The Honorable Denise Moreno Ducheny
Chair, Joint Legislative Budget Committee
State Capitol, Room 5035
Sacramento, California 95814

Dear Senator Ducheny:

Pursuant to Item 6440-001-0001, Provision 9, of the 2009 Budget Act, enclosed is the University of California’s annual Report on the 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: The Honorable Gloria Romero, Chair
Senate Budget and Fiscal Review Subcommittee #1
  (Attn: Ms. Seija Virtanen)
  (Attn: Ms. Cheryl Black)
The Honorable Wilmer Amina Carter, Chair
Assembly Budget Subcommittee #2
  (Attn: Sara Bachez)
  (Attn: Amy Rutschow)
Ms. Ana J. Matosantos, Director of Finance
Mr. E. Dotson Wilson, Chief Clerk of the Assembly
Mr. Gregory Schmidt, Secretary of the Senate
Ms. Diane Boyer-Vine, Legislative Counsel
Ms. Sara Swan, Department of Finance
Joint Legislative Budget Committee (18)
Interim Provost and Executive Vice President Lawrence Pitts
Executive Vice President Nathan Brostrom
Senior Vice President Daniel Dooley
Vice President Patrick Lenz
Associate Vice President and Director Steve Juarez
Associate Vice President Debora Obley
Executive Director Jenny Kao
Report on the Science and Math Teacher Initiative
(\textit{CalTeach})
February 2010
Legislative Report

\textbf{UC} is not just an institution of higher learning. Here, research aims higher. Service reaches higher.

\textbf{A higher level of excellence calls for a higher commitment.}
The following report is forwarded in compliance with Item 6440-001-0001, provision 9 of the 2009 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.

Executive Summary

The University of California Science and Math Teacher Initiative (SMI/CalTeach) helps to address California’s serious deficit in supply of well-qualified K-12 mathematics and science teachers by improving California’s undergraduate pipeline to mathematics and science teaching credentials.

State teacher workforce data analyzed by the California Council on Science and Technology (CCST) and the Center for the Future of Teaching and Learning (CFTL) indicate that more than 10 percent of all math and science teachers in California are underprepared. Given impending teacher retirements and growth of the K-12 population, one-third of students in the next five years will find themselves in classrooms without a qualified math or science teacher.

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. The University has developed new minors and concentrations – 60 to date across the UC system – that focus specifically on math and science teaching. This focus complements students’ work in their major to ensure both deep subject matter content knowledge and strong pedagogical skills and prepares them for teaching while they simultaneously complete their undergraduate degrees.

CalTeach has not yet graduated its first cohort, so credential attainment and job placement data are unavailable. This report for 2008-09 provides comprehensive information about CalTeach as a whole, including the need for CalTeach, program best practices, program outcomes to date, budget and expenditures, progress made to enhance the program, and challenges confronting the program.

Some highlights from this report:
CalTeach program components — best practices — ensure that students throughout the UC system, regardless of the UC they attend, have access to the same high-quality, intensive CalTeach experience. Each UC campus CalTeach program provides and participates in the following: recruitment and advising; coherent curriculum (four-level sequence); field experiences in K-12 classrooms; research experiences; professional conferences, community building and other activities to create continuity; faculty collaboration among science, math, and education departments; participation by K-12 mentor teachers; ongoing systemwide data collection, research and evaluation; partnerships with K-12, community colleges and CSU; and financial incentives for students and stipends for mentor teachers. A description of CalTeach best practices is included in Section II of this report.

Enhanced community college connections have helped CalTeach to diversify and grow. California Community College transfer students will be a critical part of reaching the goal of 1,000 new math and science teachers per year. Built on efforts inaugurated at the Foothill-De Anza Community College District, CalTeach-Community College Connections has grown to include 28 community colleges, industry partners, and a number of county offices of education, school districts and community–based organizations. Four community colleges are new in 2009, and three community college districts are part of the partnership. In addition, new courses at community colleges enable potential transfer students to experience lower-division courses that parallel those offered by the University of California. A list of participating community colleges and districts is included in Section III of this report.

CalTeach is having an immediate impact on K-12 classrooms. To date, CalTeach students have worked with 521 mentor teachers in 419 schools, working in California K-12 classrooms a total of 33,976 times. In the 2008-09 CalTeach Mentor Teacher Survey, 92 percent of the respondents agreed or strongly agreed that their CalTeach student was beneficial to them as a teacher. In addition, 96 percent of them agreed or strongly agreed that their CalTeach student was beneficial to their students. More than 90 percent of the mentor teachers surveyed indicated that they would mentor another CalTeach student.

Emerging findings suggest that future credential candidates will have stronger math/science academic records. Although longitudinal data are not yet available for CalTeach, early indicators point to CalTeach success in recruiting students with strong academic records. The interest of stronger students in the program — and recruitment strategies that target such students — suggests that those who might not otherwise consider a career in teaching are in fact doing just that. For instance, at UC Riverside in fall 2007, the CalTeach cohort of 87 prospective math or science students had a 3.12 average GPA, compared to 2.91 among declared STEM majors. Over time, additional data of this type will reveal whether providing a coherent, intellectually challenging program to recruit and prepare math and science teachers will continue to attract a new pool of students who excel academically. Information on program data and outcomes is included in Section VI of this report.

Ongoing research is robust. UC faculty continue to address the critical issue of recruitment, preparation and retention of high quality science and mathematics teachers through research. Among the questions currently being explored by UC faculty researchers:

- What characteristics and experiences of prospective teachers (e.g., gender, ethnic background, academic performance), professional conditions (e.g., salaries; preparation requirements, and costs), and institutional approaches (i.e., recruitment strategies) affect: a) the recruitment and b) the retention of qualified science and mathematics teachers?
- How do California pre-service teacher education and professional development programs prepare teachers to teach math and science in culturally and linguistically diverse classrooms?
• What is the impact of teacher education on: a) teachers’ knowledge, beliefs and practice for teaching math and science to diverse student populations and b) the achievement of the students they serve?

• What disciplinary and interdisciplinary knowledge do math and science teachers need to be effective teachers?

• What knowledge have prospective teachers developed about students’ conceptions of mathematics and science?

Challenges and Future Plans
Despite its successes, the SMI/CalTeach program confronts a number of challenges as it continues to develop. Challenges include diminishing State and University resources available to support program development, provide stipends for mentor teachers, and provide financial incentives for students that encourage their participation and support their retention in the program. Program development challenges include design and implementation of robust information systems and accountability mechanisms that will enable UC to monitor teaching credential attainment across a number of teacher preparation domains, including online credential programs.

Plans for a new sustainability model are now underway to address these challenges. The Office of the President has embarked upon an extensive review of programs, including CalTeach, with the aim of strengthening them, institutionalizing cross- program collaboration and operational efficiency, and deepening the University’s engagement in public education through them. An external review of CalTeach will examine the program’s size and scale; examine its funding model and funding opportunities, including the capacity of the University to sustain nine equally high-quality campus programs; review its existing governance, and clarify opportunities for the University to strengthen its teacher credential pathways through the CalTeach program. Additional information about future directions for CalTeach is included in Section VI of this report.

CalTeach has evolved successfully through the formative stages of program development, initial implementation and early enrollment growth. The result — strong program design guided by ongoing research, combined with partnerships among the research, education, and business communities — has lead to extraordinary public service. Using current data as well as enrollment projections for community college and “native” CalTeach students, in 2010-11 UC will be close to meeting its goal to increase to 1,000 the annual number of UC graduates who become math or science teachers. Although UC will not award all of these credentials, the University is closer than ever before to having more students who earn baccalaureate degrees in math and science from UC also earning teaching credentials.

I. The Need for CalTeach

California’s Challenge in the Math and Science Teacher Workforce
The California Council on Science and Technology (CCST) and the Center for the Future of Teaching and Learning (CFTL) joined many other state, federal, and private sector experts to draw attention to California’s alarming lack of well-qualified K-12 teachers in science and mathematics. CCST and CFTL analyzed data on the state’s teacher workforce and found that greater than ten percent of all math and science teachers in California are underprepared; that is, they lack the training and experience necessary for a teaching credential in their subject area.1 In addition,  

1 California Council on Science and Technology and The Center for the Future of Teaching and Learning (March 2007). Critical path analysis of California’s science and math teacher preparation system.
more than one-third are novice teachers in their first or second year. Attrition and retirement are further eroding the base of the science and math teaching force. Without prompt action, the State will experience as much as a 30 percent shortfall in qualified math and science teachers within the next five years. One of every three students will find themselves in classrooms without a qualified math/science teacher.

For California to remain competitive, especially in the industries that drive our state’s economic growth, its educational institutions — from K-12 schools through graduate programs — need to work together. They must collectively develop a workforce with the knowledge and skills required by an economy becoming increasingly reliant on science, engineering and mathematics. Highly qualified teachers are a linchpin in this process.

The Strategic Essentials to Meet this Need
In order to raise the number of well-qualified teachers, California must

1) Recruit a much larger number of talented, creative students to see teaching as an attractive field,
2) Expand the capacity of the State’s teacher preparation programs to accommodate these students, and
3) Strengthen the quality of teacher preparation programs to assure deep subject matter content knowledge and strong pedagogical skills.

These three elements make up the essential priorities identified by the CCST, the CFTL, and other authorities for building a larger and more expert math and science teacher corps for California’s schools.

II. The University of California CalTeach Program

A. Background
In May 2004, Governor Arnold Schwarzenegger entered into an agreement with the University to provide resources to address the math/science teacher shortage. UC committed itself to the three strategic goals noted above and to helping the state meet workforce needs for math and science teachers.

Traditionally, UC has not been considered a significant contributor to the overall teacher supply. The annual CCTC report “Teacher Supply in California: A Report to the Legislature: Annual Report 2006-07” provides the following data:


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Source: California Commission on Teacher Credentialing (CTC), CTC Teacher Supply Annual Reports 2005-06 to 2007-08.

The table below illustrates the University’s contribution to the pool of math and science teachers for the State. Specifically, UC educates a major proportion of individuals earning math credentials.
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 broadened its efforts and targeted expansion of the math/science teacher pipeline with a program focused on undergraduates. All general campuses undertook a major commitment to grow and develop teacher education activities in these fields at the undergraduate level. CalTeach is about increasing the quality and quantity of math/science teachers graduating from UC. The appropriate metric is the number of students graduating from the four year CalTeach program who earn credentials. The first cohort of CalTeach will graduate in spring 2010; data from the California Commission on Teacher Credentialing on credentialed teachers from this cohort will not be available until April 2011. Therefore, the baseline for this report is zero. If a third of the 2010 CalTeach cohort earns credentials, UC will have contributed 1,000 undergraduates to the science and math teaching profession, consistent with the goals of the program.

This commitment began in 2005 as the UC Science and Mathematics Initiative (SMI). The aim of the Initiative was to increase the quantity and enhance the quality of science and math teachers for the state. Perhaps more importantly, it also promised to establish a template for the redesign of teacher education programs. A critical feature of this new model is the close collaboration between math/science faculty, who possess the disciplinary expertise, and education faculty, who are experts in pedagogy and who typically have worked with great independence in structuring teacher preparation programs.

### B. CalTeach Program Design

CalTeach prepares and supports students majoring in science, technology, engineering or mathematics (STEM) disciplines who are interested in becoming K-12 math and science teachers. Comprised of nine UC campus programs and 28 community college partnerships, CalTeach provides a sequence of courses and field experiences to introduce students to teaching while they simultaneously 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.

Every UC freshman receives information inviting encouraging participation in CalTeach. In this way, students strong in mathematics and sciences learn early in their undergraduate academic careers about the incentives and opportunities available to them to consider a career in teaching. The next stage is for these students to build on these

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2 According to Teaching and California’s Future: Key Issues and Trends 2008, an annual report on teacher trends prepared by the Center for the Future of Teaching and Learning, “California is producing fewer teachers and has been for the past several years. In 2007, the state issued 20,308 new teaching credentials; four years earlier, the number was 27,150. Enrollment in schools of teacher education is also down.”
early experiences and move into more advanced courses and experiences, progressing toward the ultimate third phase of transitioning to and completing a credential.

DISPLAY 3: CalTeach to Credential Flow Chart

UC offered the first CalTeach courses in winter 2006. The CalTeach seminars — CaT 1 through 4 — are a sequence of courses designed to introduce students to “everyday” teaching issues and problems, building from an initial introduction to teaching through a bridge to the credential program. The CaT courses link pedagogical theory and practice. As part of a research university setting, the program also enlists a variety of special resources such the national laboratories, the natural reserve system and the Lawrence Hall of Science.

C. CalTeach Best Practices

Notwithstanding the distinct character and history of each campus, CalTeach programs are bound by ten essential components common to all that represent best practice in undergraduate teacher preparation. These elements are described below.

1. Recruitment and Advising
   The first component of the program is an aggressive recruitment effort that identifies students with intent to major in math or science, and issues these students personalized invitations to consider teaching. Coupled with the recruitment effort is a strong advising program. Advisors ensure that students know the requirements for relevant undergraduate courses, majors and minors, and have accurate, useful information about becoming a teacher. They also advise students on grants, scholarships, and other forms of aid available to prospective teachers.

2. 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 — within the context of the respective disciplines — an early introduction to the daily, practical issues common to K-12 classrooms. The coursework spans the undergraduate years from freshman to senior.

3. Field Experiences
   Students are engaged in extensive field experiences where they are paired with mentor teachers in K-12 classrooms. They take on a variety of roles from observing to assisting with teaching. These experiences not only provide CalTeach participants direct contact with K-12 students, they also give participants a sense of responsibility and purpose. Students make significant contributions to the learning environments in classrooms where they are placed.
4. **Research Experiences**  
Participants develop scientific thinking and mathematical reasoning skills as well as other capabilities related to research. While assisting their mentor teachers, they learn how to apply these skills in their teaching practices and to encourage development of these skills in the K-12 students with whom they work.

5. **Continuity Components**  
Students gain early professional experiences through conferences, credential program recruitment fairs and various network-building activities. These elements promote community within the cadre of students preparing for careers in teaching and support students in continuing on the path to becoming K-12 teachers.

6. **Faculty Collaboration Among Science, Math and Education Departments**  
Science, mathematics, and education faculty share responsibility for CalTeach. The innovative interdisciplinary partnership between these departments helps assure that students acquire deep disciplinary knowledge in math and science, research techniques, and pedagogical skills. Program graduates will master curriculum that incorporates cutting edge research and innovation in science and math, and they will be ready to work to convey that perspective and experience to their students.

7. **Participation by Mentor K-12 Teachers**  
Mentor teachers oversee student field experiences in K-12 math and science classrooms. This special program feature creates mentors for prospective teachers who gain the perspective of experienced professionals. The mentors model important lessons in everything from classroom management to delivery of instruction for students of different backgrounds and circumstances. These field placements also provide immediate, expert feedback to students on their initial contact with elementary, middle school and high school pupils.

8. **Ongoing Systemwide Data Collection, Research and Evaluation**  
The University has built an online data system to record, document and manage all aspects of CalTeach. UC also developed a Quality Indicator System to provide benchmarks and regular reports on activities and progress toward goals.

9. **Community College Partnerships**  
Parallel programs established at various community colleges are an integral and critical part of the UC SMI/CalTeach. These programs provide the same lower division coursework and field placements to high-achieving CCC math and science students as are provided to their UC counterparts. Offering such opportunities enables transfer students to enter UC CalTeach programs as upper-division students with experiences and credits equivalent to those gained by UC students entering those programs as freshmen.

10. **Financial Incentives for Students and Stipends for Mentor Teachers**  
*CalTeach* students have the opportunity to earn financial incentives for meeting prescribed program benchmarks. These incentives are linked to K-12 field placements and serve to offset travel and other expenses students incur participating in these field experiences. In addition, mentor teachers receive stipends for participating in the program — $275 for each student they supervise.
III. UC and Community College Program Implementation

A. UC Campus Implementation
All University of California campuses except UCSF have CalTeach programs and are building toward increasing production of high quality math and science teachers. As noted, campus programs share key features but also enhance the CalTeach experience for students in ways reflective of their respective approaches to teacher preparation as well as the specializations of their science and mathematics departments.

UC Berkeley
The UC Berkeley CalTeach program began in 2005. There was no forerunner or existing structure in place so it was built from scratch. Since its inception, however, participants from across the campus have embraced the CalTeach concept, working together closely to create a program consistent with the broader campus mission as well as the needs of local schools. The departments of origin include mathematics, physics, earth sciences, chemistry, biology, engineering, statistics and education.

CalTeach continues to grow at Berkeley. As of fall 2009, all 8 courses that make up the CalTeach program have been approved by the university and have been offered at least once. Six of the 8 courses include field placements with mentor teachers in local schools so that the theory that students learn on campus is grounded in the practice of teaching. The CalTeach Science and Mathematics Minor was approved in October 2009 which includes 5 of these 8 courses, and allows students to be recognized for their participation in CalTeach. The campus has submitted an experimental credential program to the CCTC in secondary math and science that would reduce the number of years required to earn a credential from five to four.

UC Davis
The UC Davis CalTeach program is a joint effort of the undergraduate colleges, the School of Education and the teachers and school districts in the region. The program has evolved into a series of four seminars aimed at math, science, and engineering (STEM) majors who would like to explore teaching as a career. Pedagogy, content, current research and standards are coupled with internships in elementary, middle school, and high school classrooms. In 2008-09, CalTeach students contributed 5,685 internship hours to area public schools. Students receive extensive advising support from program staff and UC faculty in order to help them navigate the complexities of subject matter preparation and the prerequisites required for teacher credential programs.

The campus CalTeach steering committee includes faculty representatives from mathematics, engineering, each of the natural sciences, and the School of Education. Together, they form an interdisciplinary team focused on the goal of increasing the quality and quantity of math and science credential program applicants graduating from UC Davis. The steering committee has been instrumental in establishing a Learning Assistants Program, which allows undergraduates to improve their teaching skills by assisting in university level courses.

A unique feature of the program at UC Davis is the Natural Sciences major, which was designed especially to provide the breadth and depth of science education recommended for science teachers, who commonly teach in more than one discipline.

The UC Davis CalTeach program works closely with the community colleges in the region, collaborating with course development, speaking to students groups, and encouraging their STEM majors to remain in the field and to consider careers in education.
UC Irvine
With support from the California Teach Science and Mathematics Initiative (SMI) and from a $2.4 million grant from the National Math and Science Initiative (NMSI) Foundation, UC Irvine has developed an undergraduate integrated program to make it possible to complete a bachelor’s degree in a STEM discipline and a single subject math or science teaching credential in 4 undergraduate years. The teacher preparation curriculum for this new program, which is taught by faculty from the School of Physical Sciences, School of Biological Sciences, School of Social Sciences, and Department of Education, is modeled after the UTeach program curriculum at the University of Texas at Austin. As an entry point, undergraduate STEM majors are encouraged to explore teaching as a career option by enrolling in two CalTeach introductory seminars that include K-12 classroom fieldwork. Students who make early decisions to pursue a teaching credential (typically by sophomore or junior year) go on to complete eight other certification courses, culminating in student teaching during their senior year.

A more traditional teacher certification path is open to UC Irvine undergraduate STEM majors who make a late decision to pursue a teaching credential. These students apply for admission to the UC Irvine post-baccalaureate single subject credential program after completing their bachelor’s degree. However, while they are still undergraduates, these students are encouraged to obtain field experience in classrooms through the CalTeach introductory seminars, and they are counseled about five other optional undergraduate education courses that provide an early start on completing some post-baccalaureate teacher credential program coursework.

All UC Irvine STEM students who participate in the UC Irvine CalTeach introductory seminars are eligible for additional paid field opportunities as apprentices in K-12 classrooms and in other regional out-of-school math and science education programs.

UC Los Angeles
The UC Los Angeles CalTeach program was established in winter 2006 and designed to complement a variety of SMI projects already in existence on UC Los Angeles’ campus. In winter 2006, the campus created two seminars designed to focus on the learning and teaching of science and math at the elementary school level. In fall 2006, the campus added courses focused on middle school and high school science. Math-focused students have the opportunity to continue to a series of pre-existing year-long courses addressing math instruction at the high school level. Students who complete the CalTeach program are thoroughly prepared to enter a credential program upon graduation.

For students with a math focus, the CalTeach program feeds into the new Math for Teaching Major. Seniors in this major participate in an upper-division math education course and complete their subject matter preparation. Last year, 16 students enrolled in this course. A Science Education Minor and Math Education Minor are under development and will complement a pre-existing General Education Minor.

Both science and math majors can opt to begin the joint Bachelor’s of Science/credential/Masters in Education (BS/M.Ed.) program in partnership with the UC Los Angeles Graduate School of Education & Information Studies and expedite the time required to become a teacher. In these joint programs, students take most of their credential course work during their final undergraduate year at UC Los Angeles and then finish their credential in the summer following graduation. They begin full-time teaching in the fall while concurrently enrolled in the M.Ed program. The UC Los Angeles Teacher Education Program focuses on preparing students for urban schools.

UC Los Angeles’ CalTeach program actively recruits students from all academic years, and 1st and 2nd year students are strongly encouraged to participate. Students often begin their CalTeach seminar and internship during their 1st
year and progress through the program over the duration of their UC Los Angeles academic career. Quarterly workshops and professional development opportunities keep students in the “Teaching Pipeline.”

UC Los Angeles partners with a wide diversity of schools and districts which allow our students a varied exposure to K-12 education during their observations and internships. Students are exposed to laboratory schools, public schools, charter schools and 2 different school districts (Los Angeles Unified School District and Santa Monica/Malibu School District).

UC Merced

SMI/CalTeach represents UC Merced’s first and only teacher preparation program. CalTeach at UC Merced consists of a sequence of courses and experiences — including fieldwork in elementary, middle, and high schools — to help UC Merced students explore teaching as a possible career, while they simultaneously complete the requirements of their undergraduate science, math, and engineering degrees. The CalTeach courses also comprise a Natural Sciences Education (NSED) Minor designed for students interested in obtaining a teaching credential after graduation.

UC Merced is located in the San Joaquin Valley, an area characterized by its ethnic diversity, low educational levels, and high rates of poverty and unemployment. The CalTeach program at UC Merced thus serves a unique population of K-12 schools and students. More than 50% of UC Merced students are first generation college students. The ethnic diversity of its students relative to the total number of enrollments is the highest among the UC campuses. CalTeach at UC Merced will have an enormous impact on opening doors for STEM majors to become credentialed teachers that will better reflect the face of the San Joaquin Valley, which is increasingly becoming the face of California.

The CalTeach program at UC Merced has grown rapidly since its inception in spring 2007. Over 230 students, 12% of the Natural Science student population, have taken a Natural Science Education (NSED) course. The UC Merced CalTeach students are now working in more than 25 school sites and over 70 K-12 classrooms in Merced County. We have recently expanded student placements to Stanislaus County.

In addition, this past year UC Merced CalTeach has expanded to offer NSED courses to Merced College students via the UC/CC intersegmental cross enrollment program. A grant from the College Access Foundation allows Merced College students receive scholarships to participate in UC Merced’s CalTeach program. In addition, participating Merced College students are provided academic counseling and support for preparing for transfer to UC or CSU.

UC Riverside

At UC Riverside, CalTeach has seamlessly woven itself into a collegial campus fabric with an already strong history of preparing well-trained STEM teachers. Through strong partnerships with the Graduate School of Education; the ALPHA Center; and numerous academic departments, multiple pathways have developed. These pathways enable students to achieve admissions eligibility into a teaching credential program of choice, gain public school classroom experience very early in their undergraduate careers, deepen their subject knowledge and establish professional networks. Through campus collaborations, innovative programs have been created and implemented. These include:

- Mentor Teacher Certification Program (University Extension).
- Professional development programs that improve teacher instruction, increase student achievement, and improve teacher retention.
- Professional development training opportunities that provide network building between pre-service and credentialed teachers, such as through the Mathematics Academy for Teaching Excellence (MATE), Science Quest, Copernicus Project, and Scientific Teaching Summer Institute.
• **Scientific Teaching Summer Institute Program:** This intensive, interactive program is based on a new teaching philosophy modeled in *Scientific Teaching* (Handelsman, 2007). Participants examine principles and practices of “scientific teaching” that provided them with a new set of pedagogical tools to help engage students.

Well-established connections with local K-12 communities have also enabled the campus to craft professional development opportunities that replenish and expand the pool of successful STEM teachers. With the recent conferral of a NSF Noyce award, the campus is building on its unique internal partnership with a nearby low-performing school district, Moreno Valley Unified, to create a continuum of teacher preparation and development that will result in 43 new secondary mathematics and science teachers.

**UC San Diego**

UC San Diego’s *CalTeach* program is embodied, at the undergraduate level, in new mathematics education and science education minors. The minors were approved and introduced in fall 2006, and new courses were added year by year, with the full set of courses in place for the first time in 2008. As part of the new minors, ten new courses are being offered, four by the mathematics department, four by the chemistry department (these courses cover all sciences), and two by the education studies department. UC San Diego has hired one new Lecturer with Potential Security of Employment in each of these three departments to help with the development and teaching of these new courses. More than 400 students have taken courses in the new minors. UC San Diego is also working closely with local community colleges to recruit students and to offer the lower division minor courses at the community college level.

Since its inception, UC San Diego’s Cal Teach program has been a partnership between the Division of Physical Sciences and the Education Studies department. Unlike traditional teacher education programs in which courses about teaching and learning are “tacked on” to the major in science, mathematics or engineering, UC San Diego *CalTeach* bridges disciplines to explore pedagogy in the context of the math and science content. In addition, students who complete the program will have more than 140 hours of classroom experience to prepare them for UC San Diego’s intern credential program. Completion of the minor as an undergraduate reduces the time it takes to complete San Diego’s master’s/teaching credential program from two years to 15 months.

A Department of Education grant (Fund for the Improvement of Postsecondary Education) permitted UC San Diego to provide workshops that introduced in-service mathematics teachers to the unique pedagogical approach used in the *CalTeach* courses. This grant also allowed UC San Diego to hold two conferences focused on how pedagogy can emerge from science and math content in teacher education programs. These conferences, held in spring 2008 and spring 2009, brought together representatives from the all the UC *CalTeach* programs to share lessons learned. Additional fundraising efforts are underway to expand in-service professional development to enhance the pool of mentor teachers for the program. UC San Diego was recently awarded an NSF Noyce grant of $892,049 over 3 years starting this year, which will facilitate student recruitment.

**UC Santa Barbara**

*CalTeach* has had a big impact on the recruiting and mentoring of undergraduates at UC Santa Barbara in the last few years. It is housed within the Gevirtz Graduate School of Education (GGSE) but the success of the program is the result of a collaboration with a number of departments including mathematics, physics, engineering, computer science, chemistry, EEMB (Ecology, Evolution, and Marine Biology), materials research, and MCDB (Molecular, Cellular and Developmental Biology). The campus has fostered partnerships with 32 area schools.

UC Santa Barbara’s program includes two undergraduate courses, CaT1 and CaT2, which both look at the teaching and learning of science and mathematics (in separate sections), at grade levels K-6 and 7-12 respectively. A minor in Mathematics and Science Education was launched spring quarter of the 2008-2009 academic year. The minor
includes CaT2, several general education courses, and a selection of courses taught by the mathematics and science
departments. The program has had an impact on the enrollment in the UC Santa Barbara Teacher Education
Program (TEP) as a growing percentage of the science and mathematics students in TEP are SMI alumni. This year,
for example, 30 percent of UC Santa Barbara’s science candidates came from CalTeach. UC Santa Barbara received a
$900,000 Noyce Teachers Scholars grant in 2009 from the National Science Foundation that will support 75 math
and science teacher candidates during their credential year.

UC Santa Cruz
UC Santa Cruz received a $750,000 Noyce Teachers Scholars grant from the National Science Foundation to support
32 CalTeach graduates over four years to enroll in the campus MA/teaching credential program. This award bolsters
the funding provided by a private donor the previous year to provide smaller scholarships for the same purpose.
Undergraduate students in CalTeach appear to be motivated by these post-graduate funding opportunities to pursue
their interest in teaching and to do so at UC Santa Cruz.

The UC Santa Cruz program has been working with faculty in various science departments and the Education
Department to develop curricular programs to better support the teacher pipeline. Proposals—including one for a
STEM education minor and others for science education majors—were submitted to the Academic Senate for
approval this fall. If approved, UC Santa Cruz will offer undergraduate majors in earth and planetary science,
physics, and biology that are explicitly designed to prepare them for the California Subject Examination Tests and
for a smooth transition into teaching credential programs.

B. Community College Connections
As noted earlier in this report, partnerships between the University and California Community Colleges (CCCs) are
an essential element of CalTeach. Transfer students historically comprise a substantial portion of the UC graduates
who ultimately earn teaching credentials in math and science. Accordingly, as the CalTeach programs continue to
grow, it is clear that the community college transfers will be a critical part of reaching the goal of 1,000 new math
and science teachers per year.

A key means to attract CCC students to CalTeach is to provide them with lower division experiences that parallel
those offered by the University. Each UC campus has established relationships with local community colleges to
create parallel programs. UC campuses recruit high-achieving community college math and science students,
encouraging them to take CalTeach seminars and participate in K-12 field placements. Transfers may enter UC
programs as upper division students with course credit and classroom experience equivalent to “native” UC peers.

This model is operating as CalTeach-Community Colleges Connections. It includes work in an existing
collaborative built over the past few years, starting in 2007, as well as dedicated new efforts in the northern and
southern regions of the state:

- The existing collaborative — known as the Aurora Project — extends throughout California. It was
  founded at the Foothill De Anza Community College District Office and received initial funding from the
  Alliance for Regional Collaboration to Heighten Educational Success (ARCHES). Beginning with ten
  community colleges, it has grown to include 24 community colleges, a few industry partners and a number
  of county offices of education, school districts and community–based organizations.

- A new effort is underway to expand links between the University and the community colleges to increase
  the pool of UC science and math graduates who are interested in pursuing teaching. UC Berkeley and UC
  Los Angeles will coordinate activities of campuses in the northern and southern regions of the state to
  establish new effective CalTeach partnerships with the community colleges.
All partnership programs — whether part of the original Aurora Project or among those to be developed in the next couple of years — include the same essential components found in the UC CalTeach programs. These components include CalTeach seminars, accompanying field experiences supervised by mentor teachers, continuity/support elements including community-building activities, funding (scholarships) for student participants, and stipends for mentor teachers. In addition, CCC Connections emphasizes the recruitment of community college students who are typically underrepresented in mathematics and the sciences and who have the potential to obtain a bachelor’s degree in math or science followed by a teaching credential.

Aurora Project Community Colleges and Community College Districts

Allan Hancock
Cabrillo
Chabot
College of San Mateo
Diablo Valley
Grossmont
Hartnell
Merced
Mira Costa
Modesto
Monterey Peninsula
Ohlone
Palomar
Pasadena
Riverside
San Bernardino
San Diego Mesa
San Francisco City
Santa Barbara City
Santa Monica
Ventura

San Jose Evergreen Community College District

Evergreen Valley
San Jose City

Foothill De Anza Community College District

De Anza
Foothill

Los Rios Community College District

Sacramento City
Cosumnes River
American River
IV. Program Data and Outcomes

A. Participation and Student Characteristics
The chart below displays the number of students who participated in CalTeach from winter term 2006 through winter term 2008. (Participation here is defined as successful completion of at least one CaT seminar connected with early field experiences.)

DISPLAY 4: CalTeach Student Characteristics: Total Participants to Date (2006-2008)†

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1,208</td>
<td>64%</td>
</tr>
<tr>
<td>Male</td>
<td>683</td>
<td>36%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>600</td>
<td>32%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>349</td>
<td>18%</td>
</tr>
<tr>
<td>Asian</td>
<td>677</td>
<td>36%</td>
</tr>
<tr>
<td>African-American</td>
<td>55</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>210</td>
<td>11%</td>
</tr>
<tr>
<td>Major</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>633</td>
<td>33%</td>
</tr>
<tr>
<td>Science: Biology</td>
<td>599</td>
<td>32%</td>
</tr>
<tr>
<td>Science: Chemistry</td>
<td>87</td>
<td>5%</td>
</tr>
<tr>
<td>Science: Earth</td>
<td>26</td>
<td>1%</td>
</tr>
<tr>
<td>Science: Environmental</td>
<td>30</td>
<td>1%</td>
</tr>
<tr>
<td>Science: Physics</td>
<td>61</td>
<td>3%</td>
</tr>
<tr>
<td>Engineering</td>
<td>87</td>
<td>5%</td>
</tr>
<tr>
<td>Computer Science</td>
<td>12</td>
<td>5%</td>
</tr>
<tr>
<td>Other*</td>
<td>356</td>
<td>19%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,891</td>
<td></td>
</tr>
</tbody>
</table>

† The numbers and percentages include data from previous years and preliminary data for the current year. Reflects current available data.
* “Other” includes undeclared or undecided students.

What do these data show? First, participation numbers reflect the magnitude of interest in this undergraduate teacher preparation program. Second, math and biology majors clearly predominate, each representing about one-third of participants for the given time period.

B. Systemwide and Campus Participation
The following displays show total system and campus-by-campus participation in CalTeach from winter 2006 to the current year. (“Participation” is defined as enrollment in any CalTeach course that includes a field component.) Although campus participation fluctuates somewhat depending on which courses are offered each term, the overall systemwide trend has been one of steady increase.
DISPLAY 5: Total Systemwide Enrollment by Year

<table>
<thead>
<tr>
<th></th>
<th>2005-06</th>
<th>2006-07</th>
<th>2007-08</th>
<th>2008-09*</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC Berkeley</td>
<td>45</td>
<td>134</td>
<td>192</td>
<td>185</td>
</tr>
<tr>
<td>UC Davis</td>
<td>21</td>
<td>63</td>
<td>165</td>
<td>269</td>
</tr>
<tr>
<td>UC Irvine</td>
<td>26</td>
<td>74</td>
<td>43</td>
<td>73</td>
</tr>
<tr>
<td>UC Los Angeles</td>
<td>66</td>
<td>144</td>
<td>244</td>
<td>277</td>
</tr>
<tr>
<td>UC Merced</td>
<td>0</td>
<td>22</td>
<td>75</td>
<td>113</td>
</tr>
<tr>
<td>UC Riverside</td>
<td>12</td>
<td>71</td>
<td>87</td>
<td>107</td>
</tr>
<tr>
<td>UC San Diego</td>
<td>23</td>
<td>115</td>
<td>178</td>
<td>89</td>
</tr>
<tr>
<td>UC Santa Barbara</td>
<td>0</td>
<td>32</td>
<td>147</td>
<td>125</td>
</tr>
<tr>
<td>UC Santa Cruz</td>
<td>50</td>
<td>76</td>
<td>112</td>
<td>85</td>
</tr>
<tr>
<td>TOTAL</td>
<td>243</td>
<td>731</td>
<td>1,243</td>
<td>1,323</td>
</tr>
</tbody>
</table>

*Does not include enrollment data for students enrolled in math and science education minor courses that do not include a field studies component.
Immediate Impact on K-12 Classrooms

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.

To date, CalTeach students have worked with a total of 521 mentor teachers in 419 schools, working in classrooms a total of 33,976 times.

DISPLAY 7: Cumulative Number of Field Experiences

UC CalTeach students gain valuable “hands-on” experience during their field placements, acquiring instructional tools and techniques from expert teachers in the field. In addition, many of the mentor teachers note that CalTeach participants exemplify positive role models for the students in their classrooms. Some teachers describe them as “ambassadors” who instill an excitement for science and mathematics as well as inspire aims of college attendance among the K-12 students with whom they work.

C. Evaluation

The University is building a comprehensive data system to support evaluation and research on CalTeach. This effort will feed into program improvement and will contribute to the state’s information store on teacher preparation and quality. The CalTeach online database is a centralized system with decentralized controls. Each campus updates event and participant information for both students and mentor teachers. The online system also provides information on students’ field experiences. Campuses are able to create and disseminate project-wide program surveys for evaluation purposes. The CalTeach online database also allows CalTeach student information to be directly linked to the UC Student Corporate System, which ensures access to accurate academic, persistence, and degree information.
Enrollment Targets
Given the scale, scope and novel nature of CalTeach, there are no comparable programs within UC on which to base projections of student participation. However, using data from a variety of sources—including the University of Texas UTeach program—a model of enrollment targets was developed to estimate program growth. This model is helpful in assessing the University’s progress toward its goal of contributing to the production of 1,000 math and science teachers annually.

The chart below shows the total program enrollment numbers to date followed by the enrollment targets for subsequent years. The current model aims at reaching a steady-state total enrollment of 6,750 students. This number takes into account attrition over the four years as well as incorporating transfer students and students who enter the program at a later stage of their undergraduate program. Barring changes to program resources, this steady-state enrollment target is expected to yield 1,000 graduates each year who enter credential programs in mathematics and science.

Since CalTeach is still relatively new and has little of its own longitudinal data, it is helpful to identify other mechanisms to determine whether this expected growth might actually be realized. The UTeach program at the University of Texas provides a good option for comparison. Several CalTeach components were modeled on the Texas paradigm and the two programs share certain goals and features.

Approximately ten years of data have been collected on UTeach. Like UC, the University of Texas historically did not initially serve as a major training ground for significant numbers of new teachers. However, the urgent need for more and better math/science instructors and the presence of large numbers of talented students in those fields at the Austin campus led that institution to assume responsibility in this area. Since its inception, the program has had great success; it has expanded the teacher corps far beyond levels traditionally seen in a research university. The
graph below illustrates that success and, given similarities between the Texas and UC efforts, bodes well for the future of CalTeach.

D. Impact on Science and Mathematics Teaching Credentials: Benchmark 1,000

Because obtaining a credential is at least a five year process from the time a student begins college as a freshman, it is still early to measure the impact of the CalTeach program. The contribution of these programs to increasing math/science teacher production — whether participants go on to obtain a credential at UC or elsewhere — cannot yet be fully assessed.

Nonetheless, many campuses indicate that initial enrollment increases are becoming apparent; about half of the UC credential programs report increases in the numbers of students entering in math and science. Furthermore, most of these students either participated in one or more CalTeach courses or mentioned that the increased attention and activity around math and science teaching on the campuses made them more aware of the credential program options.

Historically, the majority of UC math/science graduates interested in teaching completed their credentials somewhere other than the University. Approximately one-third complete their credential work at UC, one-third at CSU and one-third at a private institution. Taking this pattern into consideration, the following chart shows historic data and projections for the growth in the number of UC math and science graduates receiving teaching credentials over the next few years.
Although the University will not award all 1,000 credentials, data projections indicate that, assuming current conditions (1) there will be significant growth in the number of UC graduates obtaining math/science credentials over the next few years, and (2) the University will be at or near its goal of increasing to 1,000 the annual number of its graduates who become credentialed math/science teachers.

**E. Quality and Retention in CalTeach**

*CalTeach* is intended not only to attract a new and larger cadre of math/science students into teacher education, but also to change the quality of preparation of these students. To assess the quality of student experience in the program, participants are asked to complete surveys that assess their levels of satisfaction with *CalTeach* as well as the likelihood that they will complete the program and obtain a credential. A total of 471 students completed the 2008-09 survey. The survey data is summarized in Display 11.
Assessing the impact of CalTeach on the quality of math/science teachers it helps prepare presents a variety of challenges. It is difficult, for example, to isolate what elements of effective teaching are attributable to the program’s portion of teacher preparation. Still, proxy measures (such as undergraduate GPA) can be used indicate whether there have been changes in the quality of candidates drawn into teaching through the program. The University of Texas, Austin, used this approach as part of its evaluation of UTeach. Before the UTeach program, those students from the College of Natural Sciences who later became teachers had below-average GPAs as undergraduates. However, after implementing UTeach, program alumni who became math and science teachers graduated at higher rates and had significantly higher GPAs than their undergraduate peers.

Although UC does not yet have as much longitudinal data as UTeach, early indicators point to CalTeach success in recruiting students with strong academic records. For instance, at UC Riverside in fall 2007, the CalTeach cohort of prospective math teachers had a 3.12 average GPA whereas the average GPA among all mathematics majors was only 2.91. These data, while preliminary, suggest changes in the academic characteristics of students who pursue teaching careers in math and science. The research and evaluation system currently under development will, among other things, enable CalTeach to track the GPAs of all program participants. Over time, additional data of this type will reveal whether providing a coherent, intellectually challenging program to recruit and prepare math and science teachers will continue attract a new pool of students who excel academically.
V. Program Budget

A. Funding and Program Costs

*CalTeach* receives funding from three sources:

- **State Funds**: 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)**: Funds have been raised from a variety of corporate foundation and other private industry sources.
- **Federal**: Since the inception of the UC Science and Math Teacher Initiative, UC campuses have been awarded grants from NSF and other federal sources.

The cost of running *CalTeach* for 2008-09 was $7.24 million, as shown in the budget display below. Absent any change in the program structure, demand for student incentives alone could grow to as much as $4 million by 2010-11.

**DISPLAY 13: *CalTeach* Program Costs, 2008-09**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Instruction</td>
<td>$1,595,000</td>
</tr>
<tr>
<td>(2) Instructional support costs</td>
<td>391,000</td>
</tr>
<tr>
<td>(3) Supervision &amp; coordination of field</td>
<td>2,900,000</td>
</tr>
<tr>
<td>placements, administrative support</td>
<td></td>
</tr>
<tr>
<td>(4) Financial incentives for students</td>
<td>1,824,000</td>
</tr>
<tr>
<td>(5) Stipends for teachers</td>
<td>531,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$7,241,000</strong></td>
</tr>
</tbody>
</table>
(1) Please note that instruction is the cost of faculty salary and benefits for teaching 1930 students taking 122 sections of CalTeach courses.

(2) Instructional support costs include paying for TB tests, fingerprinting, and background checks (required for anyone who works with students in public schools); reimbursement of student travel expenses, educational supplies, and classroom materials used in K-12 field work; and program recruitment and advertising costs.

(3) Coordinating, supervising, and placing students in classrooms with mentor teachers requires a considerable amount of staff time. This category also includes administrative support and release time for faculty directing programs.

(4) The estimate is based on the existing model of student incentives that sets awards at $600, $800, $1,100, and $2,500 for program levels 1-4 respectively. (Though most campuses follow this model, there is some variation on a few campuses.) This structure will be revised as part of a new SMI business plan now under development; the actual figure for the coming year likely will be lower.

(5) Mentor teachers are paid $275 for each student they supervise in their K-12 classrooms. Mentors are expected to meet with, observe, guide and instruct CalTeach participants.

VI. Progress to Date and Future Directions

A. Program Development Summary

The Science and Mathematics Teacher Initiative has completed its third year. Since it began, SMI/CalTeach has evolved from an ambitious commitment into a vibrant collection of CalTeach programs that aim to increase the number of well-prepared math and science teachers in the State. This evolution has unfolded in a series of steps with significant development and implementation phases already complete and additional growth still to come.

1. Development of the Overall Plan, 2004-05
   Obtaining Funding, both Public and Private
   Campus Review and Organization

2. Implementation, 2005-07
   Campus-by-Campus Curriculum Organization (course and degree design)
   Establishing Links with Schools and Colleges
   Continued Fundraising

3. First Full-Year Program Operation, 2007-08
   Design Refinement

4. Intermediate Expansion & Growth, 2008-09
   Continued Enrollment Increases, including Community College Partnerships

5. First Class of Graduates, 2010

6. Program Review
   Program Modification and Institutionalization

7. 1,000 Teacher Goal, 2010-11
As the developmental trajectory illustrates, it requires several years to carry out an initiative of this magnitude. CalTeach has very successfully navigated the formative stages of development and, with a solid foundation, continues to grow. Campus programs have forged crucial, productive working relationships between math, science and education faculty and have found remarkable acceptance from students, who are enrolling in the program courses in noteworthy numbers throughout the UC system.

B. Challenges, Opportunities, and Future Directions
The following challenges must be addressed if CalTeach is to retain its current viability and innovation.

Funding
Notwithstanding these accomplishments, CalTeach faces fiscal challenges. These challenges arise in part from the program’s success in rapidly increasing student participation and in part from budgetary circumstances now facing the University.

As noted above, mentor teachers receive stipends for participating in the program and students receive financial incentives. Stipends and incentives generally are 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 this purpose. Significant enrollment growth caused a steep increase in demand for stipend and incentive funds that outpaced total monies raised. For 2008-09, $1.8 million was needed to cover demand; $2.3 million will be needed to cover demand in 2009-10 under the existing tiered incentive structure.

In addition, in this fiscal climate, initiatives started by or in partnership with the Office of the President must become sustained via the campuses or other means after an appropriate but limited inception and transition period. CalTeach is currently making this transition. This evolution is vital not only for budgetary reasons, but also for the campuses to take ownership of key initiatives and incorporate them into their respective academic and administrative structures. Moreover, UC system efforts to respond to State priorities — such as the math/science teacher shortage — should be integrated into the fabric of strategic goals for each campus. This integration is essential to effective fulfillment of the University’s public service mission.

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 specialized costs associated with the placement and supervision of university students in K-12 classrooms. These include TB tests and security clearances for all university students who enter K-12 schools, stipends for qualified math and science mentor teachers who host and guide the university students in their K-12 classes and provide critical feedback on performance, school placement coordination with districts, and field supervision of university students by university personnel. The original plan called for a significant fundraising effort to cover these costs. In the current fiscal climate, this has grown to be a difficult challenge to overcome.

Accountability, Research and Evaluation
Ongoing CalTeach program evaluation and reporting will be important to foster continuous program improvement, to monitor the quality and quantity of the teachers after graduation, and to document program success for funding organizations, legislators, and other stakeholders at the state and national level. A centralized data system has been used by nine campuses to capture information about CalTeach program participants and field experiences. This offers a strong starting point for the development of an evaluation plan. Additionally, this effort can leverage the existing accountability efforts and resources of other UC statewide STEM-related programs such as the California Subject Matter Project (CSMP); the California Summer School for Mathematics and Science (COSMOS); and Mathematics, Engineering, Science Achievement (MESA). Systemwide support for program accountability, via a
new Research and Evaluation unit within Education Partnerships, includes developing and refining the existing information system and supporting campus faculty and external reviewers to design and implement systematic program evaluation that monitors CalTeach participants before and after graduation, and supports potential future program assessment by UC and other researchers.

*CalTeach* faculty also participate in national research consortia. For example, *CalTeach* is part of the UTeach National Research Consortium and the Association of Public and Land Grant Universities Science and Mathematics Teacher Initiative. Both are working nationally to establish common metrics and research goals for mathematics and science teacher preparation. Interested UC faculty members involved with *CalTeach* can participate in activities related to both consortia.

Yet another research opportunity for UC faculty may open up regarding the future use of data from the California Cal-PASS system — a tracking data system under development that has the potential to follow student progress from grades preK through 16. Every UC campus has entered into data-sharing agreements with Cal-PASS. These types of data are potentially useful in studying the effectiveness of the state’s mathematics and science teachers, including *CalTeach* program graduates. Other new data sources, including the University's Transcript Evaluation Service (TES), may be useful for faculty and CalTeach administrators in identifying students as early as high school who have interest, aptitude and potential to pursue STEM majors and teaching credentials and to examine high school course patterns and grades and their impact on student choices around STEM and teaching.

The first *CalTeach* participants will graduate in spring 2010. The significant, steep enrollment growth trend in the program suggests that students find the *CalTeach* pathway to a teaching credential to be an attractive option. It is too soon to determine whether program graduates will follow through and obtain teaching credentials, and whether interdisciplinary alliances between math/science and education forge a notably stronger preparatory curriculum for those who become new teachers, although initial indications are affirmative. For now, the University must continue to support these programs and foster the growth needed to help meet California’s pressing demand for a larger, stronger teacher corps in math and science.

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