

Secondary Math and Science Teacher Preparation in California

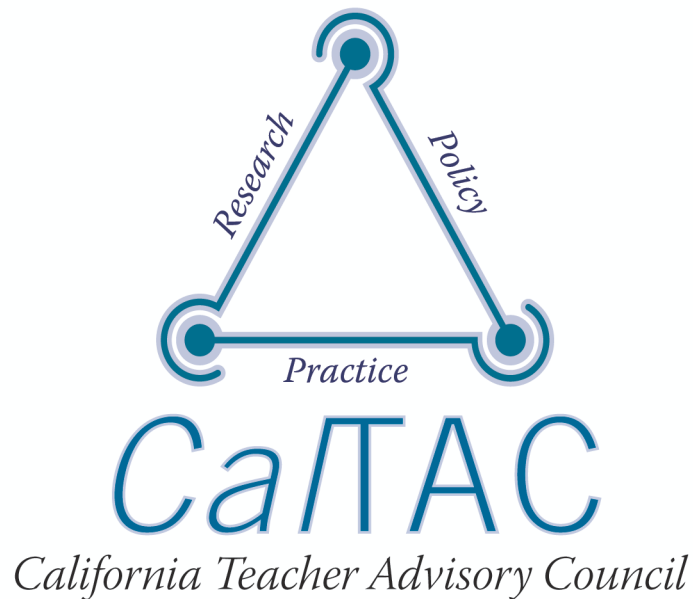
Susan Hackwood

California Council on Science and Technology

About CCST

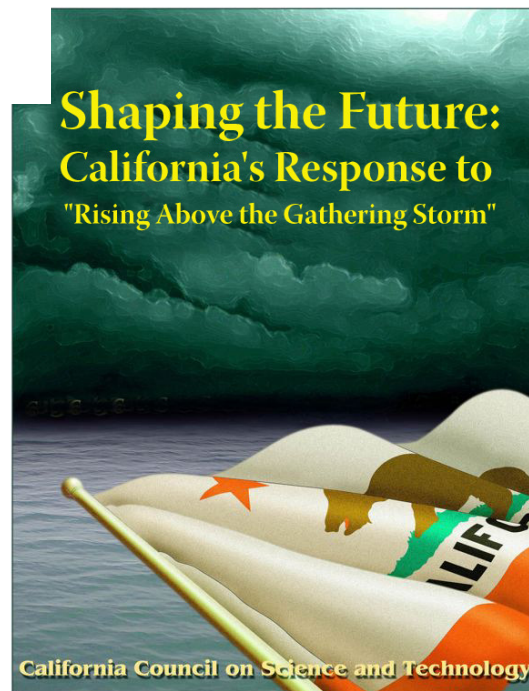
- Nonpartisan, not-for-profit corporation established in 1988 by state legislation
- Designed to offer expert advice to the state government and to recommend solutions to science and technology related policy issues
- **Sustaining institutions:** University of California, California State University, 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, Jet Propulsion Laboratory
- Work funded by state agencies, foundations, industry
- 15 Board members, 28 Council members, 120 Fellows, 12 Cal TAC
 - 6 Nobel Laureates, 79 National Academies members, 11 National Medals of Science or Technology
- **Recent focus:** STEM education, Intellectual Property, Nanotech, Biotech, Energy, Transportation, Health Information Technology

Important to get teachers' voices involved in education policy



- **CCST includes California Teacher Advisory Council (Cal TAC), a group of 12 master science and math teachers**
- **Modeled after National Academies Teacher Advisory Council**
- **Provide an invaluable and previously absent connection between the teaching community and the educational experts and policymakers who are shaping California's educational system**

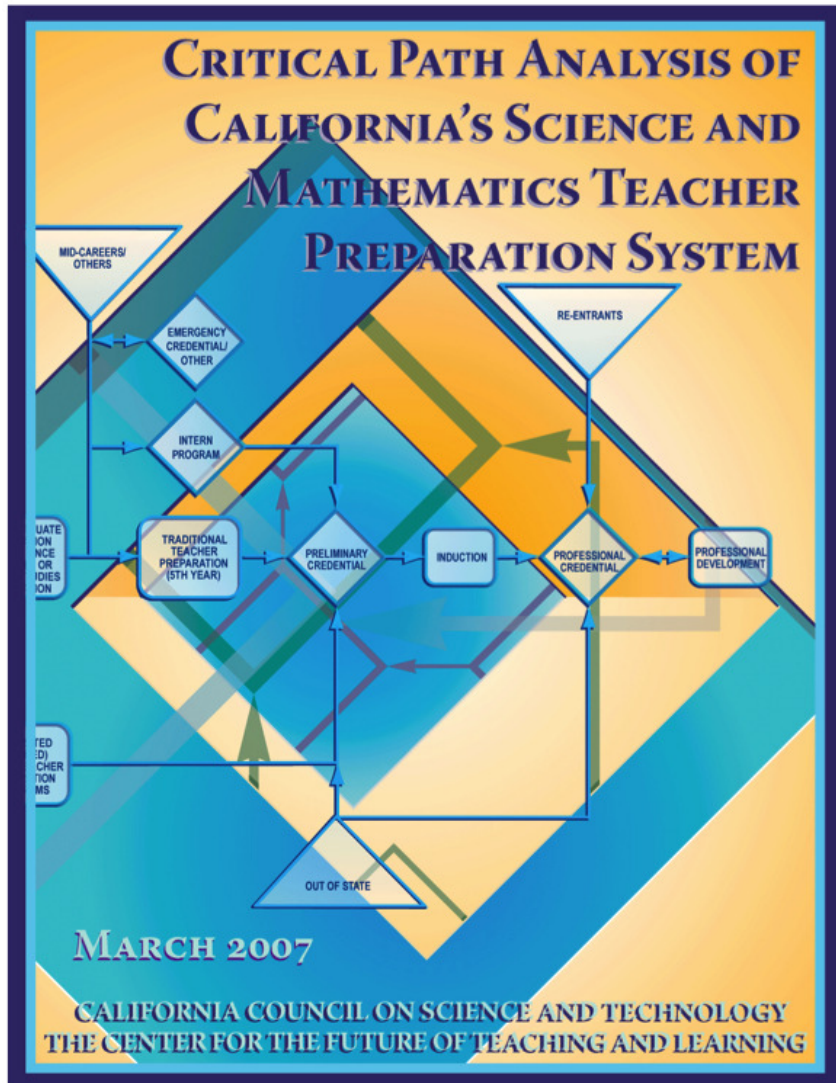
QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.



“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

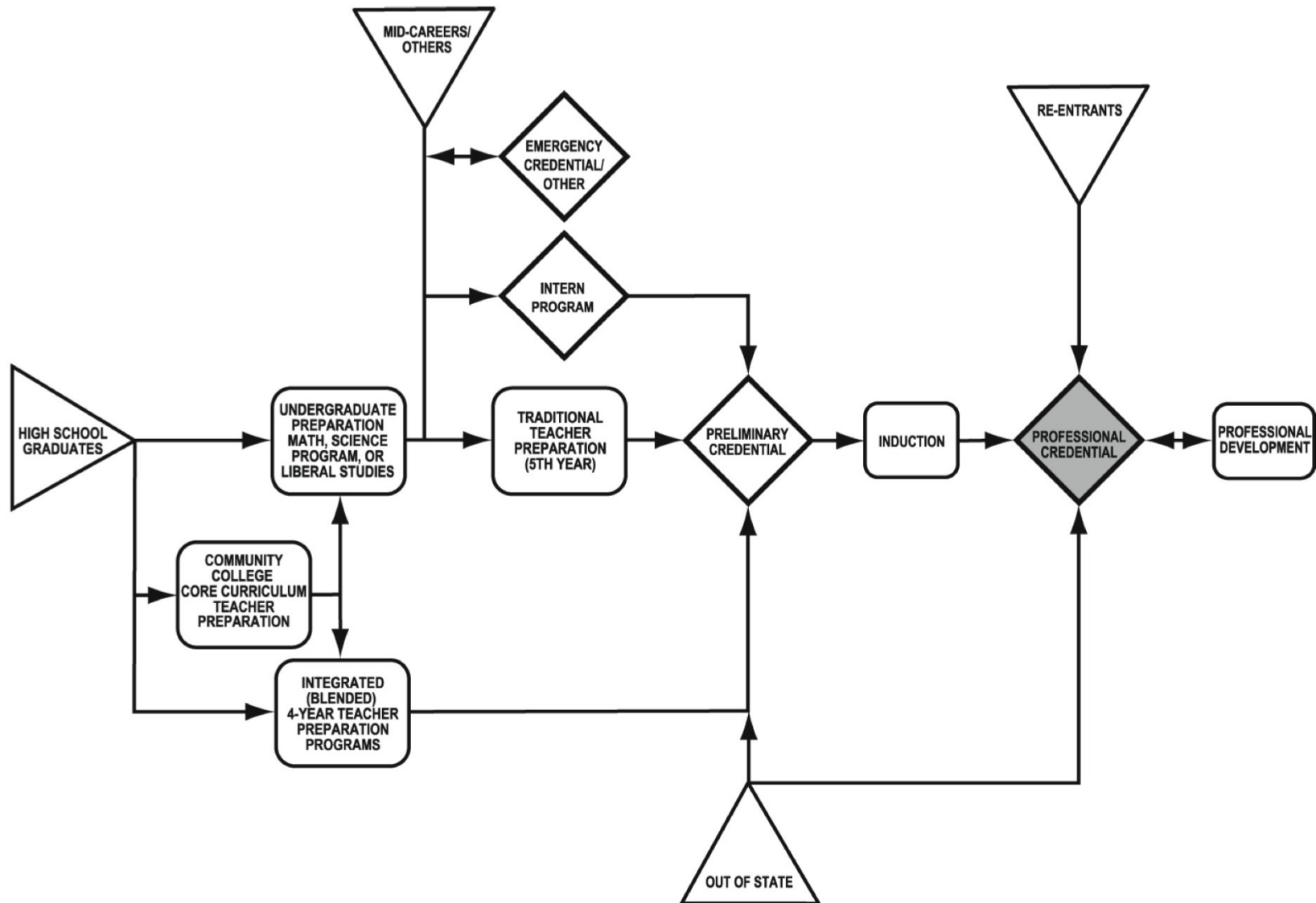
**4 CEO-led Task Forces
“California-ized” NA’s four main
recommendations**



- **Follows two previous CCST reports**
 - **California Report on the Environment for Science and Technology**
 - **Critical Path Analysis of California's Science and Technology Education System**

- **Collaboration between CCST and Center for the Future of Teaching and Learning**

Schematic Flow Diagram of the Teacher Preparation System-- Report addresses each step in process



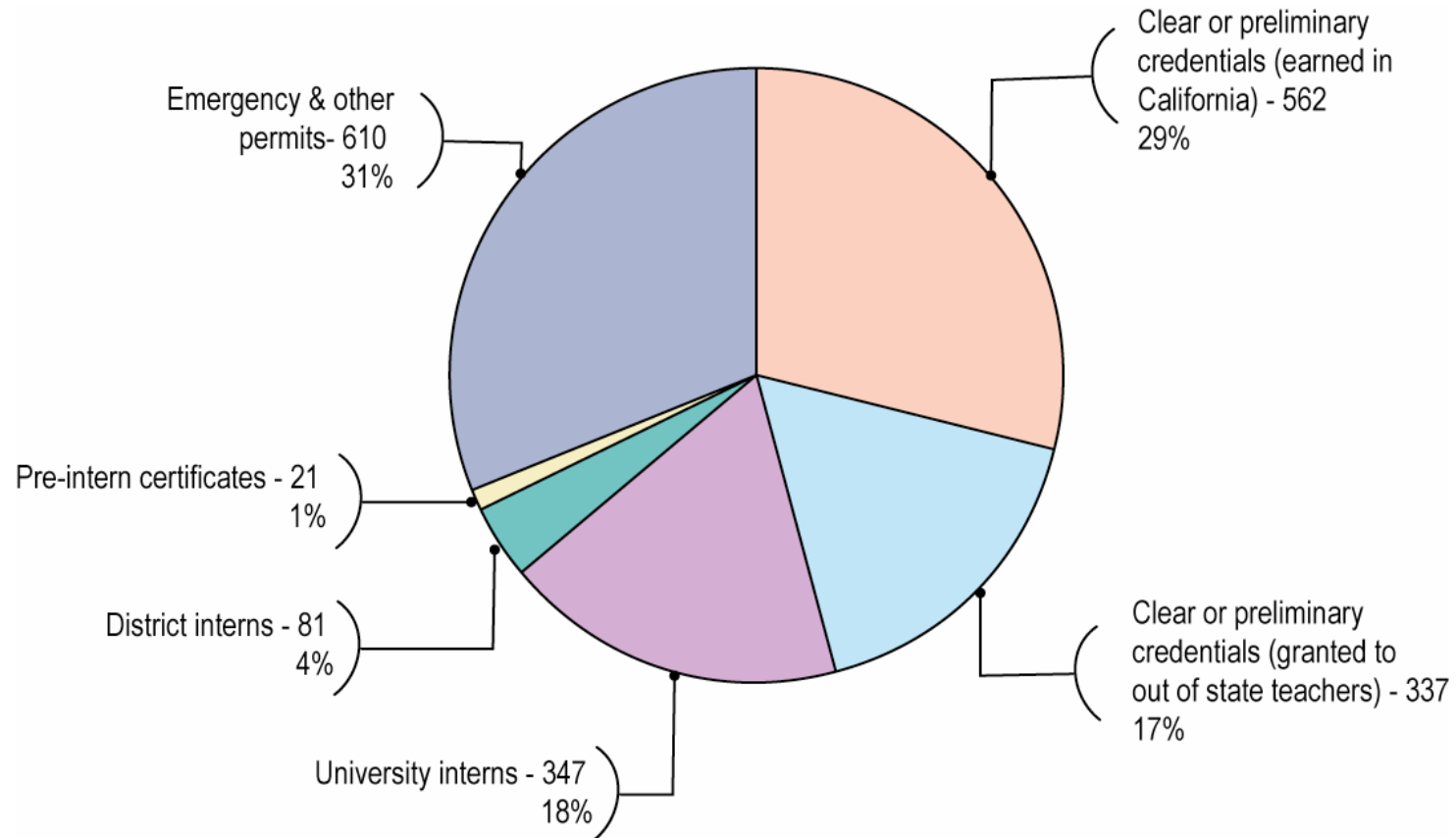
The system overall

- 307,000 teachers, over 6 million students
- Roughly 22,500 teachers teaching math and 17,500 teachers teaching science
- Percentage of underprepared teachers overall: 6% (23% of novice teachers) *[NB: Novice teachers include first and second year teachers]*
- Percentage of underprepared HS math: 12% (40% of novice teachers)
- Percentage of underprepared HS science: 9% (35% of novice teachers)
- Schools with most minorities have 4 times the number of underprepared math & science teachers (16% vs. 4% for math, 14% vs 3% for science)
- Schools with lowest API have approximately 4 times the number of underprepared math & science teachers (18% vs 5% for math, 16% vs 4% for science)
- 12% of math teachers, 9% of science teachers are teaching out of field, irrespective of API status

What are the trends?

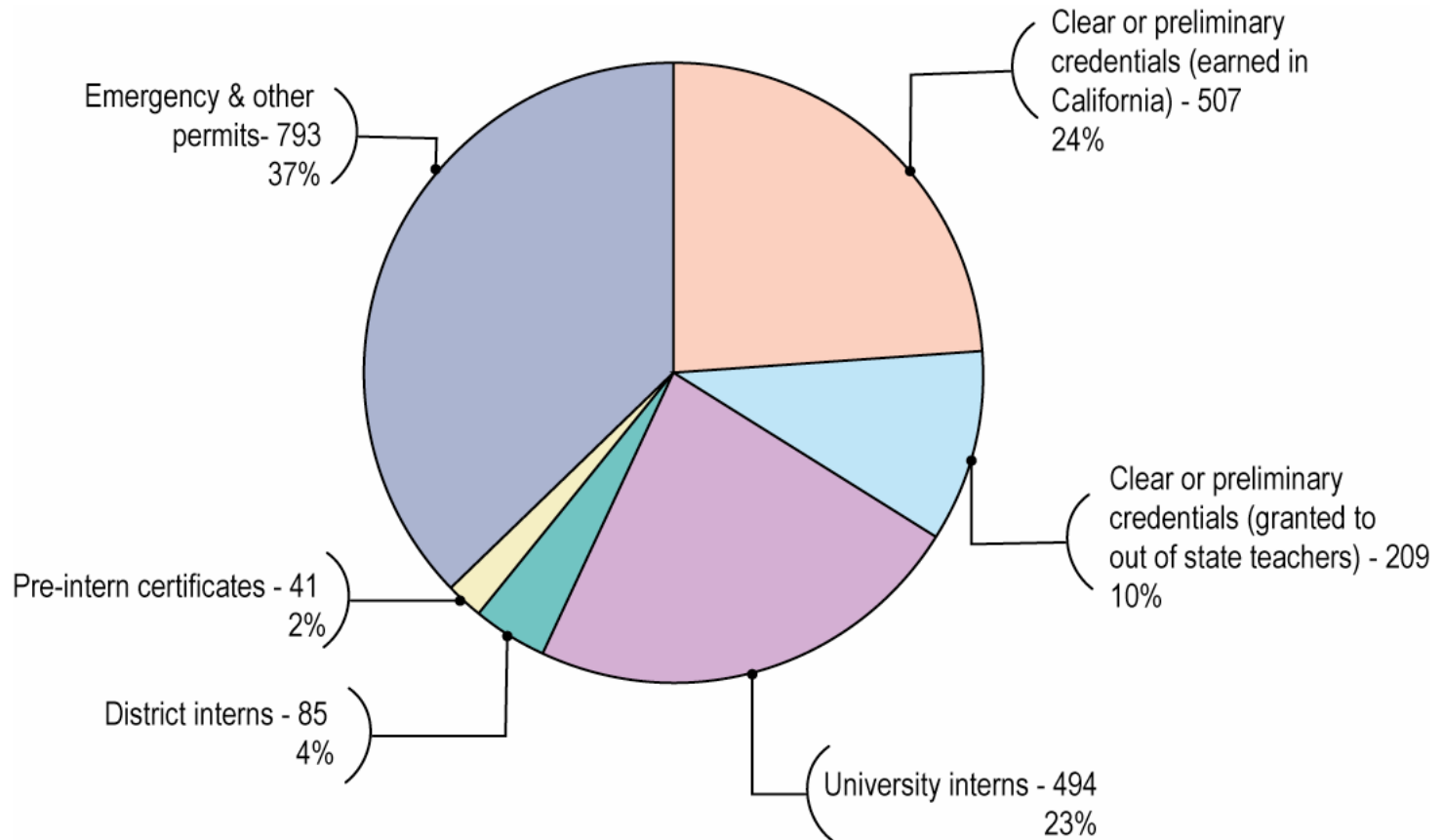
- **Roughly 2,000 math and science teachers leave the workforce each year due to normal attrition**
- **A third of CA's teachers are older than 50, half of those older than 55**
- **Conservative estimate of demand in next 10 years: 33,200 math and science teachers (20,000 due to normal attrition, 13,200 due to retirement)**
- **\$50,000 in taxpayer money lost for each teacher who leaves in first five years**

An estimated 54% of new science teacher hires do not hold a full or preliminary credential



***Estimated Number of Science Teachers Hired in 2004-05 in California,
by Credential Type
Source: CCST, 2007***

An estimated 66% of new math teacher hires do not hold a full or preliminary credential



Estimated Number of Mathematics Teachers Hired in 2004-05 in California, by Credential Type
Source: CCST, 2007

Key Findings – T CPA

1. Science and math **teachers matter**
2. CA **lacks a coherent system** to produce enough fully prepared science and math teachers
3. CA's current teacher preparation programs **do not meet the current demand** for fully prepared science and math teachers
4. In next decade, CA will face a shortage of fully prepared science and math teachers due to **attrition and retirement**
5. Strong trend toward **alternative teacher preparation** programs by prospective science and math teachers
6. CA needs more high quality **professional development** for science and math teachers
7. CA needs to examine the science and math preparation of **elementary school teachers**

Critical Path Analysis of California's Science and Mathematics Teacher Preparation System (key recommendations)

State government

- Support efforts to encourage teaching as a second career
- Support professional development for science and math teachers
- Establish a coherent system to recruit, prepare, assign and retain science and math teachers
- **Streamline pathway for students interested in teaching science and math between community colleges, CSU, and UC**
- Examine distribution of fully prepared science and math teachers

Institutions of higher education

- **Examine teacher preparation programs to see how they can be expanded**
- **Ensure that all elementary school teachers are prepared to teach science and math**

School districts

- **Provide adequate training for all mentors**
- **Design and implement coordinated, coherent professional development programs throughout school districts**
- **Develop incentive pay systems to attract teachers to high-need schools**

Industry, federal laboratories, and informal science learning centers

- **Expand support for professional development of science and mathematics teachers**

Recruitment in Community Colleges

- Approximately **38%** of students in teacher preparation programs begin their undergraduate work in a community college
- Nearly **50%** of STEM graduates from UC and CSU begin their postsecondary studies in community colleges
- **CSU: Memorandum of Understanding with CCC system to facilitate articulation**
- **UC: pilot program through California Teach initiative to identify potential science and math teachers through collaborations with community colleges**
- **Transfer students will be a key component of any new efforts to produce more science and mathematics teachers**

Community College: The Unfinished Revolution

Credit: Rosenbaum, Redline & Stephan, *Issues in Science and Technology*

Enrollment and Degree Attainment Rates by College Type (N = 7,360)

College Type	% of Total Enrollments	Attainment Rate
Private, 2-year	2%	51%
Public, 2-year	37%	34%
Private, 4-year, non-profit	19%	79%
Public, 4-year	42%	65%
Total	100%	56%

Note: Attainment rates refer to attainment of associate's degree or higher by 2000 by first college attended for the high-school senior class of 1992.

“Community colleges have shockingly low degree-completion rates. In fact, many students leave with no new qualifications: no degrees and often no credits. For students who get no degree, college provides little or no labor market benefit.”

Information Overload Versus “Package Deal” Programs