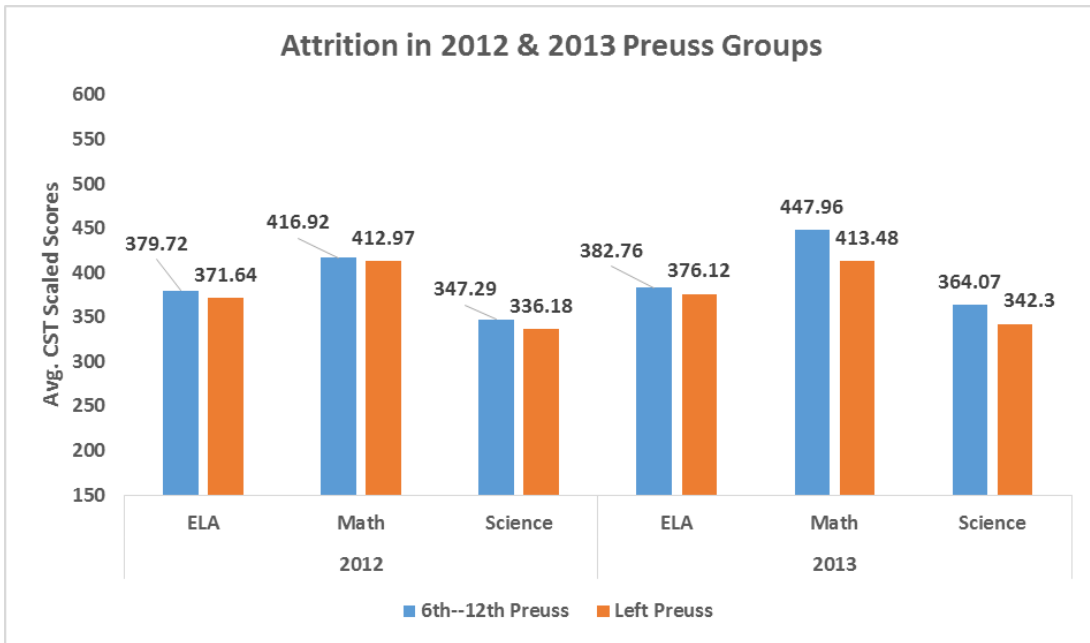


--What About Attrition?

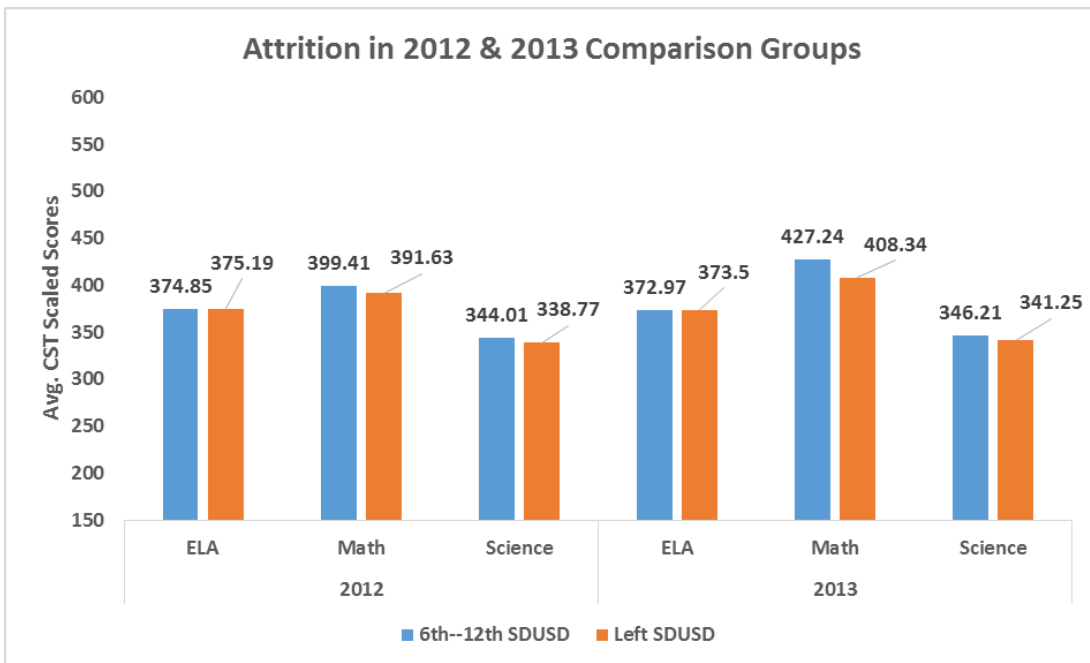
Some of the students who initially ‘won’ the lottery and attended The Preuss School starting in 6th grade remained at Preuss and graduated from Preuss, while others did not. Similarly, some of the students from SDUSD who applied and were waitlisted for Preuss remained in SDUSD from 6th through 12th grade, and some did not. It is important to understand up front if those who left were significantly different from those who remained, in order to more accurately interpret differences between ‘Preuss persisters’ and ‘Comparison SDUSD’ students. We compared those who remained to those who left within each group and each cohort using the best available academic indicator we had from 5th grade—CST scaled scores on ELA, math, and science subtests.

When comparing 5th grade CST ELA, math, and science scaled scores of those who left The Preuss School to those who remained from 6th through 12th grade and graduated, no significant differences emerged for the 2012 cohort (p s= 0.34, 0.81, 0.11, respectively). For the 2013 cohort, 5th grade ELA scores were not significantly different (p = .38), but those who remained at Preuss had significantly higher scores, on average, than did those who left Preuss on both the CST math (p = .03, M difference of 34.48 points) and CST science (p = .0024, M

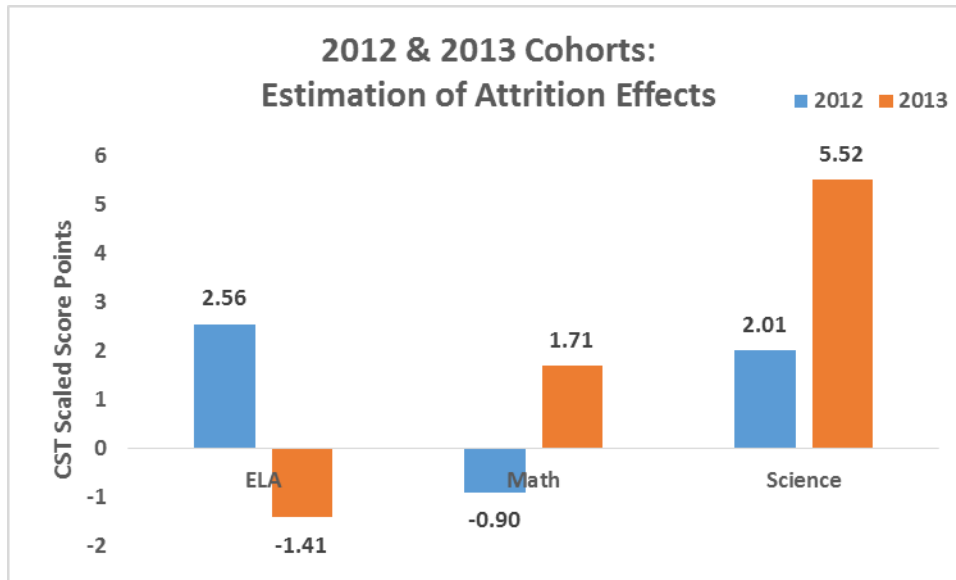
difference of 21.77 points) subtests. Average differences are depicted in the figure below. This finding that attrition from The Preuss School for the 2013 cohort was related to lower initial CST math and science scores could at least be a partial explanation for why ‘Preuss persisters’ might outperform ‘Comparison SDUSD’ students in this cohort—and will be discussed as needed in interpretation of those analyses.



When comparing CST ELA, math, and science scaled scores of those who left the comparison group (by virtue of having left SDUSD sometime between 6th and 12th grade) to those who remained from 6th through 12th grade and graduated, no significant differences emerged for either the 2012 (p s= 0.97, 0.63, 0.44, respectively) or the 2013 (p s= 0.95, 0.23, 0.50, respectively) cohorts. This suggests that differential attrition is not a concern for the comparison groups. Average differences for each CST subtest for each cohort year are depicted in the figure below.



Finally, to determine the net effect of attrition, an informal effect size was calculated for each 5th grade CST subtest in each cohort: Effect = (Preuss Final Members - Preuss Initial Members) - (Comparison Final Members - Comparison Initial members). A positive number (expressed in scale score points) means that attrition tended to raise the test scores of the Preuss persisters group relative to the Comparison SDUSD group, while a negative number means the opposite. These calculated informal effect sizes are depicted in the figure below.



For the 2012 cohort the effect of attrition was small, favoring the Preuss group for the ELA and science subtests and the comparison group for the math subtest. The overall effect of attrition was larger for the 2013 cohort, favoring the comparison group in the ELA subtest and the Preuss group in math and science CST subtests. The largest effect, 5.52 scaled score points for 5th grade CST science, translated to a 1.2% difference given the 450 point scale of the CST. While these analyses do not suggest that differential attrition could be problematic for the 2012 cohort or the 2013 overall, they do suggest that differential attrition might relate to higher 'Preuss persister' science performance in relation to the 'Comparison SDUSD' group. This will be discussed as needed in interpretation of science related academic indicators in subsequent years.

Section 3: Preuss vs. Comparison: CST Test-Taking Patterns & Performance

In this section we examine the standardized tests taken by the 2012 and 2013 Cohorts of 'Preuss persisters' and 'Comparison SDUSD' students as they progressed from grades 6 through 11 (students are not tested in 12th grade). The California Standards Test (CST) was the test used for 6th through 11th grade testing for both the 2012 and 2013 cohorts, although it is currently being phased out as new exams are designed to be more closely aligned with Common Core State Standards and Next Generation Science Standards as they are implemented in districts across the State of California. The following tables present average CST scaled scores for each subtest, for each grade, separated by cohort, for both the 'Preuss persisters' and 'Comparison SDUSD' groups. Comparisons shaded in gray indicate that differences between Preuss and comparison groups were statistically significantly different ($p \leq .05$) or marginally significant ($p \leq .10$).

2012 & 2013 Cohorts: Average CST Scaled Scores, English Language Arts

TEST	2012			2013		
	PREUSS	COMP.	P=	PREUSS	COMP.	P=
CST English Language Arts (6 th grade)	373.47	371.62	0.77	377.32	369.68	0.16
CST English Language Arts (7 th grade)	381.50	381.26	0.97	400.89	382.54	0.03
CST English Language Arts (8 th grade)	384.12	377.38	0.27	395.50	378.31	0.08
CST English Language Arts (9 th grade)	395.08	385.78	0.11	398.95	382.90	0.006
CST English Language Arts (10 th grade)	393.33	380.56	0.05	401.29	377.83	.0001
CST English Language Arts (11 th grade)	399.73	386.43	0.09	406.24	372.26	< .0001

CST ELA comparisons (above) were the most straightforward to analyze, in that this test was grade-specific with no variations. For the 2012 cohort, students in the Preuss group on average outperformed students in the comparison group from 6th through 11th grade, but the Preuss students only scored significantly higher in 10th and 11th grade. The Preuss students in the 2013 cohort also outperformed their comparison counterparts from 6th through 11th grade; these differences were statistically significant in all grades but 6th. Considering that there were no 5th grade CST ELA differences in these students before they entered Preuss or continued on in SDUSD, it seems reasonable to attribute later differences between the two groups in each cohort to the 'effect' of attending The Preuss School.

2012 & 2013 Cohorts: Average CST Scaled Scores, Social Sciences

TEST	2012			2013		
	PREUSS	COMP.	P=	PREUSS	COMP.	P=
CST History (8 th grade)	390.63	361.40	< .0001	405.73	359.66	< .0001
CST World History (9 th grade)	---	368.71	---	---	372.5	---
CST World History (10 th grade)	404.63	354.72	< .0001	405.29	371.57	.0008
CST World History (11 th grade)	---	---	---	---	357.43	---
CST US History (11 th grade)	420.14	369.04	< .0001	414.11	371.30	< .0001

CST History tests were also grade specific, with a general 8th grade history exam, a World History exam targeted for 10th grade, and a US History exam targeted for 11th grade.¹⁶ Preuss students outperformed comparison students on all history exams, and in both cohorts (see

¹⁶ The above table does illustrate, however, that some comparison students in SDUSD took World History in either 9th or 11th grade as well. The fact that several SDUSD comparison students took the World History CST exam in 9th and 11th grade is problematic for analysis. They are included as separate rows in the table to denote that they were not lumped together for analysis of Preuss vs. Comparison differences, as the CST is not vertically aligned. Because of this test scores, even on the same exam, cannot be compared from year to year.

above table). These average differences, which ranged in size from 29.23 scaled score points to 51.10 scaled score points, were all statistically significant ($p < .001$).

2012 & 2013 Cohorts: Average CST Scaled Scores, Science

TEST	2012			2013		
	PREUSS	COMP.	P=	PREUSS	COMP.	P=
CST Science 8 (8 th grade)	442.41	375.06	< .0001	466.71	392.88	< .0001
CST Science 10 (10 th grade)	393.59	366.98	.002	388.64	382.02	0.40
CST Earth Science (9 th grade)	---	346.63	---	---	347.91	---
CST Earth Science (11 th grade)	---	350.5	---	---	346.00	---
CST Physics (9 th grade)	---	338.78	---	---	353.09	---
CST Physics (11 th grade)	361.57	331.38	0.02	387.63	346.38	0.002
CST Chemistry (10 th grade)	359.92	339.87	.008	377.77	372.26	0.58
CST Chemistry (11 th grade)	336.25	329.44	0.66	360.08	339.23	0.19
CST Biological Sciences (9 th grade)	363.68	339.80	0.19	363.79	375.78	0.36
CST Biological Sciences (10 th grade)	371.60	353.65	0.39	343.29	371.15	0.19
CST Biological Sciences (11 th grade)	---	400.36	---	---	389.46	---

CST Science tests were also a bit varied (see above table), with a Science 8 and Science 10 grade-specific test; an Earth Science exam taken only by comparison group students in either 9th or 11th grade; a physics exam taken by Preuss students in the 11th grade but by comparison students in both 9th and 11th grade; a Chemistry exam taken by students in both 10th and 11th grades; and a Biological Sciences exam taken but students in grades 9, 10, and 11.

Preuss students outperformed comparison students on the Science 8 and 10 exams, although average differences were statistically significant only for the 2012 cohort and for the 2013 cohort 8th grade Science exam. Considering that there were no 5th grade CST Science differences in the 2012 cohort students before they entered Preuss or continued on in SDUSD, it seems reasonable to attribute later differences between the two groups in each cohort to the ‘effect’ of attending The Preuss School. There were significant 6th grade CST science differences in the 2013 cohort, which could possibly explain why the Preuss students scored higher on the 8th grade CST Science exam. This difference was not observed, however, in the 10th grade science exam.

Students in both cohorts took the Physics exam in 11th grade, and Preuss students significantly outperformed comparison group students. Students in both cohorts also took the CST Chemistry exam, in both 10th and 11th grade. While average Preuss student scaled scores were higher than were average comparison student scores for both years and both cohorts, only the 2012 cohort’s 10th grade scores were significantly different.

Lastly, students from both cohorts took the CST Biological Sciences exam in both 9th and 10th grade. There were no significant differences between Preuss and comparison group scores for either cohort on this exam.

2012 & 2013 Cohorts: Average CST Scaled Scores, Mathematics

TEST	2012			2013		
	PREUSS	COMP.	P=	PREUSS	COMP.	P=
CST Mathematics (6 th grade)	382.83	376.98	0.51	397.37	389.61	0.36
CST Mathematics (7 th grade)	379.49	376.63	0.73	385.32	384.56	0.93
CST Algebra I (7 th grade)	---	344.20	---	387.95	441.5	0.03
CST Algebra I (8 th grade)	319.21	359.70	.0001	389.05	373.77	0.23
CST Algebra I (9 th grade)	352.53	324.39	0.11	347.83	319.65	0.24
CST Algebra I (10 th grade)	---	322.00	---	---	334.67	---
CST Algebra I (11 th grade)	---	---	---	---	296.00	---
CST Algebra II (9 th grade)	372.00	343.57	0.25	354.16	353.11	0.95
CST Algebra II (10 th grade)	305.30	313.35	0.53	330.52	355.5	0.09
CST Algebra II (11 th grade)	292.19	271.69	0.29	322.10	293.75	0.06
CST Geometry (8 th grade)	403.54	417.33	0.72	394.00	395.27	0.95
CST Geometry (9 th grade)	327.21	333.76	0.56	344.77	348.63	0.71
CST Geometry (10 th grade)	320.54	300.74	0.19	348.82	287.21	.0001
CST Geometry (11 th grade)	311.00	---	---	318.50	284.00	0.20
CST General Math (8 th grade)	---	334.00	---	---	---	---
CST HS Math (10 th grade)	397.80	357.67	0.06	420.58	354.56	.009
CST HS Math (11 th grade)	374.94	319.72	< .0001	373.24	344.93	0.03
CST Integrated I (10 th grade)	---	279.00	---	---	327.00	---
CST Integrated I (11 th grade)	---	326.80	---	---	---	---

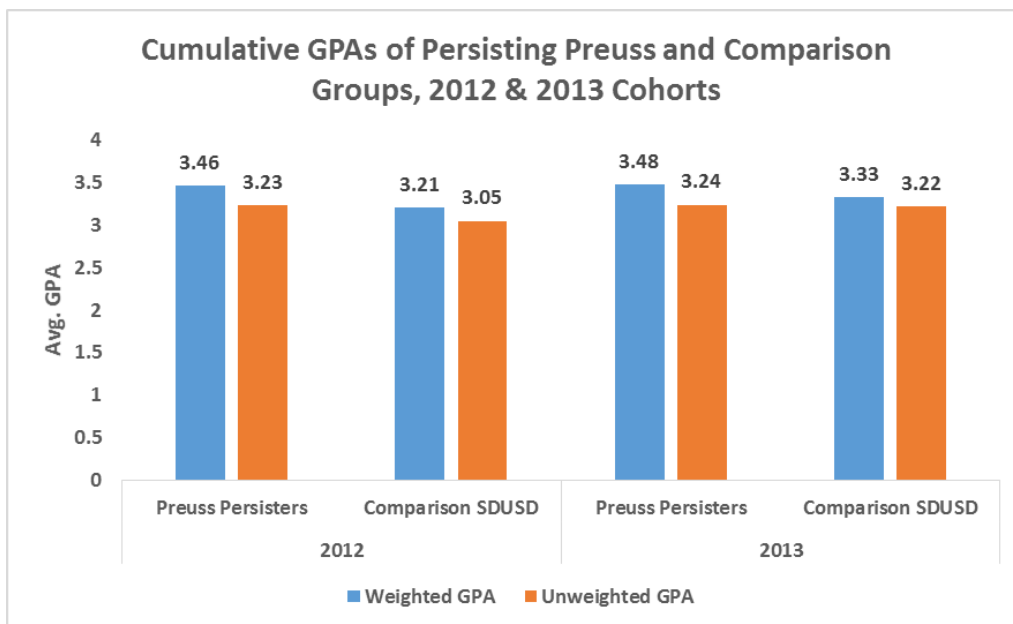
Quite a bit of variability in the timing of math CST subtests emerged within both cohorts and both the Preuss and comparison groups (see table above). While students in both cohorts took grade-specific CST Mathematics tests in 6th and 7th grade, and HS math exams in 10th and 11th grade, variability in the timing of Algebra I, Geometry, and Algebra II observed in both Preuss and comparison groups limited the power of Preuss vs Comparison tests, as students taking the same test in different years could not be pooled because the CST is not vertically aligned. Note also that some students in SDUSD took the CST General Math exam in 8th grade and the Integrated Math I exam in 10th and 11th grade, while Preuss students did not.

For math CST exams, average differences between ‘Preuss persists’ and ‘Comparison SDUSD’ students were often not statistically significant, and when they were significant for the Algebra I subtest, the comparison group scored higher on average. 2013 cohort Preuss students taking the Algebra II subtest in 11th grade significantly outperformed comparison students, but the effect was reversed for students taking Algebra II on 10th grade. For the Geometry subtest, in the 2013 cohort, those Preuss students who took Geometry in 10th grade outperformed those comparison students who also took Geometry in 10th grade. Lastly, Preuss students also significantly outperformed comparison group students on the HS Math test in both cohorts, whether taken in 10th or 11th grade.

Section 4: Preuss vs. Comparison: Grade Point Averages & AP Classes

2012 & 2013 Grade Point Averages (GPAs)

Both unweighted and weighted¹⁷ cumulative GPAs were calculated for 'Preuss persisters' and 'Comparison SDUSD' students in both the 2012 and 2013 cohorts. Averages for each group for each year are presented in the following figure. In 2012, both weighted and unweighted GPAs were on average higher for 'Preuss persisters' than for 'Comparison SDUSD' students (p s= .009 and .03, respectively). In 2013, weighted GPAs were higher for "Preuss persisters' than for "Comparison SDUSD' students, but this difference was only marginally significant (p = .07). Unweighted GPAs in 2013 did not differ significantly across groups (p = .74).



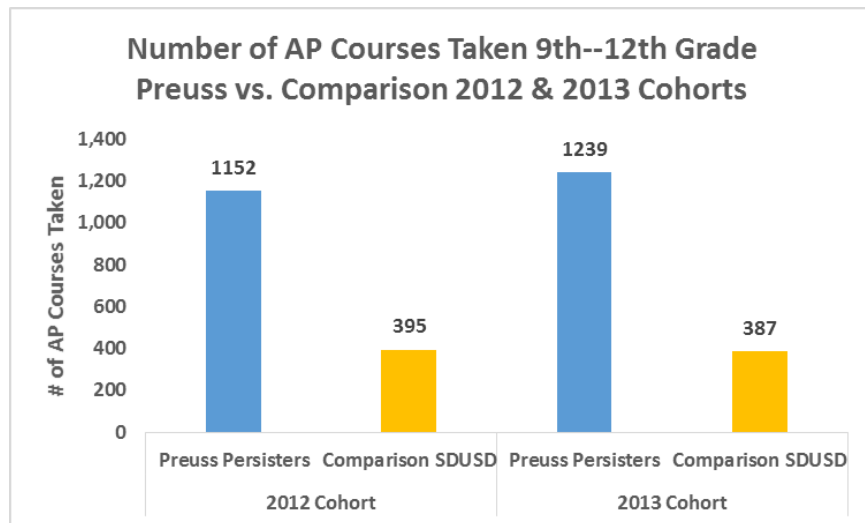
In the 2012 cohort, unweighted and weighted GPAs differed by about .20 grade points for both the 'Preuss persisters' and 'Comparison SDUSD' groups. This suggests that there were no significant differences in the number of additional grade points students earned from taking more advanced courses designated as AP, IB, or Honors. In the 2013 cohort, however, the difference between unweighted and weighted GPA was 0.24 grade points for the 'Preuss persisters' group but only 0.11 for the 'Comparison SDUSD' group, suggesting that Preuss students took more AP, IB, and Honors courses.

2012 & 2013 AP Courses Attempted and Passed

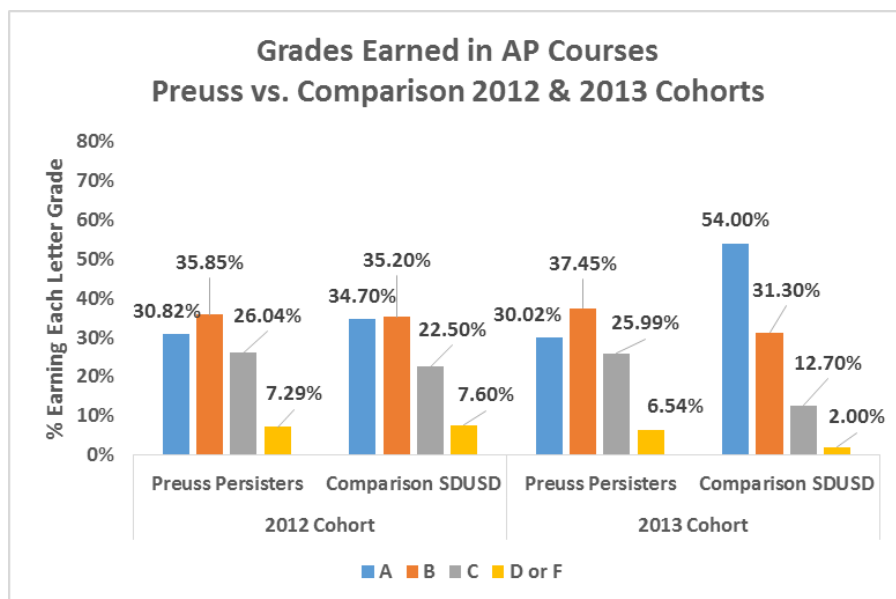
We calculated the number of AP courses¹⁸ taken by both 'Preuss persisters' and 'Comparison SDUSD' students in each cohort as well as the frequencies of grades earned in these AP courses by cohort and group. These statistics are depicted in the figures below. In the 2012 cohort, 'Preuss persisters' took an average of 14.58 AP courses each and 'Comparison SDUSD' students took an average of 4.54 AP courses. In the 2013 cohort, 'Preuss persisters' took 14.24 AP courses on average, while 'Comparison SDUSD' students took an average of 4.07. Students from the "Preuss persisters' group took more than triple the amount of AP courses than did students from the 'Comparison SDUSD' group in both the 2012 and 2013 cohorts.

¹⁷ An unweighted GPA represents the grades earned for the courses taken without adjustment for course difficulty. Weighted GPA takes into account the additional grade point(s) earned from AP, IB, and Honors courses taken and passed during high school.

¹⁸ Measured as semesters for the purposes of this report. Divide by two to get an estimate of years of AP courses.



The figure above depicts the sum of all semester-long AP courses taken by students between 9th and 12th grade. It illustrates the very large difference in AP course-taking patterns between the Preuss students and comparison group students from both cohorts. Preuss students in these cohorts were taking multiple AP classes per semester, typically, starting in 9th grade. This was not the case for comparison students attending a school in SDUSD; in fact, 30-40% of all of the AP courses taken by comparison students were taken by just 8 students in each cohort (33.97% in 2012 cohort and 43.3% in 2013 cohort).



The figure above depicts the percentage of AP course grades in each grade category, from A to D and F, for both 'Preuss persisters' and 'Comparison SDUSD' students in each of the 2012 and 2013 cohorts. Relatively few students earned a D or an F in their AP courses, and percentages were similar across cohorts and groups. The relative frequency of a 'B' grade in an AP course was also pretty stable across cohorts and groups, ranging from a low of 31.30% in the 'Comparison SDUSD' 2013 group to a high of 37.45% in the 2013 'Preuss persisters' group. Although the percentages of 'A' grades in the 2012 cohort was not significantly different, the 'Comparison SDUSD' students in the 2013 cohort earned significantly more 'A' grades in their AP classes than did 'Preuss persister' students. Along with this, 'Comparison SDUSD' students in the 2013 cohort earned significantly fewer 'C' grades than did "Preuss persisters.'

Section 5: Preuss vs. Comparison: CAHSEE & A-G Completion Rates

High School Exit Exam Performance CAHSEE

As a condition of graduation, the State of California requires that every student take and pass the California High School Exit Exam (CAHSEE). Each student is expected to make their first attempt to take and pass the two sections of the CAHSEE (Mathematics and English) by the end of the 10th grade. These sections may be taken and passed individually, with retakes allowed until the student passes.

- All students in the ‘Preuss persisters’ 2012 cohort group had taken both portions of the examination by the end of 10th grade in 2010, with all but one student passing each of the Math and English sections¹⁹ (98.7% initial pass rate on each section). Both of these students passed the section they did not pass the first time upon their second attempt the following year in 11th grade. In comparison, all of the ‘Comparison SDUSD’ students passed the Math CAHSEE upon their first attempt in 10th grade, while all but one student passed the English section (98.9% initial pass rate). This student passed this section the following year as an 11th grade student.
- In the 2013 cohort, all of the ‘Preuss persisters’ had taken and passed both sections of the CAHSEE by the end of 10th grade in 2011. In the ‘Comparison SDUSD’ group, all but one student (98.9%) had taken both sections of the CAHSEE in 10th grade in 2011. Of these, all passed the English section in 10th grade and all but two passed the Math section in 10th grade (97.9% initial pass rate). Both of these students passed the math section when taken as 11th grade students. Note that the one person who did not take the CAHSEE as a 10th grade student did take the exam in 11th grade, but did not pass either section. SDUSD has no further record of this student taking the CAHSEE in subsequent years.

A-G Completion Rates

The University of California and the California State University have jointly determined both the subject areas and the number of courses a student must take and pass (with a grade of “C” or better) to be eligible for admission to public four-year institutions in California. These requirements are collectively referred to as the “A-G requirements.” The following table presents each of the subject areas along with both the minimum and recommended number of years of study required for A-G completion:

A-G Requirements for CSU and UC Admission

REQUIREMENT	SUBJECT AREA	YEARS OF STUDY REQUIRED
“A”	History / Social Science	2
“B”	English	4
“C”	Mathematics	3 required (4 recommended)
“D”	Laboratory Science	2 required (3 recommended)
“E”	Language other than English	2 required (3 recommended)
“F”	Visual and Performing Arts	1
“G”	Electives	1
All Requirements	Total ‘Years’: 15 required, 18 recommended	

We analyzed the courses students had taken using unofficial transcripts from The Preuss School and administrative datasets supplied by SDUSD. The table below details the percentage of students in each group who met A-G requirements overall and by each subject

¹⁹ Note that these were two separate students—one did not pass the Math section but did pass the English section, and the other did the opposite.

area. All of the 79 'Preuss persister' students in the 2012 cohort successfully met A-G requirements by graduation; the same was the case for all 80 'Preuss persisters' in the 2013 cohort.

The two cohorts of 'Comparison SDUSD' students studied in this report (2012 and 2013) did have lower A-G completion rates than did 'Preuss persister' cohorts: 64.86% for the 2012 cohort and 60.47% for the 2013 cohort. Note that the 2012 'Comparison SDUSD' students were particularly behind in meeting the English and Math requirements, and that 21.62% of the students in this group missed meeting requirements in 2 or more of the A-G categories. This was also the case for the 2013 cohort, where 29.07% of students missed meeting requirements in 2 or more A-G categories and 10.47% missed A-G by 4 or more categories.

A-G Completion Rates for Preuss and Comparison Groups, 2012 & 2013 Cohorts

A-G REQUIREMENT	PREUSS % COMPLETE		COMPARISON % COMPLETE	
	2012	2013	2012	2013
A – History & Social Sciences	100%	100%	89.19%	86.05%
B – English Language Arts	100%	100%	75.68%	74.42%
C – Mathematics	100%	100%	79.73%	76.74%
D – Natural Sciences	100%	100%	91.89%	84.88%
E – Lang. other than English	100%	100%	86.49%	79.07%
F – Visual and Performing Arts	100%	100%	100%	95.35%
G – Elective	100%	100%	94.59%	95.35%
All Requirements	100%	100%	64.86%	60.47%