

Recommendation 1: *Create a “California Campaign for S&T Talent”*

Develop, recruit and retain the best and brightest students, teachers, scientists and engineers from within the United States and throughout the world.

- Create a “California Campaign for S&T Talent” to recruit top STEM talent from other states and countries that includes activities such as a state skill-based immigration advisory service, tax incentives, housing assistance, immigration assistance, and pro-active recruiting.
- Reshape the debate from immigration to skill-based recruiting. Highlight our heritage as a country of immigrants and constructively address the obstacles to attracting and retaining the best S&T talent in the world in the face of post 9/11 pressures/concerns.
- Pilot a proactive skill-based immigration program in California for accelerating the process of becoming a permanent resident alien, and that focuses on recruiting and capitalizes on our unique cultural and economic position in the country.

Teacher Recruitment and Retention. Develop a systematic out-comes based strategy for recruiting and retaining talented and dedicated individuals with strong academic and work experiences in mathematics and science into the teaching profession, especially at, but not limited to, the middle and high school levels.

- Create math/science teaching career ladders including incentives such as teacher fellowships for prospective teachers; paid summer government and private sector internships for math/science teachers; continued and expanded state financial support for National Board Certified teachers; \$200,000 state awards each year for top 100 secondary math/science teachers and their schools; substantial state incentives for districts to pursue salary differentials for fully prepared mathematics and science teachers; and participation in the proposed Adjunct Teacher Corps (consistent with President Bush’s American Competitive Initiative).
- Challenge business/industry leaders to provide a substantial portion of the necessary funding for science and mathematics teacher salary ladders.
- Create the Governor’s Teach for California program with a special emphasis on recruitment and retention of math and science teachers.
- Create a California Math and Science Teacher Academy for Prospective Teachers (composition roughly half college undergrads and half re-entry professionals) modeled on the United States military academies.
- Create a partnership between colleges and universities and Teach for America (TFA), and thus both expand recruitment of academically talented STEM majors into teaching.

Teacher Preparation and Professional Development. Ensure that teachers at all levels receive the needed training and support to assist students in meeting California’s rigorous academic math and science standards.

- Direct the California Commission on Teacher Credentialing and California’s 94 higher education institutions that prepare teachers to review their course requirements for elementary and middle school teachers and report to the Governor steps that will

be taken to insure that all such candidates receive adequate preparation in the teaching of math and science.

- Ensure that experienced science and math teachers have access to high-quality professional development.
- Provide funding for experienced science and mathematics teachers or specialists to act as mentors to novice teachers at all levels.
- Allocate funds for the state's 40+ public and private science centers to become proactive participants in providing regional science and math professional development to K-12 educators.
- Expand AB 466 funding so that faculty in low-performing schools can receive professional development training in science similar to what is currently provided in the curriculum areas of math and English language arts.
- Provide 50% tuition funding (districts would provide the other 50% of funding) for all California teachers who attend high-quality math and science summer institutes.

Lengthen the school day, especially at the elementary and middle school levels, to enable enough time for adequate science and mathematics instruction to meet state standards.

- Work toward lengthening the school day to ensure that all students — especially those in low-performing schools — have access to science instruction at the elementary and middle school levels. This change would put California on par with competitor nations.
- Provide funding for demonstration projects to test this concept, explore various approaches to lengthening the day, develop models and disseminate them.

Increase the number of STEM graduates at all levels, especially among Hispanics who represent the fastest growing and soon to be largest segment of California's population.

- Invite academia, industry and state government to participate in a collaborative program aimed at increasing the number of STEM graduates in California by enhancing the stature of these fields and addressing the pipeline. Establish a proactive consortium with participating firms contributing funds to be matched by the state for STEM competitive scholarships. Also, consider novel approaches to fund STEM education costs and remove disincentives wherever possible.
- Issue challenges, incentives and guidelines to keep programs aimed at increasing STEM graduates on track to achieving the expected progress. For example, challenge universities to produce more scientists and engineers with financial and recognition incentives, such as fellowships and traineeships. Keep track of trends in enrollment and completion rather than absolute numbers.
- Provide incentives to teachers and mentors. Create incentives for teachers to use storytelling and provide them with facilitating tools. Also create incentives for university mentors to engage in high school outreach.
- Focus on recruiting students from underrepresented groups to pursue STEM degrees, with a special emphasis on undergraduates, and the transitions from community colleges to four-year institutions and to graduate schools.

Appoint a permanent independent commission to articulate and sustain a sufficiently funded integrated strategy for improving science and mathematics education, ensuring that science assumes its full and necessary place in the core curriculum.

- Organization: 12 members appointed by the Governor for 6-year staggered terms. All members would be industry leaders or distinguished scientists or engineers, and be advised by a 12-member Advisory Committee of Educators (ACE) that includes classroom teachers appointed by the commission. This commission could be located within a new cabinet-level office focusing on S&T policy (see Recommendation 3).
- Activities:
 - Biennial Report: The commission would issue biennial reports noting progress (or lack thereof) in improving math and science education in California and recommendations for improvement.
 - Assessment: By consulting with ACE and by examining the results of research, the commission would closely monitor the effects of the state's new high-stakes science assessment on science teaching and learning.
 - Focus on critical issues: The commission would focus attention on critical issues in science and math education, such as the preparation of elementary teachers to teach math and science, and the science and math standards and curricula.
 - Advocacy: Members of the commission (and ACE) would be responsible for education and advocacy concerning its report with state government leaders as well as with leading newspapers, education, business and civic organizations.

Recommendation 2: Champion S&T in California. Create a legacy as the state's champion for excellence in science and technology education, research, and innovation.

Position California as the national leader in S&T.

- Create various state, national and international forums to position California at the vanguard of S&T research, discovery and innovation and improving K-12 science and mathematics education, with a focus on maintaining the state's leadership in an increasingly competitive world. Develop messages about S&T as a way to address critical issues in the state, such as energy, healthcare, transportation, advanced manufacturing, and infrastructure.

Raise the stature of S&T careers to make them more attractive.

- Use the Governor's unique blend of experience as an actor, producer and political leader to exploit California's central, unique roles in both the entertainment and sports industries and in science and technology.
- Establish a small working group of leaders from the entertainment industry and S&T to raise the visibility and stature of research and technical careers. Integrate S&T and artistic creative processes to make S&T careers "cool" and highly visible.
- Advocate the use of storytelling skills to engage culturally and ethnically diverse students and capture their imagination in S&T. Illustrate how S&T enables the visualization of creative storytelling in Hollywood, and empower educators to inspire the next generation of S&T leaders by using state-of-the art pedagogy and information technologies.

Recognize California's Leadership in S&T.

- Establish an annual "California Innovation Awards" to publicly celebrate and honor Californians in STEM fields of importance to the state — Nobel laureates, honored teachers, innovation leaders — who have made a major impact to their field. The competition shall be open to nominees from both the public and private sector. Hold an "academy awards" like event seeded with well-known public figures, actors, artists and sports stars as participants/co-hosts.
- Work with the entertainment industry and involve well-known Hollywood role models and star athletes to develop a public information campaign that communicates key messages about STEM education, teaching, research and innovation and how it impacts the state's economy.

Recommendation 3: S&T Policy Advice. Create a cabinet-level advisory function to the Governor to highlight the importance to the state of S&T.

Create a high-level science and technology policy function, similar to the White House Office of Science and Technology Policy.

- This organization would be the state functional equivalent of the White House Office of Science and Technology Policy (OSTP), and report directly to the Governor.
- Its leader would be a nationally recognized S&T leader who also serves as S&T Advisor to the Governor.
- Responsibilities would include 1) recommending the state's S&T research priorities and advising on budgetary matters dealing with S&T issues; and 2) advising on policies that will make California the most successful place in the world for STEM education at all levels, research at the frontiers of knowledge, and innovation.
- Examples of functions:
 - Develop a research agenda to identify "California's Grand Challenges in S&T" — key areas in which California can invest and build "substrates for the future." The goal is to identify and instigate creation of the next generation of technologies that will benefit the state, and from which new innovation, new industries and economic development will emerge.
 - Lead a "rapid-response" effort within the Governor's office to identify opportunities and enable California to compete successfully for new federal or industry funds.
 - Work with the public and private sectors to ensure that state and federal investments in S&T contribute to the state's economic prosperity, environmental quality, and security.
 - Draft policies and manage the "Grand Challenges in Science and Technology" and "State Innovation Fund" (as described in Recommendation 4).
 - Solicit objective analyses of S&T issues that impact the state, such as:
 - A review of the drivers of innovation and competition in other states and countries so as to inform the Governor about the most competitive and innovative practices that California can adopt.
 - A survey of S&T policy functions in other states.
 - Biennial reports, by an appointed permanent commission (see Recommendation 1), to articulate a sufficiently funded integrated strategy for improving science and mathematics education in California.
 - Develop long-term responses to the complex issues raised in the National Academies' report, establish a bi-partisan task force, with balanced participation from industry, academia, national laboratories and state government, to take a broader holistic view of the issues and use an integrating, systems approach to develop a "big picture" road map for California.

Endorse the establishment of a complementary joint legislative standing committee on S&T to set a legislative agenda for state S&T issues

Recommendation 4: *Invest in S&T Research and Innovation in California*

Fund research on “California’s Grand Challenges in S&T” that are identified by the Governor’s S&T policy advisor.

- California’s Grand Challenges in S&T are a way to rally public, private, university and industry support in strategic areas for research and innovation that are important to and will benefit California, such as clean energy. Strategic research funding in selected areas would, by design, leverage existing investments such as facilities, equipment, and computing that created the biotechnology, information technology, and nanotechnology industries, and jumpstart California’s capacity for a competitive edge in these new research areas and in new, advanced manufacturing.

Create a “State Innovation Fund” focused on strategic investments in California that could provide matching monies and increase the likelihood of success of worthy projects from the state in national and international competitions.

- Establish a new, flexible, streamlined “innovation fund” of \$50 M per year, managed by the new science advisor (or by a non-partisan group), to respond to fast-moving federal matching fund requests or to make seed investments in newly emerging scientific research opportunities of strategic interest to the state. Focus the initial investment in California’s areas of existing strength such as energy, the environment, biotechnology, information technology and telecommunications.

Support and exploit existing state S&T assets.

- Maximize the potential of previous state investments and provide necessary operating funds of \$40 M per year for the California Institutes for Science and Innovation that have proven successful thus far in showing more than a 2-1 return on investment. Require an industry led review after seven years of the state’s return on its investment that is tied to certain economic benchmarks.
- Inventory California’s existing assets (locations and capabilities) of advanced research instrumentation facilities (ARIF). Identify immediate ARIF needs and create a prioritized list of investment needs for the upcoming fiscal year to enable the state to compete effectively for federal dollars, and also to identify areas for strategic state investments.
- Create a common electronic grants portal. By Executive Order, require that all new state research-funding opportunities be listed in a common electronic portal. This site should be modeled on the federal site “grants.gov” and allow for easy keyword searching across agency solicitations.

Endorse policies that foster innovation through public-private partnerships.

- Examine and, as appropriate, revise state policies, such as conflict-of-interest laws, that inhibit creative collaborations between the public and private sectors, especially between researchers in state-funded universities and industry.
- Provide matching funds to industry for research that responds to state needs.

- Endorse legislation that provides clarity and reduces conflicts related to intellectual property derived from state-funded research and owned by state-funded research institutions.
- Develop tax incentives for industry investments in science, technology, engineering and mathematics education, such as industry support for high-quality professional development for science and mathematics teachers (on site, in universities or in informal learning centers); for contributions to science and mathematics teachers preparation in institutions of higher education; or programs to enhance K-12 academic preparation, especially for students in low-performing schools.
- Appreciating that much of the innovation in California comes from small companies and that they serve as an attractive S&T employment opportunity, set up a commission to audit the state's current support packages/services for small companies and find ways to simplify, enhance and effectively communicate improved initiatives.

Support tax incentives for R&D investment in California.

- Simplify the tax code by instituting an across-the-board tax credit (similar to New York) for industrial R&D conducted in California.
- Develop tax incentives for university-industry partnerships.
- Design a targeted business plan for the state to attract new investments in research and manufacturing, and new industries.