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February 10, 2011

The Honorable Bob Blumenfield
Vice Chair, Joint Legislative Budget Committee
1020 N Street, Room 553
Sacramento, California 95814

Dear Assembly Member Blumenfield:

Pursuant to Item 6440-001-0001, Provision 8, of the 2010 Budget Act, enclosed is the University of California's annual report to the Legislature on *Science and Math Teacher Initiative (CalTeach).*

If you have any questions regarding this report, Associate Vice President Debora Obley would be pleased to speak with you. She can be reached by telephone at (510) 987-9112, or by e-mail at Debora.Obley@ucop.edu.

With best wishes, I am,

Sincerely yours,

Mark G. Yudof
President

Enclosure

cc: Mr. Gregory Schmidt, Secretary of the Senate
Ms. Jody Martin, Joint Legislative Budget Committee
Ms. Tina McGree, Legislative Analyst's Office
Ms. Amy Leach, Office of the Chief Clerk of the Assembly
Ms. Diane Anderson, Legislative Counsel Bureau
Provost and Executive Vice President Lawrence Pitts
Executive Vice President Nathan Brostrom
Vice President Patrick Lenz
Associate Vice President and Director Steve Juarez
Associate Vice President Debora Obley
Executive Director Jenny Kao

Report on Science and Math Teacher Initiative *(CalTeach)*

February 2011

Legislative Report

An investment in UC pays dividends far beyond what can be measured in dollars. An educated, high-achieving citizenry is priceless.

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Report on the Science and Math Teacher Initiative (*CalTeach*)
February 2011

The following report is forwarded in compliance with Item 6440-001-0001, provision 8 of the 2010 Budget Act, which states:

> "8. Of the funds appropriated in Schedule (1), $1,125,000 is provided to continue support for science and math resource centers to implement the Science and Math Teacher Initiative. 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

In May 2004, Governor Arnold Schwarzenegger entered into an agreement with the University to provide resources to address California's mathematics and science teacher shortage. Prior to the agreement with the Governor, UC teacher preparation efforts concentrated on training at the graduate level. Because of the urgency of the math/science teacher shortage, the University expanded its undergraduate math/science teacher pipeline. The University of California's Science and Math Teacher Initiative (SMI/*CalTeach*) is intended to help address California's serious deficit of well-qualified K-12 mathematics and science teachers by improving California's undergraduate pipeline to mathematics and science teaching credentials. All general campuses have committed to growing undergraduate teacher education activities in science and math, thereby ensuring statewide access to the program. The University of California offered its first *CalTeach* courses in Academic Year 2005-2006.

Through *CalTeach*, the University of California is recruiting and preparing mathematics and science majors for future teaching careers by providing special coursework and field experiences in K-12 schools. Comprised of nine campus programs and 28 community college partnerships, *CalTeach* provides a sequence of courses and field experiences to introduce students to teaching while they complete their undergraduate degrees. Specialized classes, specialized research opportunities, and direct work in K-12 classrooms complement disciplinary studies to ready each program participant to pursue a teaching credential after receiving his or her bachelor's degree. The University has developed new minors and concentrations – 60 to date 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 deep subject matter content knowledge and strong pedagogical skills.

II. MATHEMATICS AND SCIENCE TEACHER CREDENTIALS

Although UC has not traditionally been a significant contributor to the overall teacher supply, it does educate a significant proportion of individuals earning mathematics and science credentials. Moreover, as the tables below indicate, UC's production of mathematics and science credential earners has remained relatively constant despite the significant changes the teaching profession has undergone as a result of California's economic environment.

According to the most recent California Commission on Teacher Credentialing (CCTC) report, "Teacher Supply in California: A Report to the Legislature: Annual Report 2008-09," UC prepared five percent of all credentialed

teachers from 2004-05 to 2008-09, but prepared 35 percent of all mathematics and science credentialed teachers during this time period.

Display 1: All Credentialed Teachers by Segment of California Higher Education, 2004-05 to 2008-09

All Credentials	2004-05		2005-06		2006-07		2007-08		2008-09	
CSU	13,584	56%	12,033	54%	10,840	53%	10,148	53%	9,418	53%
UC	1,177	5	1,099	5	1,005	5	949	5	930	5
Private/Independent	9,388	39	9,287	41	8,463	42	7,987	42	7,449	42
TOTAL	24,149		22,419		20,308		19,084		17,797	

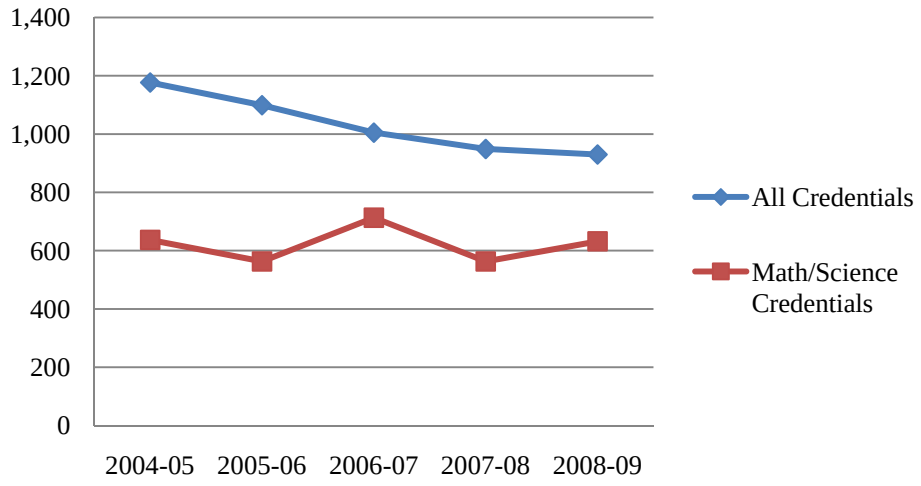
Source: California Commission on Teacher Credentialing; 2008-2009 is the most recent year for which data are available.
Percentages may not total 100% due to rounding error.

Display 2: Math and Science Credentialed Teachers by Segment of California Higher Education, 2004-05 to 2008-09

Math and Science Credentials	2004-05		2005-06		2006-07		2007-08		2008-09	
CSU	844	47%	783	49%	866	46%	848	49%	943	50%
UC	637	35	563	36	713	38	563	33	632	34
Private/Independent	314	17	237	15	308	16	303	18	309	16
TOTAL	1,795		1,583		1,887		1,714		1,884	

Source: California Commission on Teacher Credentialing; 2008-2009 is the most recent year for which data are available
Percentages may not total 100% due to rounding error.

Display 3. Credentialed Teachers Prepared By UC



Source: California Commission on Teacher Credentialing; 2008-2009 is the most recent year for which data are available

Display 4: Mathematics and Science Credentials by Campuses, 2008-09

	Mathematics		Science	
Berkeley	41	11%	22	9%
Davis	45	12	42	17
Irvine	54	14	32	13
Los Angeles	70	18	37	15
Riverside	55	15	24	9
San Diego	63	17	37	15
Santa Barbara	34	9	35	14
Santa Cruz	17	4	24	9
Total	379		253	

Source: California Commission on Teacher Credentialing; 2008-2009 is the most recent year for which data are available.
Percentages may not total 100% due to rounding error.

III. BEST PRACTICES

All nine general University of California campuses have *CalTeach* programs. Campus programs share key features but also differ somewhat 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)	Science, mathematics, and education faculty work together to design curricula and innovative instructional strategies to help students acquire deep mathematical and scientific knowledge, research techniques, and pedagogical skills.

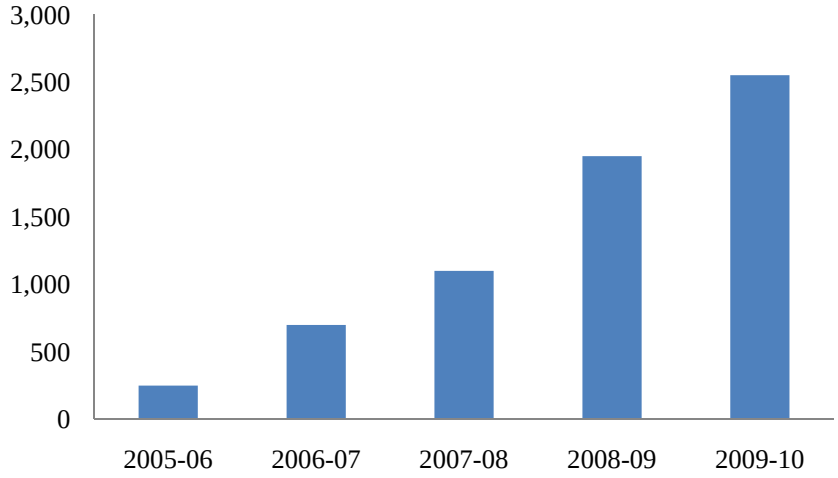
Mentor K-12 Teachers	Mentor teachers oversee student field experiences in K-12 mathematics and science classrooms. The mentors model important lessons in everything from classroom management to delivery of instruction for students of different backgrounds and circumstances.
Data Collection	The University 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.

IV. PROGRAM DEMOGRAPHICS

Enrollment

Display 5 shows the total number of *CalTeach* courses in which students have enrolled to date. The steady increase suggests that mathematics and science majors are increasingly interested in exploring the possibility of teaching careers.

Display 5: Number of *CalTeach* Courses Taken, By Year



One of the distinguishing features of *CalTeach* is the extensive early fieldwork where participants are paired with mentor teachers and spend 30 hours per term in K-12 classrooms. As part of these field placements, UC students observe, assist, and teach under the guidance of their mentors. In 2009-10, 980 unduplicated students were enrolled in *CalTeach* courses that included field placements. Over the life of the program (2005-2010), more than 4,000 (duplicated) *CalTeach* students have been placed in 420 schools under the supervision of 1,000 mentor teachers.

CalTeach Enrollee Characteristics

While California K-12 students have grown much more diverse, the teacher population remains close to the national average, at approximately 70 percent White (Ed-Data, 2008). However, minority students account for 72 percent of *CalTeach* enrollees. Likewise, though women are traditionally under-represented in science, technology, engineering and mathematics (STEM) majors, more female students have participated in *CalTeach* than male students.

Display 6: *CalTeach* Enrollee Characteristics: Total Enrollees to Date (2005-2010)

	***CalTeach* Enrollees**		**UC STEM Majors**
	N	**%**	**%**
Gender			
Female	2,084	50%	43%
Male	1,291	31	57
Unknown	776	19	0
Ethnicity			
Asian	1,382	33	47
White	1,015	24	28
Hispanic	654	16	13
Other	231	6	10
African-American	97	2	2
Unknown	772	19	
Major			
Biological Sciences	1,224	29	
Mathematics/Statistics	737	17	
Engineering	176	4	
Computer Science	23	1	
Physical Science	62	1	
Undeclared	317	7	
Other	957	23	
Unknown	655	18	
TOTAL	4,151		

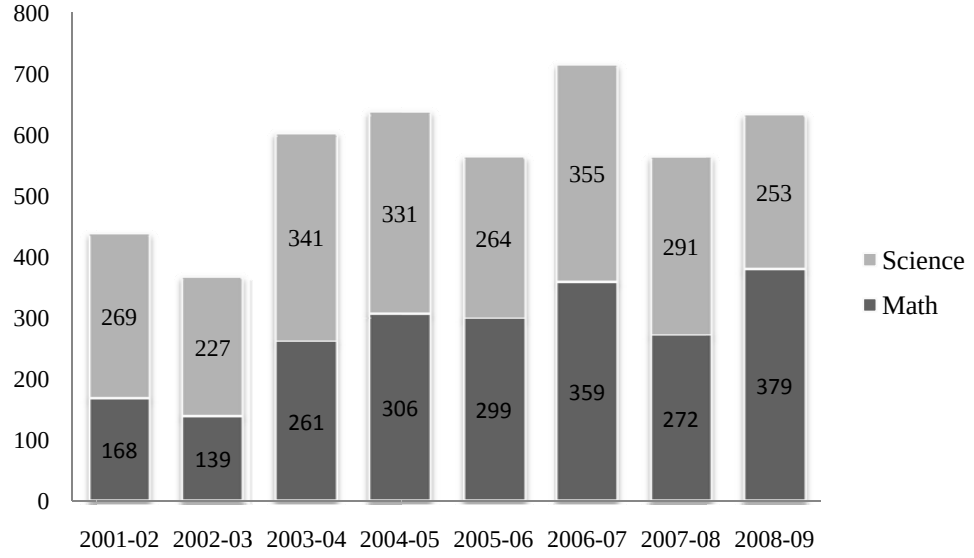
Source: California Postsecondary Education Commission.

V. PROGRAM EFFECTIVENESS

Between Spring 2007 and Spring 2010, 1,802 unduplicated students who graduated took at least one *CalTeach* course. Since the first full cohort of *CalTeach* participants completed undergraduate degrees in Spring 2010, it is still too soon to evaluate the impact of the *CalTeach* programs based on the number of graduates entering a teaching credential program. Thus, it is not yet clear whether these programs increase the number of K-12 mathematics and science teachers. The number of *CalTeach* students from our first cohort who entered teaching credential programs after successfully completing their undergraduate degrees will be available in 2011.

Display 7 indicates that the number of UC teacher education graduates awarded mathematics and science teaching credentials by the California Commission on Teacher Credentialing (CCTC) has fluctuated from year to year.

Display 7: Math and Science Credentialed Teachers Prepared by UC, By Year



Source: California Commission on Teacher Credentialing.

Enrollments in credential programs reflect job market trends in teaching; from 2007-08 to 2008-09, California's overall teacher workforce declined one percent, from 310,000 to 307,000. Since 2003-04, the number of enrollees in teacher preparation programs in California has dropped 34 percent, from approximately 68,000 to approximately 45,000, and the number of new teaching credentials issued by the state is down 37 percent, from nearly 27,000 to nearly 17,000 (Center for the Future of Teaching and Learning, 2010). Similarly, UC is seeing a decline in math and science credential graduates from 2006-07. Whether this represents a downward trend due to labor market conditions for teachers is unclear at this point.

VI. 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 million in National Science Foundation (NSF) and other federal grants to support the program.

While baseline funding provided by the state has been essential for establishing programs, it is not sufficient to meet real program costs, 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).

Display 8: *CalTeach* Program Costs, 2009-10

CATEGORY	COST
(1) Supervision and coordination of field placements, administrative support	$2,900,000
(2) Financial incentives for *Cal Teach* students	1,824,000
(3) Instruction	1,595,000
(4) Stipends for teachers	531,000
(5) Instructional support costs	391,000
TOTAL	7,241,000

Stipends for both students and mentor teachers are generally paid from extramural funds raised systemwide. At this point, as a result of the popularity of the program, campuses have expended nearly all of the funds set aside for these payments. In recent years, steady enrollment growth has increased the demand for student stipends. Absent any change in the program's structure, demand for student stipends in 2010-11 may outstrip the funds available, especially given the current economic environment.

APPENDIX 1. 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 of 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 combines coursework and student teaching that replicates the curriculum of the UTeach program at the University of Texas, Austin. It includes two introductory seminars on teaching mathematics and science and fieldwork similar to that provided at other UC *CalTeach* campuses. All courses address mathematics and science teaching and learning, emphasize inquiry-based learning, 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, and first- and second-year students are strongly encouraged to participate. 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. Moreover, partnerships with schools and districts create opportunities for students to experience teaching in various contexts through their field placements.

UC Riverside. At UC Riverside, the *CalTeach* program enables students to go into a teaching credential program and to deepen their subject knowledge through field experience. Partners include the Graduate School of Education, the Academy of Learning through Partnerships for Higher Achievement Center, numerous academic departments in the College of Natural and Agricultural Sciences, the College of Engineering, the University Education Extension Program, and local K-12 communities.

UC San Diego. Through *CalTeach*, UC San Diego's new mathematics and science education minors integrate mathematics and science content in their STEM majors with education courses and field work. New minors have been developed, and mathematics and science faculty co-teach with education studies faculty.

UC Santa Barbara. The *CalTeach* program introduces undergraduates to teaching and learning science or mathematics through inquiry-oriented and problem-solving activities in their courses. Students are thus equipped to apply such approaches when they teach in K-12 classrooms.

UC Santa Cruz. UC Santa Cruz's *CalTeach* program provides advising and training at the undergraduate level for future classroom teachers. The program provides a sequence of four *CalTeach* internships and seminars that can be freestanding or taken as part of an Education minor or major in Mathematics, Physics, Biology, and Earth and Planetary Sciences.

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