

**Testimony to U.S. Senate Committee on
Health, Education, Labor, and Pensions**
*NCLB Reauthorization: Strategies for Attracting, Supporting and Retaining
High Quality Educators*
The CSU Mathematics and Science Teacher Initiative

Beverly Young, Ph.D.
Assistant Vice Chancellor, Academic Affairs
California State University System
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Introduction

Chairman Kennedy, Ranking Member Enzi, and members of the Committee, thank you for inviting me to discuss the efforts of the California State University (CSU) system to double its production of credentialed math and science teachers. The CSU commends the Committee for its attention to this critically important task.

The California State University – Background

Few, if any, university systems can match the scope of the CSU system. The CSU is the largest four-year university system in the country, with 23 campuses, approximately 417,000 students and 46,000 faculty and staff. The CSU's mission is to provide high-quality, affordable education to meet the ever-changing needs of the people of California. Since the system's creation in 1961, it has awarded about 2 million degrees. We currently award approximately 84,000 degrees and 13,000 teacher credentials each year.

The CSU plays a critical role in preparing outstanding candidates for the job market. Our graduates help drive California's aerospace, healthcare, entertainment, information technology, biomedical, international trade, education, and multimedia industries. The CSU confers 65 percent of California's bachelor's degrees in business, 52 percent of its bachelor's degrees in agricultural business and agricultural engineering, and 45 percent of its bachelor's degrees in computer and electronic engineering. The CSU also educates the professionals needed to keep the state running. It provides bachelor's degrees to teachers and education staff (87 percent), criminal justice workers (89 percent), social workers (87 percent) and public administrators (82 percent). Altogether, about half the bachelor's degrees and a third of the master's degrees awarded each year in California are from the CSU.

One key feature of the CSU is its affordability. For 2006-07, the CSU's systemwide fee for full-time undergraduate students is \$2,520. With individual campus fees added, the CSU's total fees average \$3,199, which is the lowest among any of the comparison public institutions nationwide.

Close to sixty percent of the teachers credentialed in California (and ten percent of the nation's teachers) each year are prepared by the CSU. Chancellor Charles Reed and the CSU Board of Trustees have made high-quality teacher preparation one of the highest priorities of the system. Following a decade of unprecedented growth and reform in public K-18 education, the CSU

Board of Trustees in 1998 embraced systemwide efforts to improve teacher preparation in a policy entitled *CSU's Commitment to Prepare High Quality Teachers*.

The California State University and Mathematics and Science Teacher Preparation

The California State University (CSU) has brought together its range of programs in science and mathematics leading to a baccalaureate degree and to a teacher education credential to address severe teacher shortages in these fields. In 2005, CSU awarded 651 math, 1,930 biological sciences, and 516 physical sciences (chemistry, geosciences, and physics) undergraduate degrees. Although these are only some of the fields that are precursors to teaching credentials in mathematics and science, they provide evidence of an institutional capacity to address the challenges the state faces.

The CSU Mathematics and Science Teacher Initiative¹

As a system, CSU's goal is to at least double the production of math and science teachers during the next five years. This means increasing from a baseline figure of approximately 750 new math and science teachers produced annually to a minimum of 1,500 new teachers produced in these fields by 2009-2010.

CSU's Math and Science Teacher Initiative began in 2004-05 through a planning process involving all of its 23 campuses. A seven-part action plan was developed that is focused on meeting "one goal through diverse pathways." Each campus is committed to a specific plan based on regional needs and strengths. Plans designate a numerical goal for increased credential production. They include a variety of promising strategies and programs for reaching goals.

Component #1. Comprehensive Recruitment Aimed at Expanding and Diversifying the Pool of Candidates

Objective: To significantly expand recruitment of new math and science teacher candidates

Programs: Comprehensive, sustained, and innovative recruitment and marketing initiatives

The first component of CSU's action plan is directed toward substantially expanding and diversifying the pool of qualified candidates for math and science teaching. It is a broadly-based recruitment effort targeted to college students and recent graduates, community college and high school students, mid-career and pre-retirement professionals, recent retirees, and teachers with the potential to change fields. Campuses are using a wide range of print and electronic tools for comprehensive and innovative marketing and recruitment approaches using a variety of media. The CSU Teacher Recruitment Projects, for which \$75,000 of lottery funds are allocated annually to each campus, offer advising, test preparation, and financial aid to students.

Component #2. Creation of New Credential Pathways

Objective: To establish multiple new pathways to mathematics and science teaching credentials

¹ See <http://www.calstate.edu/teachered/MSTI>.

Programs: A broad range of new programs beginning at the freshman level and continuing through fast-track post-baccalaureate options

A central part of the CSU strategy to expand math and science teacher production is the creation of new credential pathways. The purpose is to establish multiple points of entry into these fields for individuals at different educational and career stages. New pathways include, for example, (1) the new Foundational Level math credential for middle school teachers and (2) blended programs for undergraduates in which an academic major and teacher preparation are integrated in an articulated program of study. These blended programs are particularly promising because teacher preparation begins well before California's traditional post-baccalaureate program, and college students can typically complete these programs in slightly more than four years.

Several campuses are planning new pathways that will enable professionals in math and science-based fields to transition to careers in math and science teaching—including efficient, fast-track paths to the state's recently established specialized science credentials. These enable individuals with Ph.D.s to earn a teaching credential rapidly. Other approaches are focused on assisting credential candidates initially enrolled in different fields and current teachers in other fields to obtain a teaching authorization in math or science.

Component #3. Internet-Supported Delivery of Instruction

Objective: To create systemwide Internet-supported math and science credential preparation resources

Program: A new online-supported teacher preparation program in mathematics and science

To accommodate the needs of diversified pools of candidates, flexible preparation options are needed. Anytime, anyplace instruction is particularly advantageous for candidates who are career changers and currently fully employed. Learning from the infrastructure created for CalStateTEACH (the CSU statewide site-based credentialing program), CSU's initiative includes development of Internet-supported instruction to be available to candidates and programs statewide. California Polytechnic University at San Luis Obispo is leading the development of this effort.

Component #4. Collaboration with Community Colleges

Objective: To implement integrated 2-year/4-year math and science credential preparation programs with California's community colleges

Programs: Partnerships with community colleges that align lower division and upper division math and science teacher preparation and institutionalize early recruitment and academic advising in these fields

California's community colleges represent one of the largest potential recruitment pools of future math and science teachers in the state. A central component of campus plans is collaboration

with community colleges in integrated 2-year to 4-year programs that provide an articulated and continuous sequence of preparation for math and science teaching. CSU campuses are working with their regional feeder community colleges to establish articulated programs. The Chancellor's Offices of the CSU and of the California Community College System have entered into a Memorandum of Understanding (MOU) that identifies the system-level strategies to be implemented in support of 2-year to 4-year articulated pathways.

Component #5. Financial Support and Incentives

Objective: To provide financial support for new math and science teachers through the full array of available fiscal mechanisms

Programs: Scholarships, loan assumption programs, paid tutoring, service learning, school district internships

An important component of CSU's strategy—one essential for its success—is having sufficient support for candidates through scholarships and loan assumption/cancellation programs, paid tutoring, and internship opportunities that will make teacher preparation financially attainable and attractive for college students of all backgrounds. This is particularly important because students from underrepresented groups, those most often in need of financial assistance, must increasingly be a substantial part of the math and science teacher work force. Expanding their participation within these professions is a central component of CSU's strategy.

A major effort has been undertaken by CSU in collaboration with the California Student Aid Commission to foster maximum utilization of California's Assumption Program of Loans for Education (APLE). Outreach efforts ensure that all CSU students know of this important state program for future teachers, which provides up to \$19,000 of loan forgiveness for new math and science teachers. CSU campuses have awarded loan cancellation funding to more than 4,000 teacher education students in the past year, enabling them to enter the teaching profession in math, science, and other teaching shortage fields with little or no debt.

Tutoring is another important vehicle providing financial support and additional recruitment benefits. Research shows that the desire to assist others is a primary factor in recruitment into math and science teaching and that the opportunity to do so enhances the quality of new teacher preparation in these fields. On a number of CSU campuses, both service learning and paid tutoring are being integrated with math and science teacher recruitment. Using community service learning to foster interest in math and science teaching is a priority of the CSU system.

An additional approach for providing financial support to candidates is through paid internships in lieu of student teaching. These internships are typically followed by full-time teaching positions in the same school or school district. Numerous CSU campuses have arrangements with surrounding school districts that provide paid internships for math and science candidates. CSU campuses provide significant support for their teacher candidates in intern positions in order to ensure that they have the kind of guidance and assistance they need to be successful.

Component #6. Supporting and Evaluating Promising Approaches Having Scale-Up Potential

Objective: To identify cost-effective math and science teacher recruitment and preparation approaches

Programs: Implementation and examination of a range of different expansion approaches

The CSU strategy is a carefully planned effort aimed at supporting, refining, and scaling up especially promising and cost-effective approaches for preparing highly qualified math and science teachers. Priority is placed on identifying, supporting, and examining strategies for increasing credential production that have clear potential for replication at multiple campuses.

An example is seen in campus programs that prepare candidates for the new Foundational Level math credential. The credential is designed particularly for middle school math instruction, a field in which a very large shortage of qualified teachers exists in California and nationally. There is a need for teachers with the new math credential in all regions of the state, and CSU campuses are piloting a range of promising approaches preparing individuals to earn it.

The Chancellor's Office has begun identifying especially effective approaches implemented by campuses for achieving growth in math and science teacher production. These approaches are being examined thoroughly and will be described in detail for adoption by other campuses.

Component #7. Partnerships with Business, Industry, and Federal Laboratories

Objective: To institutionalize partnerships that enhance the attractiveness of teaching careers in math and science

Programs: Partnerships with business, industry, and federal laboratories enriching math and science teachers' career opportunities

Long-term success in increasing production and retention of math and science teachers requires the active participation of corporate leaders and partnerships with federal laboratories. They can assist to bring about fundamental changes in the societal value accorded math and science teaching and in the attractiveness of careers in these fields.

Business and industry involvement often includes scholarships for future math and science teachers. The CSU system has a longstanding partnership with the Boeing Company, for example, through which scholarships have been provided to future math and science teachers. Federal Department of Energy Labs in California have provided opportunities for paid summer laboratory experiences for CSU teacher candidates in ongoing research, and plans are in motion to expand this effort. In collaboration with education programs at the Jet Propulsion Laboratory (JPL), CSU established the CSU-NASA partnership several years ago. It enables CSU campuses to connect with the nation's most advanced applications of technology as they prepare future math and science teachers.

Report of Initial Results of CSU Initiative: March 2007

Progress to date indicates that CSU's initiative is on course for achieving intended outcomes. Since launching of the initiative two-and-a-half years ago, credential production has increased 37.6%, from 768 to 1,057. Production increased 64% in mathematics and 16% in the sciences. In math, more than two-thirds of the increase is attributable to growth in the new Foundational Level credential. In the sciences, more than one-quarter of the increase has been in the newly authorized specialized credentials. Both of these patterns of gain demonstrate the importance of creating new credential pathways. Increases have occurred in the severest shortage fields: more than 15% of the increase in the sciences has been in the physical sciences (physics and chemistry), fields particularly in need of increased production.

To sustain long-term growth, recruitment efforts are needed that significantly increase pools of credential candidates from all backgrounds. CSU campuses have made significant efforts to raise scholarship funds to assist in recruitment. Last year, four additional CSU campuses were awarded prestigious National Science Foundation (NSF) Robert Noyce Scholarship grants for mathematics and science teachers. This program has been a priority for CSU campuses, and a total of eleven now have been awarded these NSF grants.

A significant issue requiring long-term, sustained attention is math and science teacher retention. The majority of CSU campuses host professional development programs for teachers, targeted especially for high need schools. CSU campuses will be expanding their efforts in this area with support through *No Child Left Behind* Title II funds to institutions of higher education in the state. These programs typically include intensive summer institutes accompanied by creation of learning communities during the school year. Programs of this nature have been shown to be effective in providing support for teacher effectiveness and growth. The CSU programs have been based on thorough needs assessments that identify local teachers' needs.

Expanding professional development roles of campuses is important to CSU in relation to its commitment to place math and science teachers in high need schools. CSU has entered into a partnership with the California County Supervisors Educational Services Association in a \$2.87 million project aimed at addressing this issue by recruiting math and science teacher graduates to consider teaching in the highest need schools in the three largest regions of the state.

CSU Teacher Education Evidence and Accountability Systems

The CSU annually conducts the largest and most comprehensive evaluation of the outcomes of its teacher education programs in the nation. The annual *CSU Systemwide Evaluation of Teacher Education Programs* has been in place since 2001. It consists of a comprehensive outcome evaluation of interrelated components of teacher preparation that, taken together, provide a rich and detailed picture of program quality and effectiveness. It has to date included analyses of:

- the level of each graduate's preparation during his or her initial years of K-12 teaching, as reported by CSU's teaching graduates
- the effectiveness of programs as reported by the school site supervisors of CSU graduates during their first years of teaching
- the placement and retention of CSU teacher education graduates in teaching careers.

Beginning in 2007-08, the annual evaluation will include data on the effects of CSU teacher preparation programs, including its math and science programs, on the learning gains of K-12 pupils, enabling the CSU to further assess the success of its math and science teacher initiative.

Conclusion

The CSU and its campuses have initiated a wide range of strategies that have substantial promise for increasing the size and the quality of the mathematics and science teacher work force. We thank you for your interest in the CSU and our efforts to prepare the substantial numbers of high quality teachers in these fields who are essential if we are to continue to compete in the global economy. I will be pleased to answer any questions you might have, and look forward to working with you in this critical area in the future.

Supplemental Attachments to Testimony

CSU Mathematics and Science Teacher Initiative: 2005-06

Campus Projects and Activities: 2005-06	
Campus	Primary Activities
Channel Islands	Recruit Career Changers; Offer Fast Track Specialized Science Credentials; Foundational Level Math Credential; K-12/Business Partnership
Chico	Hands-on Lab for K-12 Recruitment; Blended Programs in Math, Physical Science; Foundational Level Math; Service Learning
Dominguez Hills	Recruit Career Changers; Blended Programs in Math, Science; Community Colleges– Recruitment/Articulation with 8 LA Campuses
Fullerton	Integrated Programs in Math, Biology, Chemistry, Geosciences, Physics; Foundational Level Math; Specialized Sciences Credentials; Innovative Technologies
Humboldt	Math Education Minor for Teacher Candidates; Blended Programs in Math, Sciences; Service Learning; Dedicated Dormitories, Student Interest Groups
Los Angeles	Blended Programs in Science; Foundational Level Math; Specialized Math, Science Credentials; Expedited Summer Study; Community College Bridges Program
Northridge	Comprehensive Recruitment and Strategic Marketing; Expand Upper Division/Transfer Students in Blended Math Program; Recruit from Private Colleges in Region
Pomona	Community College Integrated Programs in Math, Science; Foundational Level Math; Recruit from Agriculture, Engineering Majors; Service Learning
San Diego	Community College Recruitment via Paid Tutoring; Foundational Level Math; Specialized Sciences Credentials; Systemic Alignment with EAP and Other Outreach
San Luis Obispo	Blended Programs in Math, Biology, Chemistry, Physics; Online Programs for Math and Science Credentials; Foundational Level Math; Specialized Science Credentials
Additional Private Sector Support: 2005-06	
Boeing, Edison, State Farm Insurance	Campus Project Support; Scholarships for Math and Science Teacher Candidates; Support for Teacher Professional Development; Grants for Service Learning/Tutoring

CSU Mathematics and Science Teacher Initiative: 2006-07

Campus Projects and Activities: 2006-07	
Campus Math and Science Credential Pathways Growth	
	Increase Blended Programs
	Technology Infused Programs
	Expand Quality Internship Programs
	Expand Current Credential Pathways
Campus Recruitment Efforts	
	Recruit Undergraduates, Community College Students, Career Changers
	Flexible and Accelerated Credential Options
Campus Website Development and Publicity Activities	
	Website Development
	Media, Publicity, Events
Statewide Support Activities	
	Conferences, Meetings
	Statewide Web Support and Development
	Statewide Publicity Campaign
Additional Major Support Related to Initiative: 2006-07	
State of California Budget Act	Mathematics and Science Teacher Recruitment Project Targeting High-Need Regions of State CSU Partnership with California County Superintendents Educational Services Association
NCLB Title II State Higher Education Funds	Mathematics and Science Teacher Retention: Summer Institutes and Academic Year Follow-Up Through CSU California Science Project and California Mathematics Project Sites

**CSU Math and Science Teacher Initiative:
Examples of Promising Campus Strategies
California State Polytechnic University, San Luis Obispo**

California Polytechnic State University, San Luis Obispo (SLO) has embarked on a distinctive multidimensional university-wide strategy for more than doubling its preparation of math and science teachers. This strategy reflects the capabilities of the campus and the related state and national leadership of its President. The approach builds on the capacity of its University Center for Excellence in Science and Math Education and the capabilities of the campus and CSU system for online delivery of credential programs and student services.

New Credential Pathways and Credential Growth Strategies	<ul style="list-style-type: none"> • New blended programs in chemistry, biology, physics, and math leading to BA/credential in 4 years + 1 term • New Specialized Credentials in Biology, Chemistry, and Physics (rapid pathway for Bachelor's degree holders) • Community College transfer programs for junior year entry • Credential completion for Continuing Education Adult Degree Program Completers • Innovative online delivery of instruction and student services through hybrid model
Recruitment Strategies	<ul style="list-style-type: none"> • Target new populations: <ul style="list-style-type: none"> – Math and science majors and minors – Engineering majors (including new Engineering Education Option for undergraduates) – Community College transfers, including Continuing Education Adult Degree Program completers – Students from across the state interested in online credential coursework • Expand regional outreach with print and electronic recruitment information • Develop campuswide advising; draw on strength of University Center for Science and Math Education • Attract undergraduates and K-12 students through professional programs of Math and Science Clubs • Extend the geographical range in which student teachers can be placed • Extend the use of online tools and Web-based technologies in recruitment • Provide CSET test preparation workshops • Offer campus tours; provide math, science, and engineering outreach to K-12 schools • Collaborate with MESA and AVID to provide high school and community college academic support • Outreach via email(s) from Admission Office focused on math and science teaching to a broad audience • Financial Aid Offices include focus on math and science teaching
Community College Strategies	<ul style="list-style-type: none"> • Host multiple activities for community college students; present math and science teaching pathways • Publicize junior year blended programs suitable for community college transfers
Fiscal Incentives and Strategies	<ul style="list-style-type: none"> • Stipends for Science Education Club Tutors and EAP Math Mentors • Websites for students to access financial aid directly from a range of departments and Admissions Office • Use of online tools for disseminating information about loan assumption and scholarships • Teacher as researcher industry/federal lab model for new teachers
Community Service Learning	<ul style="list-style-type: none"> • Preparation of EAP math mentors for tutoring roles • Early field experience in K-12 schools for student clubs

**CSU Math and Science Teacher Initiative:
Examples of Promising Campus Strategies
California State University, Fullerton**

California State University, Fullerton (CSUF) initiated a comprehensive, university-wide program involving 10 academic departments—with ongoing involvement of the President. Its goal is to more than double math and science teacher production; its strategies include recruitment of undergraduates from SMET, business, engineering, and other fields. It has integrated online learning tools to help candidates strengthen their content knowledge and pass the California Subject Examination for Teachers (CSET). It has created flexible scheduling, including late afternoon, evening, and summer courses. It has been selected as a Case Study in conjunction with the national project being undertaken by the National Association of State Universities and Land Grant Colleges.

<p>New Credential Pathways and Credential Growth Strategies</p>	<ul style="list-style-type: none"> • Expand enrollments in foundational level math credential; provide online learning tools in math • Offer integrated bachelor’s degree and credential program with reduced units to graduation • Assist credential candidates in other fields to switch to math or science • Encourage math and science majors and SMET-related majors to enter teaching • Teach classes at flexible times and offer innovative summer programs
<p>Recruitment Strategies</p>	<ul style="list-style-type: none"> • Recruit from multiple/single subject/special education candidates, current teachers • Recruit new specialized science credential program candidates from recent graduates, current teachers, and career changers • Offer summer sections of <i>Methods of Teaching Foundational Mathematics</i> and <i>Methods of Teaching Science</i> • Attract new populations from STEM and related fields: <ul style="list-style-type: none"> – Promote teaching careers in science and math departments – Recruit majors in biology, chemistry, geology, environmental science, and physics and minors in natural sciences – Encourage science majors to earn teaching credential with Master of Arts in Teaching (MAT) in Science – Distribute information in business, computer sciences, engineering, information science buildings • Recruit high-achieving math and science students in local high schools; sponsor future teacher field trips to CSU Fullerton • Offer online CSET test preparation with Orange County Department of Education: pay test preparation costs and test fees • Recruit/advise Elementary candidates with math and science backgrounds • Identify and recruit teachers who need to establish subject matter competence to meet NCLB “highly qualified” criteria • Provide outreach through EAP contacts with schools; distribute Future Teacher brochures and APLE information
<p>Community College Strategies</p>	<ul style="list-style-type: none"> • Recruit community college students into articulated programs at Fullerton, Santa Ana, and Cypress community colleges • Provide academic advising, publicize math and science programs at community colleges • Arrange teaching of prerequisite courses at local area community colleges; align syllabi
<p>Fiscal Incentives and Strategies</p>	<ul style="list-style-type: none"> • Assist students with APLE loan cancellation awards and scholarships • Increase math and science intern placements (candidates are paid by school districts) • Pay full or partial costs for math and science courses in University Extended Education

**California State University Mathematics and Science Teacher Summit
Meeting California's Challenge
March 2, 2006**

Purpose of Summit

The *Recruiting and Preparing Mathematics and Science Teachers Summit* held on March 2, 2006 helped to launch the California State University (CSU) Math and Science Teachers initiative (MSTI). It engaged leaders throughout the CSU system in a wide-ranging discussion of strategies for significantly increasing the production of mathematics and science teachers—thereby laying a foundation for each campus' role in expanding math and science teacher preparation. The Summit, in this fashion, addressed the most significant human resource issues that California and its science- and technology-based industries face today.

Background

Leaders across American society have recognized the critical importance of recruiting and training more and better-prepared mathematics and science teachers for the nation's schools. This was a central conclusion of *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, the recently issued report of National Academy of Sciences' Committee on Prospering in the Global Economy of the 21st Century.

The Committee, which included among its members several current and former industry chief executive officers, university presidents, researchers—including three Nobel prize winners and former presidential appointees—reported as the highest priority action to be taken: Annually recruit 10,000 science and mathematics teachers. Its second priority action was: Strengthen the skills of math and science teachers through training and education programs. And its third priority action was: Enlarge the math and science pipeline by increasing the number of students who take advanced science and mathematics courses during high school.

The recommendations of this National Academy of Sciences Committee conform closely with the design the California State University is initiating within its landmark Mathematics and Science Teacher Initiative. The May 2004 compact between Governor Schwarzenegger and California's higher education community identified the critical shortage of K-12 mathematics and science teachers as a major priority. A commitment was made by the California State University system to double the production of mathematics and science teachers by the year 2010.

Summit Partners and Participants

The California State University Chancellor's Office co-sponsored the Summit with a number of partners, including Apple Computer, The Boeing Company, the California Space Authority, the California Council on Science and Technology, the Center for the Future of Teaching and Learning, Edison International, the Majestic Realty Company, Morgan Stanley, Jet Propulsion Laboratory, and State Farm Insurance. The attendees included representatives from throughout the CSU system, California's other K-12 and higher education institutions, and business, foundation, and governmental agency leaders.

Note: The complete agenda and presentations from the Summit are available at:
www.calstate.edu/teachered/msts

Memorandum of Understanding Pathways to Mathematics and Science Teaching

The California State University
The California Community Colleges

California faces a shortage of fully credentialed and qualified mathematics and science teachers and has within its current teaching workforce in these fields a much smaller proportion of teachers from diverse backgrounds than are represented in the K-12 student population.

California's community colleges enroll half of all freshman college students in California and the majority of underrepresented college freshmen. Coordinated efforts between the California Community Colleges (CCC) and the California State University (CSU) can help to increase the number of credentialed teachers in mathematics and science, including teachers from underrepresented backgrounds, and to ensure alignment between community college programs of study and subsequent university preparation for teaching in these fields.

Therefore, the CSU and the CCC agree to implement the following provisions of this Memorandum of Understanding:

1. CSU and CCC will collaborate in publicizing the significant need for mathematics and science teachers in California and the opportunity to complete an articulated program of preparation that begins with lower-division preparation at the community college and is completed at the CSU.
2. CSU and CCC will make available Web-based resources that provide recruitment, academic advising and financial aid information to CCC Transfer Center Directors, CCC Counselors, and CSU Teacher Recruitment Project Directors for supporting community college students interested in teaching careers. Financial aid resources will provide details on relevant grants, scholarships, and loan assumption programs and include assistance to community college students in acquiring APLE loan repayment awards upon transfer to a CSU campus with 60 semester units.
3. CSU and community college campuses will involve their respective mathematics and science faculty in aligning programs and coursework for community college students interested in teaching. They will (a) identify at least six units of lower-division coursework in the mathematics and science Lower Division Transfer Patterns (LDTP) relevant to preparing for teaching, and (b) include in this coursework, as appropriate, experiences that foster understanding of K-12 teaching, but do not reduce or eliminate course requirements either of the community colleges or necessary to maintain articulation with four-year institutions.
4. CSU campuses will establish regional Mathematics and Science Teaching Pathways Advisory Committees. These Advisory Committees will generally be established in connection with Teacher Recruitment Projects. The Advisory Committees will assist in the planning of recruitment activities and in the design of programs and courses in mathematics and science for transfer students. The Advisory Committees shall include representatives of community colleges, CSU mathematics, science, and education faculty, and other educators as appropriate.
5. CCC and CSU will actively promote cross enrollment and dual admissions programs for community college students interested in mathematics and science teaching. Examples of effective practices will be jointly disseminated by the respective Chancellor's Offices.

Note: This summary includes the primary substantive provisions of the complete Memorandum of Understanding.

Building Evidence Systems for Accountability and Improvement in Teacher Education: The California State University's Center for Teacher Quality

Background

With 23 campuses and an annual enrollment of more than 400,000 students, California State University (CSU) is the largest public university system in the world. Central to its core mission is the preparation of the education workforce in California. Close to sixty percent of the teachers credentialed in California each year are prepared by the CSU. Chancellor Charles Reed and the CSU Board of Trustees have made high-quality teacher preparation one of the highest priorities of the system. Following a decade of unprecedented growth and reform in public K-18 education, the CSU Board of Trustees in 1998 embraced systemwide efforts to improve teacher preparation in a policy entitled *CSU's Commitment to Prepare High Quality Teachers*.

Beginning in 2001, each CSU campus participates annually in the Systemwide Evaluation of Teacher Education Programs. A central purpose of this evaluation is to provide information that the Deans and other campus leaders can use in making improvements in teacher education programs. Rather than viewing the evaluation as a one-time event, the Deans committed to an ongoing evaluation that would provide them with fresh data about the quality of their programs each year.

As a partner with public schools in the education enterprise, the CSU uses feedback information at two levels: Individual CSU campuses make improvements in teacher preparation programs based on the many specific evaluation findings, and the CSU system undertakes systemwide initiatives when evaluations reveal systemwide needs. The CSU credits teachers and administrators for these opportunities to strengthen the teaching profession.

The CSU knows of no other system of four-year universities that has relied on teacher and administrator feedback for so many years. CSU teacher education programs have benefited richly from the advice and guidance of K-12 professionals.

The CSU Systemwide Evaluation consists, structurally, of the six interrelated sets of activities and outcomes of teacher preparation shown in Figure 1 below. Taken together, the evaluation of these six areas provides a rich and detailed picture of program quality and effectiveness.

Figure 1

