UNIVERSITY *of* CALIFORNIA

Science and Math Teacher Initiative *(CalTeach)*

February 2012

Legislative Report

Executive Summary

Under California's Master Plan for Education, the University of California (UC) is primarily responsible for doctoral degrees in public higher education, while the California State University (CSU) system is chiefly responsible for the undergraduate and graduate training of teachers. However, in May 2004, to address the state's shortage of highly qualified math and science teachers, Governor Arnold Schwarzenegger asked UC to help improve the undergraduate pipeline to math and science teaching credentials. In response, UC created its *CalTeach* program in 2005-06.

CalTeach encourages students majoring in science, technology, engineering, and mathematics (STEM) to augment their studies with a sequence of *CalTeach* courses and fieldwork in K-12 classrooms that ready them to pursue teaching credentials after receiving their baccalaureate degrees. Each of UC's nine undergraduate campuses operates a *CalTeach* program.

- Math and science teaching credentials issued to UC baccalaureates (regardless of where they completed their graduate training) climbed from 637 in 2004-05 (before the creation of *CalTeach*) to 865 in 2009-10, an increase of 36%. [See Display 4]

- From 2005-06 through 2010-11, across the nine campuses, roughly two-thirds of *CalTeach* students remain in STEM majors, while about one-third gravitate toward non-STEM fields. The *CalTeach* ratio of STEM to non-STEM attrition compares favorably to STEM aspirants sampled from 224 institutions of higher learning, 40% of whom switched to non-STEM majors after four years of college. [See Display 6]

- While California's K-12 students have grown more diverse, their teachers remain close to the national average, approximately 70% White/Caucasian. However, 64% of *CalTeach* enrollees are non-White/Caucasian, with under-represented minorities (Hispanic/Latino, African American/Black, and American Indian/Native American) comprising nearly 22%. Likewise, though women are traditionally under-represented in STEM fields, more female students have participated in *CalTeach* (59%) than male students (40%). [See Display 8]

- With respect to academic achievement, *CalTeach* graduates had a slightly higher Grade Point Average (3.18) at graduation than UC STEM graduates (3.14), and a higher proportion (nearly 77%) completed their degrees in four to five years than all UC STEM graduates (nearly 70%). [See Display 10]

- Of the 787 *CalTeach* graduates in 2010, 535 (nearly 68%) graduated with STEM degrees. Of the 535 STEM graduates, 153 (nearly 29%) took three or more *CalTeach* courses. [See Display 12]

- The 787 *CalTeach* students who graduated in 2010 completed their field placements in 112 schools, of which 48 (nearly 43%) had low Academic Performance Index ratings (API 1-5). Sixty-three percent of students enrolled in these schools were under-represented minorities, and 58% were eligible for free or reduced price lunches.

- Of the cumulative 1,839 UC students who completed their undergraduate degrees at UC campuses between 2005-06 and 2009-10 *and* took at least one *CalTeach* course: 408 of them (nearly 22%) have earned a total of 586 math and science credentials from the State of California. [See Display 14].

- Another 186 (10%) former *CalTeach* students were enrolled in post-baccalaureate teacher preparation programs at CSU and UC campuses in Spring 2011. Of those 186 former *CalTeach* students, 72 of them (nearly 39%) were enrolled at CSU teacher education programs and 114 of them (61%) were enrolled at UC teacher education programs. [See Display 15]

UNIVERSITY OF CALIFORNIA

Science and Math Teacher Initiative

(*CalTeach*)

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The following report is forwarded in compliance with Item 6440-001-0001, provision 7 of the 2011 Budget Act, which states:

> *The University of California (UC) shall report to the Legislature and the Governor by February 1 of each year on its progress toward increasing the quality and supply of science and mathematics teachers resulting from implementation of the Science and Math Teacher Initiative. This report shall include the following information*: *(a) annual number of mathematics and science teachers awarded credentials (by each UC campus) beginning with the 2004–05 academic year (before the State first provided funding for the initiative), (b) an expenditure plan on the use of the funds appropriated in this item, (c) the effectiveness of the initiative's different components and activities, including an identification of best practices, and (d) the job placement of students who earn a mathematics or science teaching credential, including the location of the K–12 school of employment and whether it is in an urban, rural, or suburban setting.*

This document is the annual report responding to this legislative request.

I. BACKGROUND

Historically, under California's Master Plan for Education, the University of California serves students at all levels of higher education, and is the public segment primarily responsible for awarding the doctorate and many professional degrees in areas such as medicine and law. The California State University (CSU) system is the segment authorized to deliver undergraduate and graduate education pertaining to teacher education.[1] Over time, it became evident that the state was not producing sufficient numbers of highly qualified mathematics and science teachers[2]. To help address this serious deficit, in May 2004, Governor Arnold Schwarzenegger entered into an agreement with the University to improve California's undergraduate pipeline to mathematics and science teaching credentials.

UC's Science and Math Teacher Initiative (SMI/*CalTeach*) encourages students majoring in science and math to augment their studies with a sequence of *CalTeach* courses and fieldwork experiences that introduce them to teaching while they complete their undergraduate degrees. These courses, together with research opportunities and direct work in K-12 classrooms, complement disciplinary studies and ready each *CalTeach* participant to pursue a teaching credential after receiving his or her bachelor's degree.[3]

[1] In 2006, state legislation (SB 724) authorized CSU to award a specific Doctor of Education (Ed.D.) in educational leadership.

[2] *Critical Path Analysis of California's Science and Mathematics Teacher Preparation System.* California Council on Science and Technology and the Center for the Future of Teaching and Learning, 2007. A comprehensive evaluation of California's capacity to prepare math and science teachers. www.ccst.us/publications/2007/2007TCPA.php

[3] To obtain a state teaching credential, California typically requires at least one additional year of post-baccalaureate study in a credential or master's degree program. However, two UC campuses, Berkeley and Irvine, have developed experimental four-year credential programs that enable students to obtain a California teaching credential while they simultaneously complete their undergraduate degrees.

UC offered its first *CalTeach* courses in 2005-06. All nine of UC's undergraduate campuses operate *CalTeach* programs, thereby ensuring statewide access to the program. The University has developed new minors and concentrations – more than 60 across the UC system – that focus specifically on mathematics and science teaching and support *CalTeach* objectives. This focus complements students' work in their majors to ensure both substantive content knowledge and strong pedagogical skills.

II. MATHEMATICS AND SCIENCE TEACHER CREDENTIALS

Over the past four years, California has cut school spending by 23 percent and cut student per capita spending by $1,414 – more than any other state. Although the student population increased between 2009-10 and 2010-11, there were nearly 13,000 fewer teachers serving that population.[4]

Moreover, over the past six years, there has been a steady decline in the number of teaching credentials issued in California across all three of the higher-education segments (UC, CSU, and private/independent colleges and universities). As evidenced in Display 1, CSU campuses produced 8,432 of all credentials issued in 2009-10, down from 13,584 in 2004-05 (a decline of nearly 38 percent). Private/independent universities produced 6,775 of the credentials issued in 2009-10, down from 9,388 in 2004-05 (a decline of nearly 28 percent), and UC produced 944 of the credentials in 2009-10, down from 1,177 in 2004-05 (a decline of nearly 20 percent). Of the total credentials produced in 2009-10 (16,151), CSU produced 52 percent, the private/independent colleges and universities produced 42 percent, and UC produced six percent.

Displays 1 through 4 summarize the numbers of credentials issued between July 1, 2005, and June 30, 2010, upon the recommendation of a California Institution of Higher Education with a Commission-accredited credential program. The numbers include individuals who are receiving initial certifications, as well as individuals who were previously certified, holding intern credentials or emergency permits.

Display 1. Credentials Produced by California Institutions of Higher Education, 2004-05 through 2009-10

Institutions	2004-05		2005-06		2006-07		2007-08		2008-09		2009-10	
	N	%	N	%	N	%	N	%	N	%	N	%
CSU	13,584	56.3	12,033	53.7	10,840	53.4	10,148	53.2	9,418	52.9	8,432	52.2
UC	1,177	4.9	1,099	4.9	1,005	4.9	949	5.0	930	5.2	944	5.8
Private and Independent	9,388	38.9	9,287	41.4	8,463	41.7	7,987	41.9	7,449	41.9	6,775	41.9
Totals	24,149		22,419		20,308		19,084		17,797		16,151	

Source: California Commission on Teacher Credentialing: "Teacher Supply in California: An Annual Report to the Legislature, 2004-05 through 2009-10."
Note: Numbers do not reflect the number of individuals receiving credentials, but rather the number of credentials issued (i.e., a person may have more than one credential). At this writing, 2009-10 is the most recent year for which data are available. Percentages may not total 100% due to rounding.

As Display 2 shows, over the same time period, despite the decline in total teaching credentials issued in California, the number of math and science credentials increased from 2,735 in 2004-05 to 3,091 in 2009-10 (an increase of 13 percent). Both CSU and the private/independent colleges and universities increased their production of math and science credentials

[4] *The Status of the Teaching Profession 2011*. The Center for the Future of Teaching and Learning, 2011, p.2. http://www.cftl.org/documents/2011/TCF.SR.2011.pdf

over the six-year period – CSU by an impressive 36 percent, the private/independent schools by a tiny fraction of a percent. UC experienced a modest decline of nearly seven percent. Of the total math and science credentials issued in 2009-10 (3,091), CSU produced 45 percent, the private/independent colleges and universities produced 46 percent, and UC produced nine percent.

Display 2. Math and Science Credentials Produced by California Institutions of Higher Education, 2004-05 through 2009-10

	2004-05		2005-06		2006-07		2007-08		2008-09		2009-10	
	N	%	N	%	N	%	N	%	N	%	N	%
CSU	1,011	37.0	1,057	38.5	1,288	42.6	1,356	42.5	1,367	42.9	1,378	44.6
UC	305	11.2	286	10.4	281	9.3	298	9.3	290	9.1	284	9.2
Private and Independent	1,419	51.9	1,401	51.1	1,451	48.0	1,539	48.2	1,526	47.9	1,429	46.2
Total	2,735		2,744		3,020		3,193		3,183		3,091	

Source: CSU data provided by the CSU's Office of Chancellor, Mathematics and Science Teacher Initiative Report. (2011); UC Data provided by the California Commission on Teacher Credentialing.
Note: Numbers do not reflect the number of individuals receiving credentials, but rather the number of credentials issued (i.e., a person may have more than one credential). At this writing, 2009-10 is the most recent year for which data are available. Percentages may not total 100% due to rounding.

Display 3 shows the math and science credentials produced by UC's eight teacher education programs from 2004-05 (one year prior to the inception of *CalTeach*) through 2009-10, by campus.

Display 3. Math and Science Credentials Produced through UC, by Campus, 2004-05 through 2009-10

	2004-05			2005-06			2006-07			2007-08			2008-09			2009-10		
	Math	Science	**Total**	Math	Science	**Total**	Math	Science	**Total**	Math	Science	**Total**	Math	Science	**Total**	Math	Science	**Total**
Berkeley	1	8	**9**	5	10	**15**	1	5	**6**	6	4	**10**	4	7	**11**	3	10	**13**
Davis	10	23	**33**	7	22	**29**	9	26	**35**	11	26	**37**	11	13	**24**	15	30	**45**
Irvine	19	39	**58**	26	14	**40**	28	23	**51**	45	33	**78**	41	40	**81**	34	44	**78**
Los Angeles	28	31	**59**	26	31	**57**	23	16	**39**	28	20	**48**	43	25	**68**	24	23	**47**
Riverside	28	11	**39**	36	14	**50**	30	11	**41**	22	10	**32**	22	7	**29**	16	8	**24**
San Diego	30	32	**62**	29	25	**54**	40	29	**69**	34	25	**59**	18	20	**38**	18	12	**30**
Santa Barbara	10	13	**23**	6	14	**20**	9	10	**19**	8	13	**21**	6	9	**15**	9	11	**20**
Santa Cruz	7	15	**22**	11	10	**21**	10	11	**21**	4	9	**13**	10	14	**24**	11	16	**27**
Total			**305**			**286**			**281**			**298**			**290**			**284**

Source: California Commission on Teacher Credentialing.
Note: At this writing, 2009-10 is the most recent year for which data are available; UC Merced and UC San Francisco do not have graduate teacher education programs.

Display 4 shows that a significant number of math and/or science credentials have been issued to individuals who received their undergraduate degrees from UC, regardless of where they subsequently studied for their teaching credentials.

Display 4. Math and Science Credentials Issued to UC Baccalaureates, 2004-05 through 2009-10

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	% Change 04-05 through 09-10
Math	306	299	359	272	379	419	36.9%
Science	331	264	355	291	253	446	34.7%
Totals	637	563	714	563	632	865	35.8%

Source: California Commission on Teacher Credentialing.
Note: At this writing, 2009-10 is the most recent year for which data are available.

III. THE UC SCIENCE AND MATH TEACHER INITIATIVE: *CalTeach*

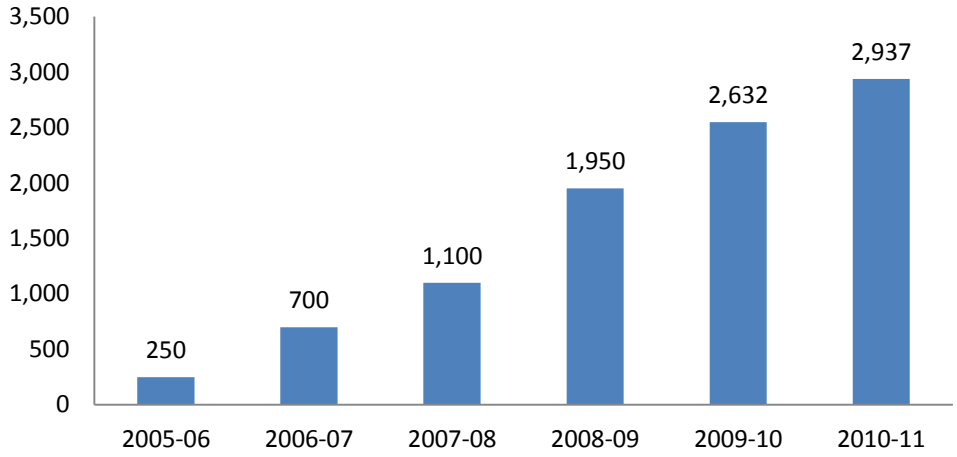
Best Practices – All nine of UC's undergraduate campuses operate *CalTeach* programs. Campus programs share key features but also differ based on their respective approaches to teacher preparation and the specializations of their science and mathematics departments. Notwithstanding the distinct character and history of each campus, *CalTeach* programs include ten common features that represent best practices in undergraduate teacher preparation.

Program Component	Description
Recruiting and Advising	*CalTeach* identifies incoming UC students intending to major in mathematics or science, and issues these students personalized invitations to consider teaching. Coupled with this recruitment effort is a strong advising program.
Coherent Curriculum	For students who opt to consider teaching, UC campuses offer a coherent sequence of courses in science and education and in mathematics and education. This sequence is designed to provide an early introduction to the daily, practical issues common to K-12 classrooms within a science or math context.
Field Experiences	Students take on a variety of roles in classrooms, from observing to assisting with teaching. These experiences provide *CalTeach* participants direct contact with K-12 students and also give participants a sense of responsibility and purpose.
Research Experiences	Participants develop scientific thinking and mathematical reasoning skills, and learn research and evaluation methods. While assisting their mentor teachers, they learn how to apply these skills and methods in their teaching practices.
Exposure to Professional Experiences	Students gain early professional experiences through conferences, credential program recruitment fairs, and various network-building activities.
Faculty Collaboration (Education, Mathematics,	Science, mathematics, and education faculty work together to design curricula and innovative instructional strategies to help students acquire deep mathematical and

Science)	scientific knowledge, research techniques, and pedagogical skills.
Mentor K-12 Teachers	Mentor teachers oversee student field experiences in K-12 mathematics and science classrooms. The mentors model important lessons in everything from classroom management to delivery of instruction for students of different backgrounds and circumstances.
Data Collection	The University continues to refine an online data system to record, document, and manage all aspects of *CalTeach*.
Community College Partnerships	Parallel programs established at various community colleges enable transfer students to enter UC *CalTeach* programs having already completed the first two courses in the four-course *CalTeach* sequence.
Financial Stipends for Students and for Mentor Teachers	*CalTeach* students may receive modest financial support to offset travel and other expenses they incur while participating in field placements. Mentor teachers receive stipends for each student they supervise.

Course Taking – Display 5 shows the total number of *CalTeach* courses in which students have enrolled from 2005-06 through 2010-11. Judging by the growth in the number of courses taken, it appears that UC undergraduates are increasingly curious about the possibility of teaching mathematics and/or science.

Display 5: Systemwide *CalTeach* Course Enrollment by Year, 2005-06 through 2010-11



Source: Program data from *CalTeach* Information System

CalTeach Enrollee Characteristics – Display 6 shows, from the program's inception, the total number of *CalTeach* students by campus and, broadly, by type of major: Science, Technology, Engineering, and Mathematics (STEM) majors or non-STEM (social sciences and humanities) majors.[5] At Berkeley, Merced, and Santa Barbara, *CalTeach* students are split almost evenly between STEM and non-STEM majors. By contrast, at Riverside and Irvine, over 80 percent of the *CalTeach* students are in STEM fields.

Overall, across the nine campuses, roughly two-thirds of *CalTeach* students remain in STEM majorss. The *CalTeach* ratio of STEM to non-STEM attrition compares favorably to STEM aspirants sampled from 224 institutions of higher learning studied by UCLA researchers. Among their findings, they state: "While every student in the sample began with an interest in majoring in a STEM field, by the time four years of college were completed, 40% of students had switched majors to a non-STEM field."[6]

Display 6. *CalTeach* Students by STEM and Non-STEM Majors, by Campus, 2005-06 through 2010-11

CAMPUS	STEM		Non-STEM		Total
	N	%	N	%	N
Berkeley	336	47.9	366	52.1	702
Davis	698	67.9	330	32.1	1,028
Irvine	384	81.5	87	18.5	471
Los Angeles*	652	73.6	227	25.6	886
Merced	181	52.5	164	47.5	345
Riverside*	358	84.0	67	15.7	426
San Diego	487	64.2	272	35.8	759
Santa Barbara	235	45.6	280	54.4	515
Santa Cruz	224	69.3	99	30.7	323
Total	3,555	65.2	1,894	34.7	5,455

Source: Program data from *CalTeach* Information System; UCOP Corporate Student System.
Note: UCLA is missing information on majors for seven of its *CalTeach* students and UC Riverside is missing information on majors for one of its *CalTeach* students. Percentages may not total 100% due to rounding.

[5] Baccalaureate degrees are noted for students at the time of their graduation. For students who have not yet graduated, we use the majors they have declared according to the campus registrars' most recent records. For students who have yet to declare majors, we note their intended majors on their UC applications.

[6] Jessica Sharkness, M. Kevin Eagan Jr., Sylvia Hurtado, Tanya Figueroa, Mitchell J. Chang, "Academic Achievement among STEM Aspirants: Why do Black and Latino Students Earn Lower Grades than their White and Asian Counterparts?" University of California, Los Angeles, 2011: p. 20.

For the 5,455 UC undergraduates who have taken at least one *CalTeach* course since the program began in 2005-06, Display 7 shows the STEM majors they most often elected.[7]

Display 7. *CalTeach* Students' STEM Majors, 2005-06 through 2010-11

MAJOR	N	%
Biological/Life Sciences	1,466	26.9
Mathematics	1,000	18.3
Physical Sciences	443	8.1
Engineering	360	6.6
Computer Sciences	45	0.8
Other STEM Majors	241	4.4
Non-STEM Majors	1,892	34.7
Missing	8	0.2
Total	5,455	100.0

Source: Program data from *CalTeach* Information System; UCOP Corporate Student System
Note: Percentages may not total 100% due to rounding.

While California's K-12 students have grown much more diverse, the teacher population remains close to the national average, at approximately 70 percent White/Caucasian.[8] However, as Display 8 shows, non-White/Caucasian students account for nearly 64 percent of *CalTeach* enrollees and under-represented minorities (Hispanic/Latino, African American/Black, and American Indian/Native American) comprise nearly 22 percent. Likewise, though women are traditionally underrepresented in STEM majors; more female students have participated in *CalTeach* than male students.

Display 8. Demographics of *CalTeach* STEM Majors, 2005-06 through 2010-11

	N=3,555	%
GENDER		
Female	2,109	59.3
Male	1,422	40.0
Unknown	24	0.7
ETHNICITY		
Asian/Pacific Islander	1,488	41.8

[7] These STEM majors are based on the Classification of Instructional Programs (CIP) used by the U.S. Department of Education's National Center for Education Statistics (NCES).
[8] Ed-Data, State of California Education Profile (2008 – 2009). Retrieved December 1, 2009, from http://www.ed-data.k12.ca.us/Navigation/ fsTwoPanel.asp?bottom=%2Fprofile.asp%3Flevel%3D06%26reportNumber%3D16

White/Caucasian	1,065	30.0
Hispanic/Latino	666	18.7
African American/Black	94	2.6
American Indian/ Native American	23	0.6
Other	60	1.7
Missing/Unknown	159	4.5
1ST GENERATION COLLEGE		
Yes	1,349	37.9
No	1,567	44.1
Unknown	639	18.0
SAT SCORES		
SAT Combined Average Score	1,211 (N=2,819)	
SAT Math Average Score	632 (N=2,786)	

Source: Program data from *CalTeach* Information System; UCOP Corporate Student System
Note: Percentages may not total 100% due to rounding.

IV: 2009-10 *CalTeach* GRADUATES

The *CalTeach* program began in 2005-06, graduating its first full cohort of *CalTeach* participants in Spring 2010. Across the nine UC undergraduate campuses, a total of 787 students who took at least one *CalTeach* course graduated with their baccalaureate degrees in 2009-10. As Display 9 shows, 2009-10 *CalTeach* STEM graduates are very similar to all 2009-10 UC STEM graduates, with a few notable exceptions. Women comprise nearly 61 percent of the *CalTeach* STEM graduates, but only 45 percent of all STEM graduates. Asian students are less likely to be involved with *CalTeach*; they comprise 43 percent of the *CalTeach* graduates, but 53 percent of all STEM graduates. Latino students are more likely to be involved with *CalTeach*, making up nearly 15 percent of *CalTeach* graduates, but only 10 percent of all STEM graduates. Over one-third of all UC STEM graduates (36 percent) are the first in their families to go to college, compared with fewer than a quarter (23 percent) of *CalTeach* graduates.

Display 9. Demographics of the 2009-10 *CalTeach* and 2009-10 UC STEM Graduates

	2009-10 *CalTeach* STEM Graduates		**2009-10 UC STEM Graduates**	
GENDER	**N=531**	**%**	**N=14,356**	**%**
Female	322	60.6	6,448	44.9
Male	209	39.4	7,908	55.1
ETHNICITY	**N=510**	**%**	**N=13,426**	**%**
Asian/Pacific Islander	228	42.9	7,239	53.0
White/Caucasian	183	34.5	4,348	31.8
Hispanic/Latino	77	14.5	1,391	10.2
African American/Black	11	2.1	245	1.8
Native American	2	0.4	60	0.4
Other	9	1.7	388	2.8
1ST GENERATION COLLEGE	**N=490**	**%**	**N=12,910**	**%**
Yes	123	23.2	4,689	36.3
No	367	69.1	8,221	63.7
SAT SCORES				
SAT Combined Average Score	**(N=459)** 1,221			**(N=10,958)** 1,243
SAT Math Average Score	**(N=454)** 635			**(N=11,023)** 655

Source: Program data from *CalTeach* Information System; UCOP Corporate Student System
Note: Percentages may not total 100% due to rounding.

With respect to academic achievement, Display 10 shows that *CalTeach* graduates had a slightly higher grade point average (3.18) at graduation than UC STEM graduates (3.14), and a higher proportion (nearly 77 percent) completed their degrees in four to five years than all UC STEM graduates (nearly 70 percent). Display 11 shows the number of 2010 *CalTeach* graduates across the nine UC undergraduate campuses.

Display 10. Academic Benchmarks for 2009-10 *CalTeach* STEM and UC STEM Graduates

	2009-10 *CalTeach* STEM Graduates		**2009-10 UC STEM Graduates**	
GPA at Graduation	3.18 (N=529)		3.14 (N=14,357)	
Time to Degree	N=362	%	N=9,836	%
4-5 yrs	277	76.5	6,865	69.8
5-6 yrs	80	22.1	2,515	25.6
6-7 yrs	5	1.4	347	3.5
7-8 yrs	0	0.0	109	1.1

Source: Program data from *CalTeach* Information System; UCOP Corporate Student System
Note: Time to Degree is calculated for those who completed their STEM degrees, and is also calculated for those who entered UC as freshmen in the fall term. Transfer students and students who completed their non-STEM degrees at UC are excluded from this analysis.

Display 11. 2009-10 *CalTeach* Graduates by Campus

	N	**%**
Berkeley	59	7.5
Davis	150	19.1
Irvine	58	7.4
Los Angeles	149	18.9
Merced	46	5.8
Riverside	37	4.7
San Diego	121	15.4
Santa Barbara	101	12.8
Santa Cruz	66	8.4
Total	787	100.0

Source: Program data from *CalTeach* Information System

Of these 787 *CalTeach* graduates in 2010, 535 (67.9 percent) graduated with STEM degrees. Of the 535 STEM graduates, 153 (28.6 percent) took three or more *CalTeach* courses (Display 12).

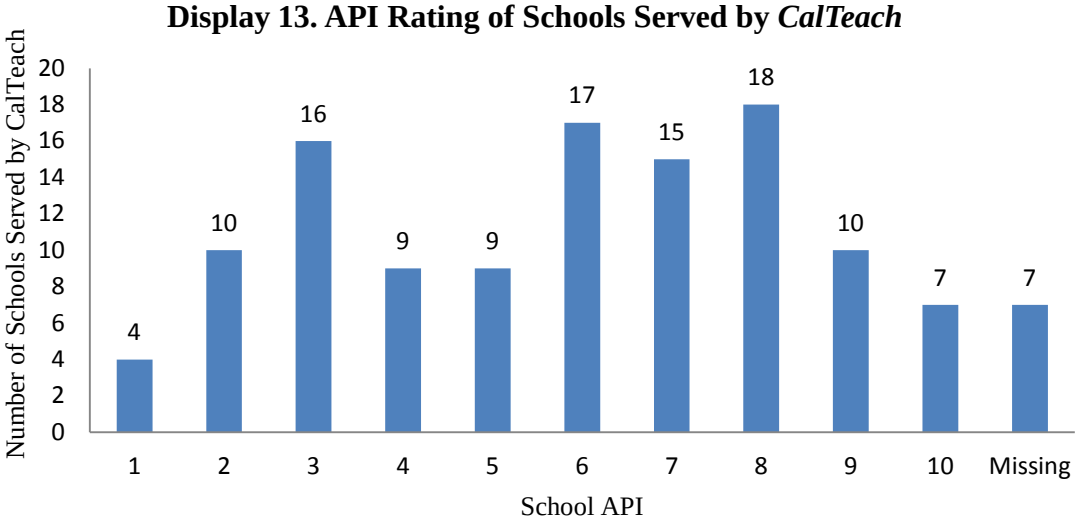
Display 12. Number of *CalTeach* Courses Taken by 2009-10 *CalTeach* STEM Graduates

Number of *CalTeach* Courses Taken	N	%
1	246	46.0
2	136	25.4
3 or more	153	28.6
Missing	3	0.6
Total	535	100.0

Source: Program data from *CalTeach* Information System

The 787 *CalTeach* students who graduated in 2010 completed their field placements in 112 schools. In these 112 schools, 48 (nearly 43 percent) had API ratings of 1-5 (Display 13), 63 percent of the enrolled students were under-represented minorities, and 58 percent were eligible for free or reduced price lunches.

Display 13. API Rating of Schools Served by *CalTeach*



Source: Program data from *CalTeach* Information System, California Department of Education DataQuest, 2009-10

Given the rising costs of both undergraduate and graduate education, not to mention the uncertainty of finding secure employment in public schools during California's ongoing budget woes, it is also possible that *CalTeach* graduates do not begin graduate training in teacher preparation programs directly after completing their baccalaureate degrees. As a result, a review was conducted of the cumulative 1,839 UC students who completed their undergraduate degrees at UC campuses

between 2005-06 and 2009-10 *and* took at least one *CalTeach* course: 408 of them (nearly 22 percent) have earned a total of 586 math and science credentials, including district intern credentials and supplementary authorizations, from the State of California (Display 14).

Display 14. *CalTeach* Students with Mathematics & Science Credentials by Subject, 2006-07 to 2011-12[9]

Credentials Issued By Year							
Subject	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**Total**
Regular Mathematics	3	43	87	84	77	18	**312**
Foundational mathematics	0	1	6	12	21	4	**44**
Mathematics Sub-total	3	44	93	96	98	22	**356**
Science: Biology	0	13	31	36	53	4	**137**
Science: Chemistry	0	1	7	17	23	5	**53**
Science: Geosciences	0	0	0	0	5	2	**7**
Science: Physics	0	0	6	5	5	2	**18**
Foundational Science	0	0	0	1	2	1	**4**
Science Sub-total	0	14	44	59	88	14	**219**
Math & Science Sub-total	3	58	137	155	186	36	**575**
Supplemental Authorizations[10]	0	2	2	3	4	0	**11**
Math & Science Total	**3**	**60**	**139**	**158**	**190**	**36**	**586**

Source: California Commission on Teacher Credentialing.
Note: This table presents California Commission on Teacher Credentialing data from 2006-07 through 2010-11 for mathematics and science credentials recommended by California Institutions of Higher Education (UC, CSU, and private/independent universities). District intern credentials are included in these figures since they meet federal No Child Left Behind (NCLB) requirements.

[9] The data for 2011-2012 are partial year data; they were matched in August 2011.
[10] Supplemental authorizations included animal science, plant science, and introductory science.

Another 186 (10 percent) former *CalTeach* students were enrolled in post-baccalaureate teacher preparation programs at CSU and UC campuses in Spring 2011. Of those 186 former *CalTeach* students, 72 (nearly 39 percent) were enrolled at CSU teacher education programs and 114 (61 percent) were enrolled at UC teacher education programs (Display 15).

Display 15. Enrollment of *CalTeach* Graduates in Teacher Education Programs in Spring 2011

	CSU Teacher Education Programs		UC Teacher Education Programs		Total	
Single Subject Credential	**N**	**%**	**N**	**%**	**N**	**%**
Math	30	34.9	56	65.1	86	100.0
Science	30	40.0	45	60.0	75	100.0
Other	3	50.0	3	50.0	6	100.0
Multiple Subject Credential	9	47.4	10	52.6	19	100.0
Total	**72**	**38.7**	**114**	**61.3**	**186**	**100.0**

Source: California State University, University of California.
Note: Percentages may not total 100% due to rounding.

Finally, despite the ongoing difficulties of finding and keeping teaching jobs in California, a review was conducted of those former *CalTeach* students who are presently employed at public schools. Using the Beginning Teacher Support and Assessment (BTSA) database, of the 408 former *CalTeach* students who have already earned teaching credentials, we found 177 (43 percent) employed in 162 California public schools.[11] On average, in these 162 schools, 68 percent of the students were underrepresented minorities and 61 percent were eligible for free or reduced price lunches. However, it is important to note that the BTSA database is limited to those new teachers who chose to participate in BTSA programs and who are teaching in California public schools. It excludes teachers who did not participate in the program, teachers who trained in California, but teach in public schools out of state, and those who teach in private schools in California.

V: EXPENDITURES AND FUNDING SOURCES

CalTeach receives funding from four sources:

- **State**: The state provides $1.125 million annually ($125,000 is allocated to each of the nine general campuses).
- **University**: UC matches the total state appropriation, with each campus receiving an additional $125,000.
- **Extramural (corporate, private, intersegmental)**: Since the program's inception, UC's Office of the President and the campuses have raised $18 million from a variety of corporate foundation and other private industry sources.
- **Federal:** Since program inception, SMI/*CalTeach* has received $44.75 million in National Science Foundation (NSF) and other federal grants to support the program.

[11] "Beginning Teacher Support and Assessment" (BTSA) is a two-year, state-funded induction program, cosponsored by the California Department of Education (CDE) and the Commission on Teacher Credentialing (CTC). The program is designed to support the professional development of newly credentialed teachers and it fulfills CTC requirements for "California Clear Multiple and Single Subjects credentials." The BTSA database includes only those beginning teachers who are teaching in public schools.

While baseline funding provided by the state has been essential for establishing programs, it is not sufficient to meet real program costs (Display 16), which, in addition to standard instructional costs, include special costs associated with the placement and supervision of university students in K-12 classrooms (e.g., tuberculosis tests and security clearances for all university students who enter K-12 schools, stipends for qualified mathematics and science mentor teachers, school placement coordination with districts, and field supervision of university students by university personnel).

Display16: *CalTeach* Program Expenditures, 2010-11

CATEGORY	COST
(1) Supervision and coordination of field placements, administrative support	$2,900,000
(2) Financial incentives for *Cal Teach* students	760,000
(3) Instruction	1,840,000
(4) Stipends for teachers	230,000
(5) Instructional support costs	391,000
TOTAL	**$6,121,000**

In the past year, total program expenditures have declined from $7.2 million to $6.1 million, a reduction of nearly 16 percent. Core program expenditures have outstripped State and University funds, so program administrators have pursued extramural funds. However, after meeting basic administrative and instructional costs, declines in systemwide gifts/grants to the program in 2010-11 reduced the sums available for financial incentives for students and stipends for master teachers. Student incentives declined from $1.8 million to $760,000 (a reduction of 58 percent), while stipends for teachers declined from $531,000 to $230,000 (a reduction of 57 percent).

APPENDIX: Campus Program Information

UC Berkeley. UC Berkeley's *CalTeach* program participants work concurrently on learning scientific, mathematics, or engineering content, pedagogy, and gaining real world experience in local classrooms. Faculty from the College of Letters and Science, College of Chemistry, College of Engineering, the College of Natural Resources, and the Graduate School of Education work together to design curricula and improve instruction of future K-12 mathematics and science teachers.

In May 2010, UC Berkeley was approved by the California Commission on Teacher Credentialing for an experimental credential program that would allow science, mathematics, and engineering majors to complete their secondary mathematics or science teaching credentials as undergraduates by completing an eight-course sequence, rather than the typical four-course sequence provided to undergraduates. This experimental credential program is unique because it accelerates the rate at which students can complete both their subject matter preparation (through their undergraduate degrees in science, mathematics, or engineering) and their pedagogical training. The sooner these young teachers complete their training, the sooner they can enter K-12 classrooms.

UC Davis. *CalTeach* at UC Davis is embedded in the Mathematics and Science Teaching (MAST) program. MAST is the only comprehensive program of instruction and advising on campus that helps students explore their interest in teaching and prepare to enter the fifth-year teaching credential programs. A key component of Davis' program is the Natural Science major, a unique program in the UC system designed to provide the breadth and depth of science education recommended for science teachers, who commonly teach in more than one discipline. Students are required to have an introductory year of coursework in chemistry, earth science, life science, mathematics, and physics. Advanced work in two natural sciences provides the subject matter preparation to teach in two disciplines.

UC Irvine. UC Irvine's *CalTeach* program is modeled on the UTeach program at the University of Texas, Austin. The UCI School of Physical Sciences and the School of Biological Sciences offer degree programs that make it possible for undergraduates to earn a math or science bachelor's degree and a California single-subject math or science teaching credential, all in four undergraduate years. With this accelerated program, talented STEM majors are qualified for teaching jobs in middle schools and high schools as soon as they graduate. As a starting point, the UCI *CalTeach* curriculum includes three introductory seminars on teaching mathematics and science and fieldwork similar to that provided at other UC *CalTeach* campuses. Candidates for the teaching credential complete ten additional courses and extensive supervised clinical experience in classrooms. All courses address mathematics and science teaching and learning, emphasize inquiry-based approaches, and emphasize the instructional needs of all learners, including California's culturally and linguistically diverse student populations.

UC Los Angeles. UCLA's *CalTeach* program actively recruits students from all academic years. Students often begin their seminars and internships during their first year and progress through the program over the duration of their undergraduate career. Quarterly workshops and professional development opportunities keep students in the teaching pipeline. An innovative summer internship provides incoming transfer and continuing *CalTeach* students exposure to urban teaching. Moreover, partnerships with schools and districts create opportunities for students to experience teaching in various contexts through their field placements. *CalTeach* students are encouraged to enter our senior undergraduate credential programs to expedite the time to credential so that they can enter classrooms as credentialed teachers the September following their undergraduate graduation.

UC Merced. *CalTeach* is UC Merced's first and only teacher preparation program. The program is designed to encourage students majoring in natural and cognitive sciences, mathematics, or engineering to consider becoming K-12 mathematics and science teachers. The program consists of coursework, a minor degree program, and additional support and experiences that allow students to explore their interest in science and mathematics education, as well as improve their own understanding and ability to communicate scientific and mathematical concepts.

UC Riverside. At UC Riverside, the *CalTeach* program provides students with a personalized program and pathway for entering a teaching credential program. Quarterly advising, content enriching experiences through summer academies, conferences, symposiums, rich field experiences that include classroom and after-school activities, and professional networking opportunities give participants a well-rounded view of the teaching profession. Partners include the Academy of Learning through Partnerships for Higher Achievement [ALPHA] Center, numerous academic departments in the College of Natural and Agricultural Sciences, the College of Engineering, the Graduate School of Education, the University Education Extension Program, and local K-12 districts.

UC San Diego. UC San Diego's *CalTeach* team introduced nine new courses to create minors in mathematics education and science education that undergraduates can take in conjunction with their STEM majors. The minors are co-taught by mathematics and science faculty and education studies faculty, and integrate content and pedagogy in courses and field experiences to prepare future teachers for careers in schools that serve diverse students from populations traditionally underrepresented in the STEM fields. The undergraduate portion of *CalTeach* reduces the length of UC San Diego's Master's and Teaching Credential program, and makes it possible for credential students to have paid teaching positions in local schools while they complete their credential-related work. With Robert Noyce funds from the National Science Foundation, UC San Diego has initiated a Master Teacher Fellowship program that will enhance local teachers' knowledge of science and mathematics content and pedagogy, and help build a community of teachers who can be excellent mentors to our *CalTeach* students.

UC Santa Barbara. UC Santa Barbara's *CalTeach/Science and Mathematics Initiative* encourages STEM undergraduates to become exemplary secondary science and mathematics teachers. The program includes both introductory courses in science and mathematics teaching and an interdisciplinary Minor in Science and Mathematics Education. Students pursuing this minor select from a menu of courses in education, mathematics, chemistry, biology, physics, geography, and environmental science. The minor also includes experience in local elementary and secondary schools: Under the mentorship of master teachers, undergraduates observe, help design, and participate in the teaching of science or mathematics to K-12 students. From their participation in UCSB's *CalTeach*, undergraduates gain a deep understanding of science and mathematics content, students and student learning, inquiry-oriented and problem-solving teaching strategies, and the structure and purposes of schools. With this knowledge and experience, they can apply to the UCSB Teacher Education Program. Several funding sources are available to support their completion of this 13-month program.

UC Santa Cruz. UC Santa Cruz's *CalTeach* program provides advising and training at the undergraduate level for future classroom teachers with a sequence of four *CalTeach* internships and seminars that can be freestanding or taken as part of an Education minor or a major in Mathematics, Physics, Biology, or Earth and Planetary Sciences. The program partners with academic departments across campus to increase financial and academic support for future math and science teachers, including administering scholarships for graduates entering UC Santa Cruz's M.A./credential program.

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