Current Status of STEM Workforce

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California Council on Science and Technology

February 2, 2009
Sacramento

CCST - CA's S&T Policy Advisory

- Nonpartisan, not-for-profit corporation established in 1988 by state legislation
- Designed to offer expert advice to the state government and to recommend solutions to S&T related policy issues
- Work funded by state agencies, foundations, industry
- 15 Board members, 28 Council members, 129 Fellows, 12 Cal TAC
  - 5 Nobel Laureates, 81 National Academies members, 12 National Medals of Science or Technology

Recent work: Climate change, Personal Genomics Healthcare, STEM education, Intellectual Property Nanotech, Biotech, Healthcare Information Technology, Energy, Transportation

- Sustaining institutions: University of California, California State University, California Community Colleges, Stanford University, University of Southern California, California Institute of Technology

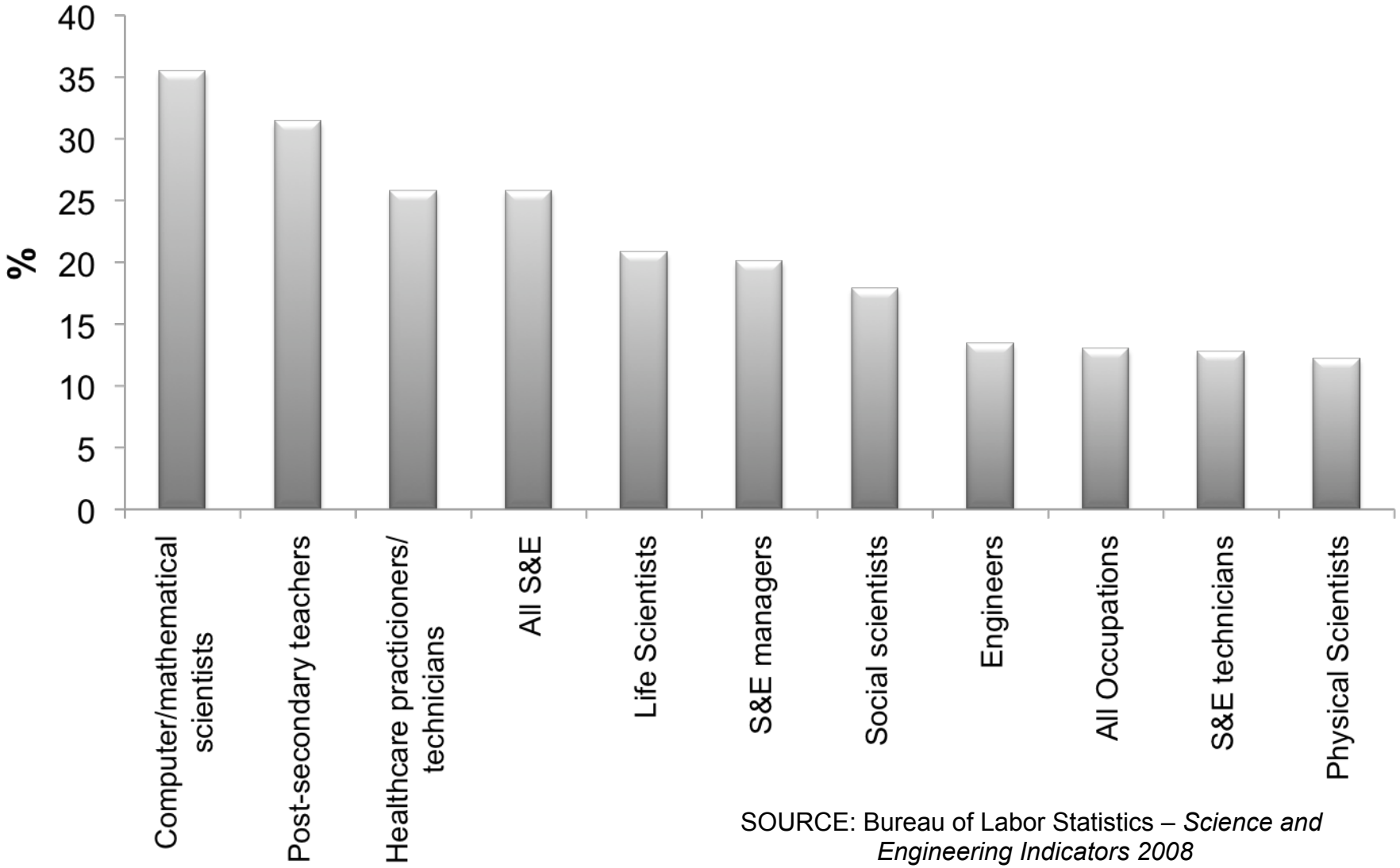
- Affiliate members: Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratory/California, Stanford Linear Accelerator Center, NASA Ames, NASA Jet Propulsion Laboratory

Projected Future S&T Workforce

- 2006 - 2016 health care practitioners and technicians will add the most new jobs (1.4 million; 19.8% growth rate)
- Computer and mathematical occupations will grow the most quickly (0.8 million jobs; 24.8% growth rate)
- Other related occupational groups such as architecture & engineering (0.3 million jobs, 10.4% growth rate) life, physical, and social sciences (0.2 million jobs, 14.4% growth rate)
- Of the 30 fastest growing occupations, with a growth rate of 27% compared to the 10% average for all occupations, many are science and technology-related.

Source: Bureau of Labor Statistics

Projected increase in employment, for S&E and selected other occupations: 2004 - 14



SOURCE: Bureau of Labor Statistics – *Science and Engineering Indicators 2008*

Workforce Challenge

Need workforce that is highly technical with:

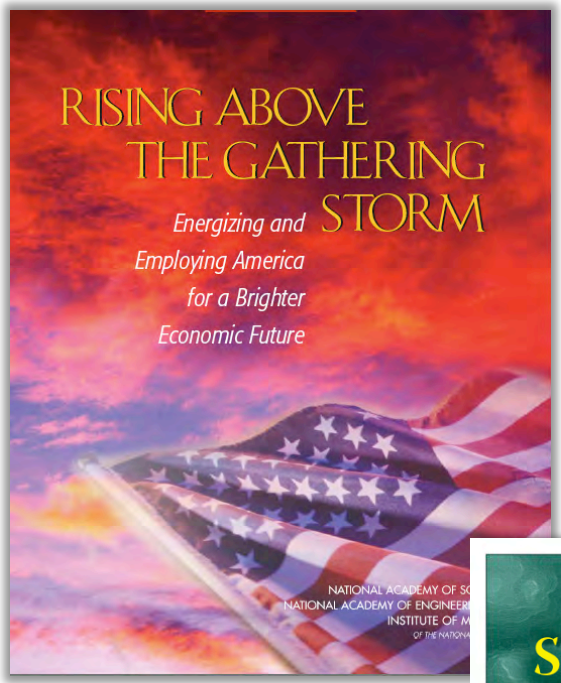
- bio, info, nano -- technology skills
- multilanguage, multicultural skills
- business skills
- can operate in a world economy

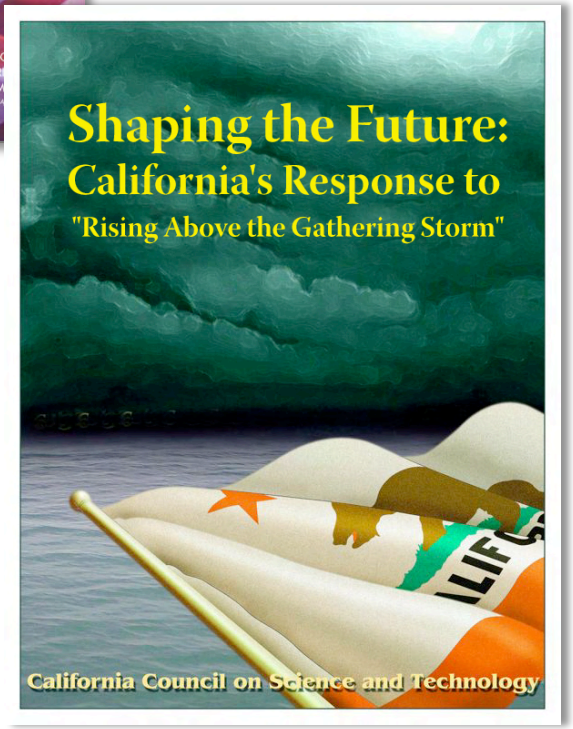
The skills needed to be successful competitors in the modern world economy

- The ability to apply that capacity for abstract thought to complex real-world problems—including problems that involve the use of scientific and technical knowledge—that are nonstandard, full of ambiguities, and have more than one right answer.
- A high capacity for abstract, conceptual thinking.
- The capacity to function effectively in an environment in which communication skills are vital – in work groups.

Ray Marshall and Marc Tucker - 1992

Thinking For A Living: Education And The Wealth Of Nations





"I would like to request that CCST use its resources - experts in all fields of science and technology who are committed to a strong and vibrant California economy - and report back to me on how the State can better understand and use the assets at its disposal to build the infrastructure needed to lead the economy of the future."

-Governor Arnold Schwarzenegger

4 CEO-led Task Forces CA's version of the NA's four main recommendations

Primary Recommendations

- Increase the talent pool by vastly improving K-12 science and mathematics education
- Ensure top place in the world to innovate
- Make an attractive setting in which to study and perform research - best and brightest students, scientists, and engineers
- Sustain and strengthen commitment to long-term basic research that has the potential to be transformational

Drivers for Sustainability of an Innovation Environment

- Economic growth and Globalization
- Demographic Changes
- Security and stability
- Climate Change

"The only way we can hope to compete is with brains and ideas that set us above the competition - and that only comes from investments in education and R&D"

Craig Barrett

What is Innovation?

- Creation and application of new ideas that generate economic and social value
- 1990s innovation – was technology and its application
- 2008 now about new strategies, products and processes, new business models and new markets

Shifting Sources of Success

From:

Inherited Assets

- Geography
- Climate
- Natural Resources
- Population

To:

Created Assets

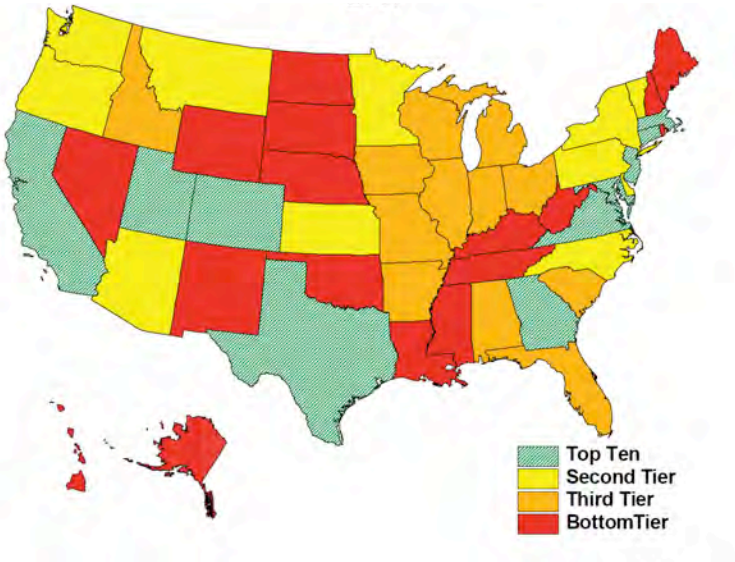
- Top universities
- Research centers
- Talented people
- Entrepreneurial culture
- Networks
- Vibrant downtowns

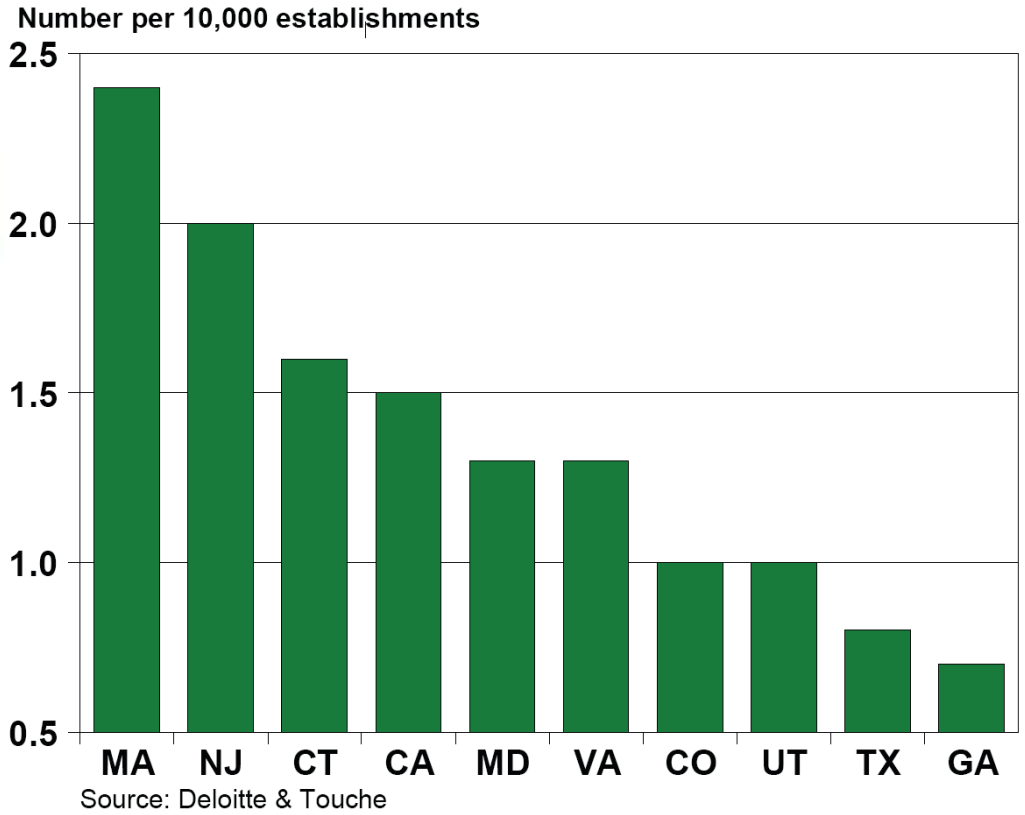
Solutions

- Boost the development of skilled human talent that powers innovation
- Improve the economic environment and institutions that support innovation
- Respond to the changing global marketplace

Number of Technology Fast 500 companies per 10,000 establishments, 2007

- measures a state's relative performance in generating fast-growing high-tech enterprises



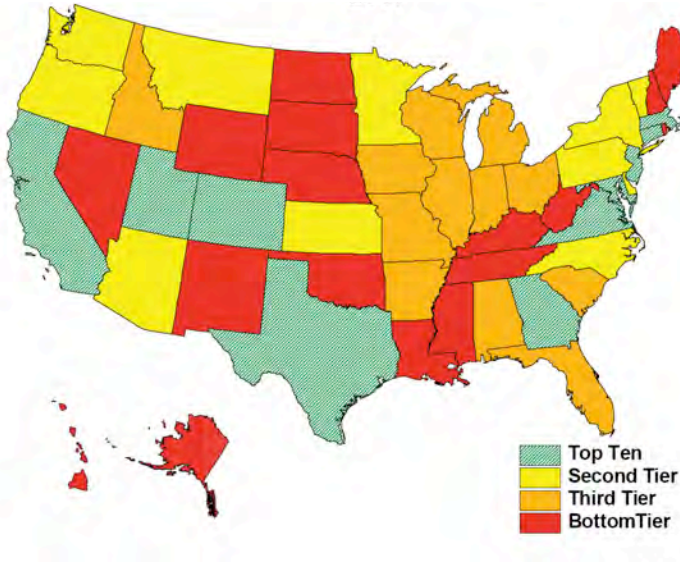


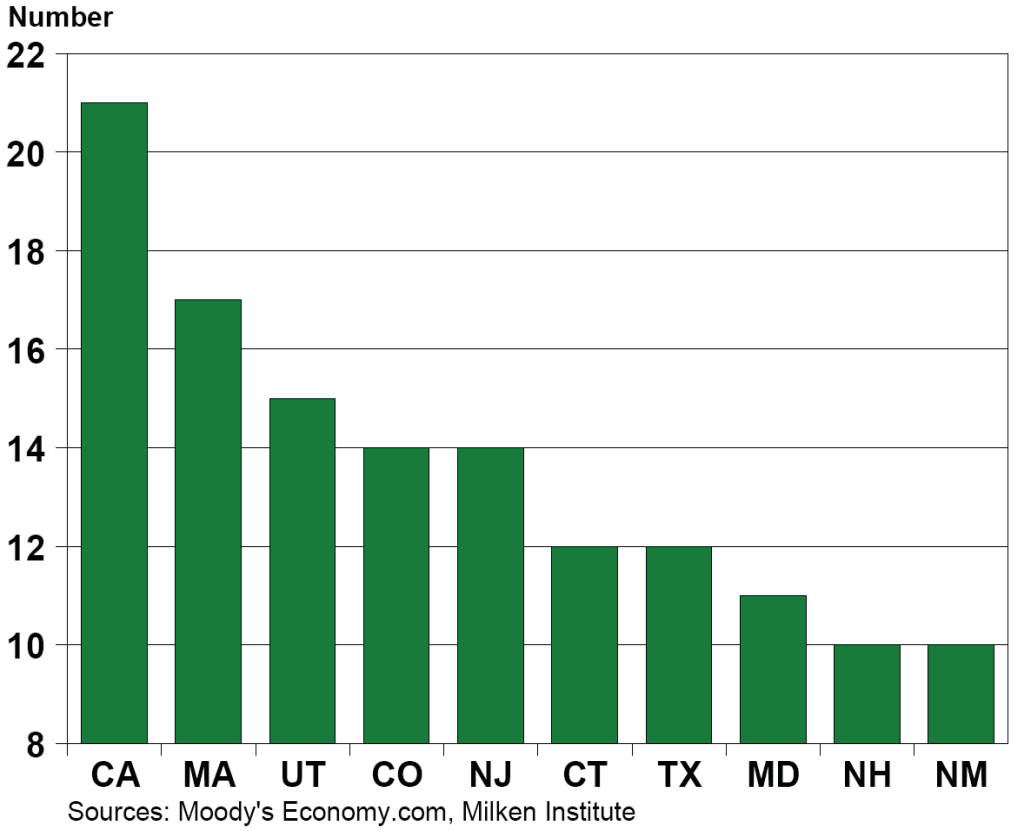
Source: Deloitte & Touche

Source: Milken Institute

Number of High Tech industries with Location Quotient higher than 1.0, 2006

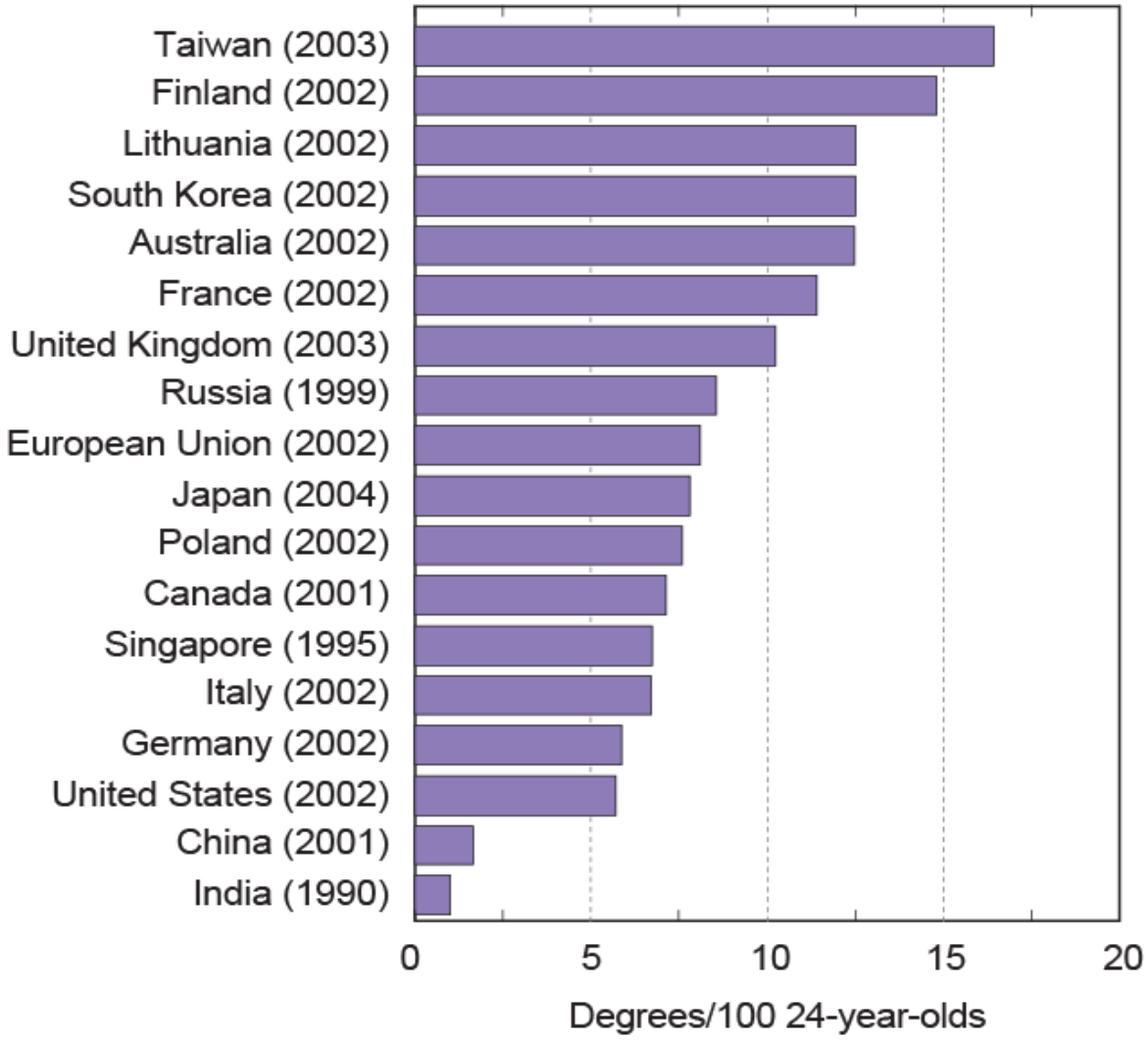
- location quotient measures a state's level of employment concentration relative to the industry average across the United States





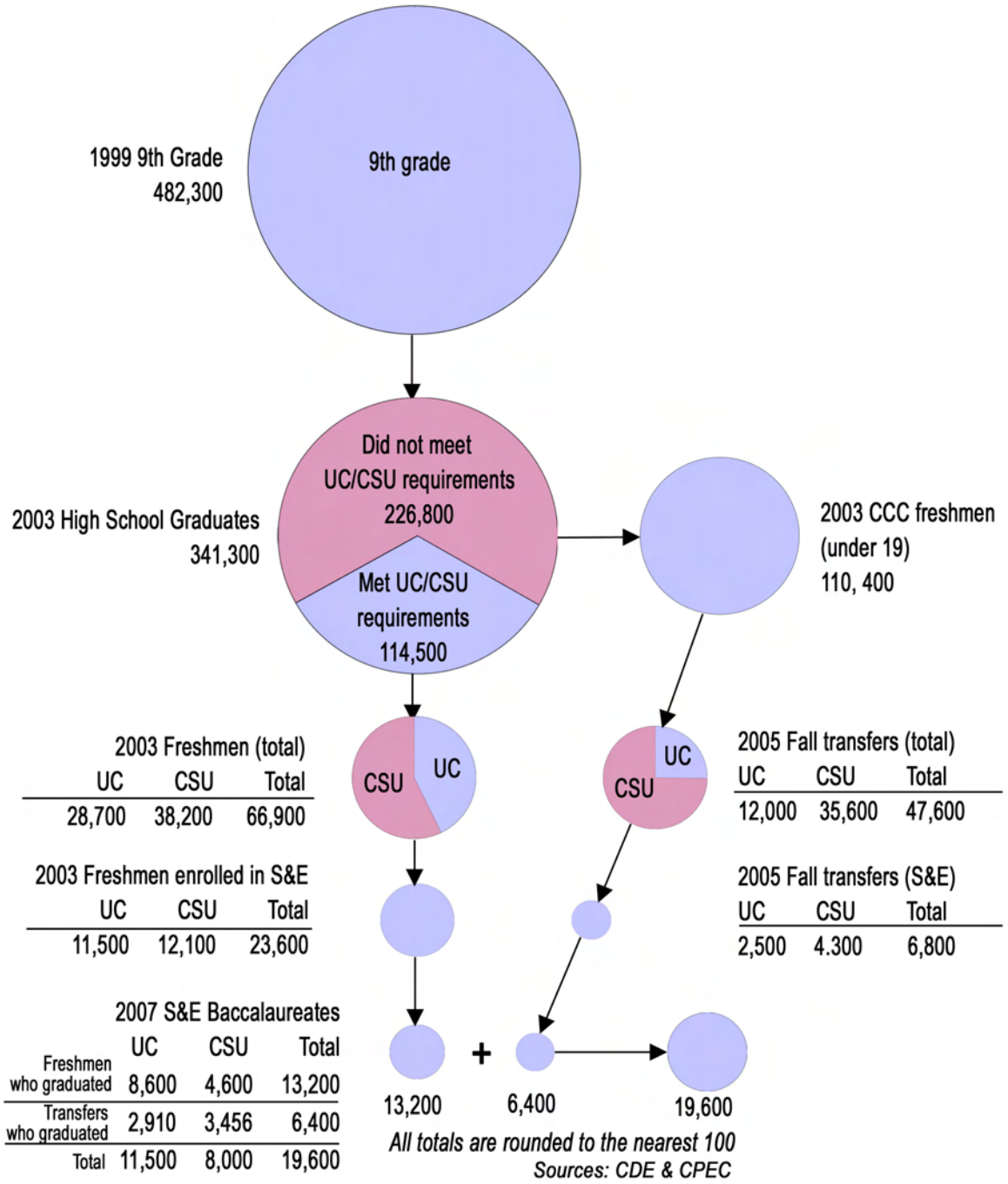
Source: Milken Institute

NS&E degrees per 100 24-year-olds, by country/economy: Most recent year



NS&E = natural sciences and engineering

Science and Engineering Indicators 2006



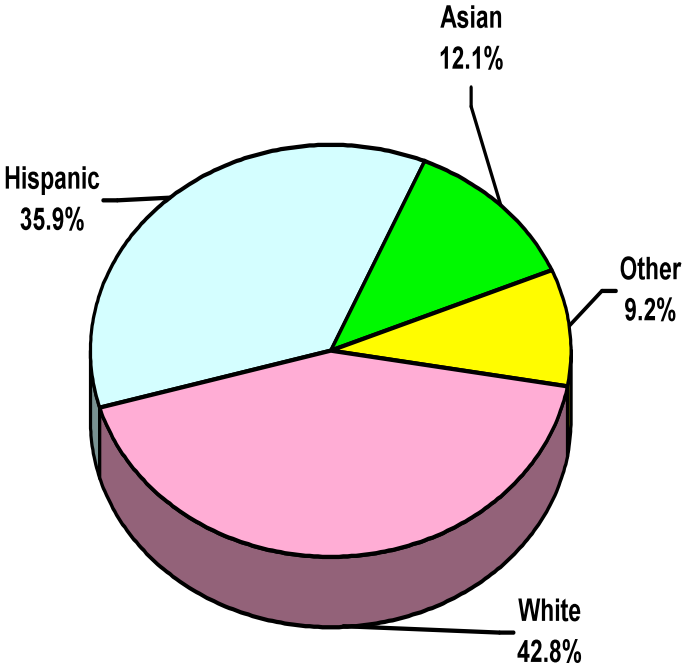
The Shrinking Pie

Only 4% of 9th graders graduate in S&E

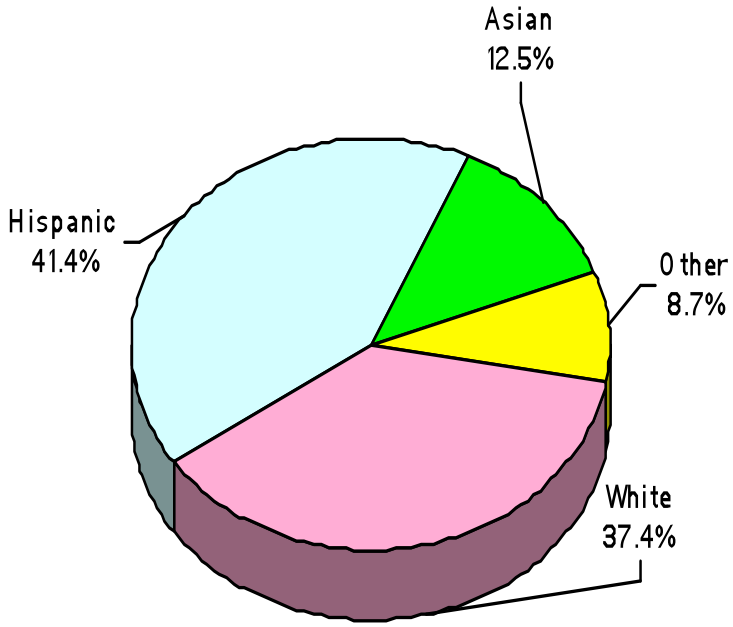
Up to 60% lost in college

32% CCC transfers

California's racial diversification 2006-2020 projection



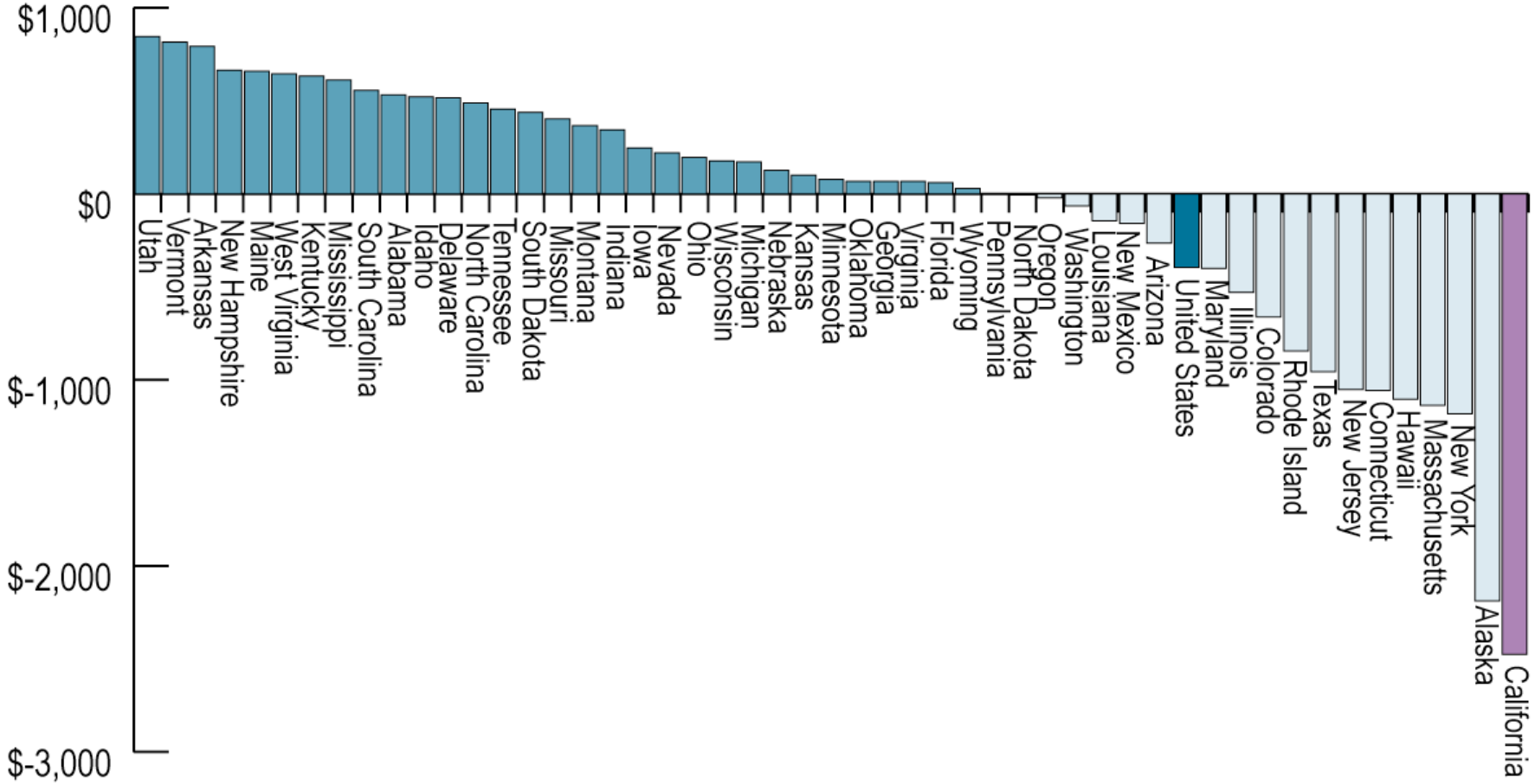
2006



2020

Source: Department of Finance.

Failure to achieve in education will have economic consequences



Projected Change in Personal Income per Capita by State, 2000-2020
Source: National Center for Higher Education Management Systems (2005)

"While most descriptions of necessary skills for children do not list "learning to learn," this should be the capstone skill upon which all others depend.

Memorized facts, which are the basis for most testing done in schools today, are of little use in the age in which information is doubling every two or three years. We have expert systems in computers and the Internet that can provide the facts we need when we need them. Our workforce needs to utilize facts to assist in developing solutions to problems."

Robert Galvin and Edward Bales,
Motorola, 1996