



NAPE

The STEM Equity Pipeline

California Association of Regional
Occupational Centers and Programs
Conference

Palm Springs, CA

Thursday, November 15, 2012



National Alliance for Partnerships in Equity

NAPE is a consortium of state and local education and workforce development agencies, businesses, and national organizations committed to the advancement of equity and diversity in classrooms and workplaces



National Alliance for Partnerships in Equity

**Mission to expand career options
and the economic potential of
America's workforce by
collaborating with stakeholders to
build the capacity of teachers,
administrators, parents, and
employers.**



NAPE's Lines of Business

Technical
Assistance

Public Policy
(Advocacy)

Research
& Evaluation

Professional
Development



Special
Populations

Nontraditional
Career
Preparation

STEM Equity
Pipeline

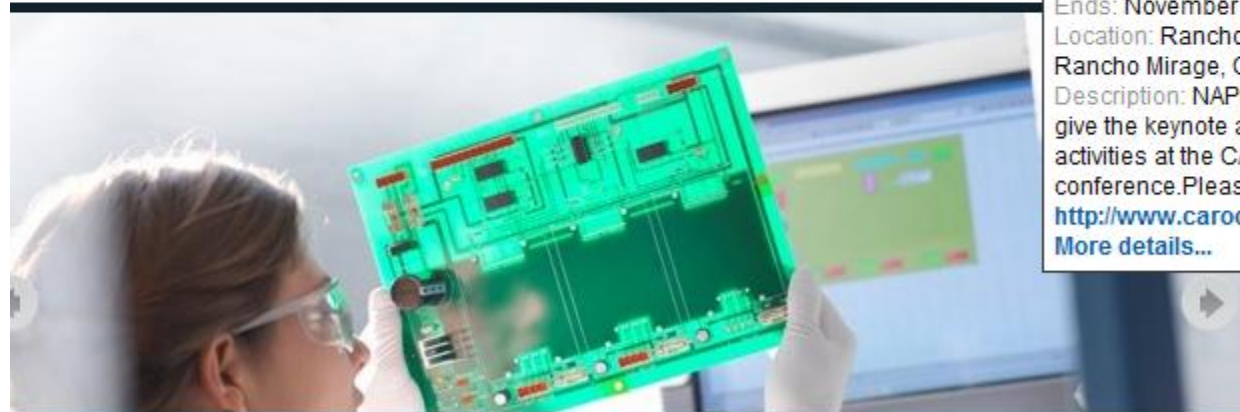
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The Equity Professionals

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Keynote at the CAROPC Conference
 Starts: 12:00 am
 Ends: November 16, 2012 - 12:00 am
 Location: Rancho Las Palmas resort, Rancho Mirage, CA
 Description: NAPE CEO Mimi Lufkin will give the keynote address to open the day's activities at the CAROPC conference. Please visit <http://www.caropc.org/> for all the details.
[More details...](#)

November 2012

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1	2	3	4
8	9	10	11
12	13	14	15
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26	27	28	29

NAPE Education Foundation Receives 5-Year NSF Grant to

Connect with NAPE



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Career and Technical Education in the National Dialogue



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Recent Reports of Interest

Pathways to Prosperity
Harvard Graduate
School of Education

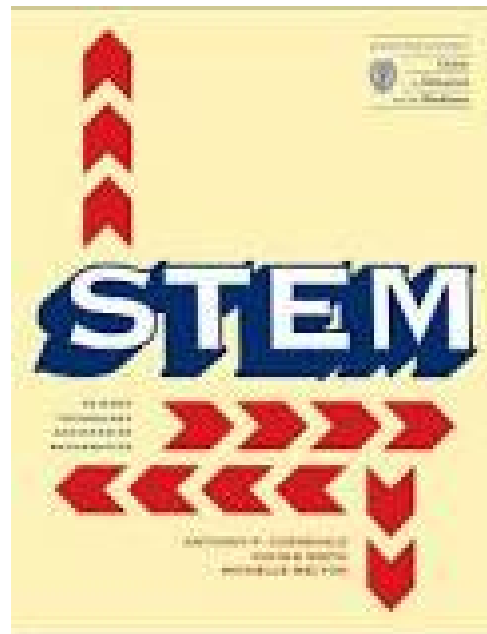
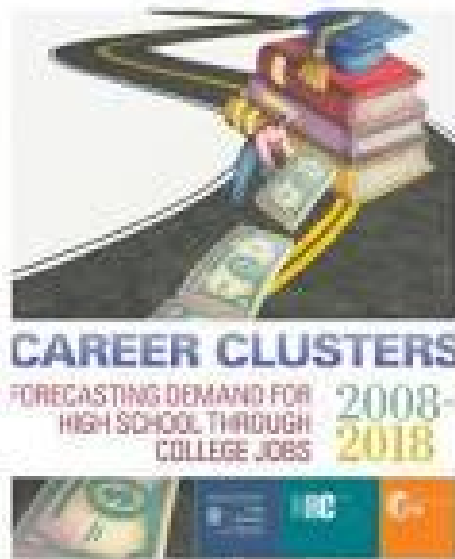




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Recent Reports of Interest

” Center on Education and the Workforce,
Georgetown University





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Recent Reports of Interest

Enterprising Pathways:
Toward a National Plan
of Action for Career
and Technical
Education





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Recent Reports of Interest

Investing in America's
Future: A Blueprint for
Transforming Career
and Technical
Education





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Curriculum and Standards

” Commo

” Next Ge

” Commo

Career Clusters™
Knowledge and Skills and a
Common Career Technical
Core



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Why all the buzz about **STEM**?



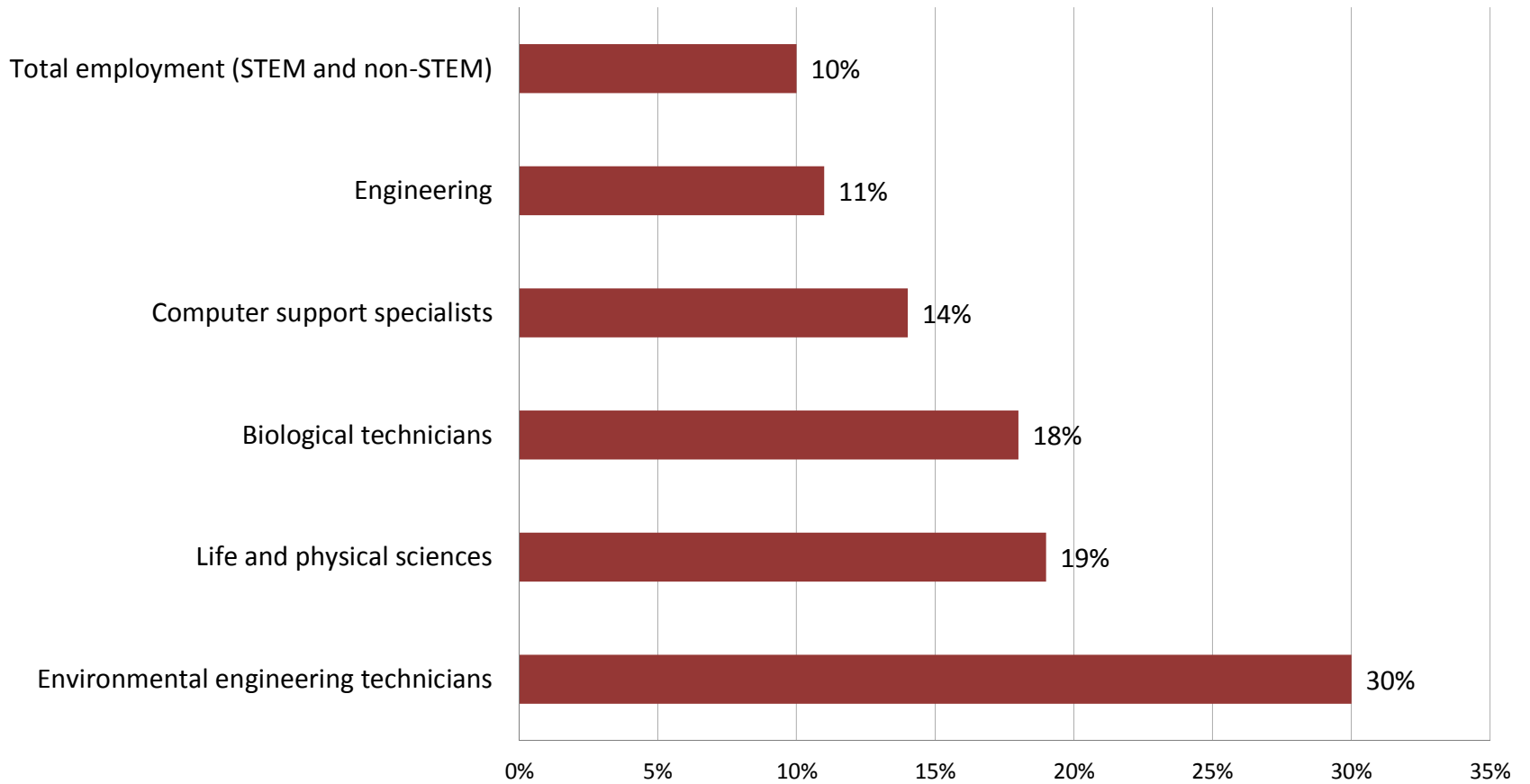
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NAPE's Definition of STEM

Seven Career Clusters

- “ Science, Technology, Engineering and Math
- “ Agriculture, Food and Natural Resources
- “ Health Science
- “ Information Technology
- “ Manufacturing
- “ Transportation, Distribution and Logistics
- “ Architecture and Construction

Figure 1. Projected Growth in Employment in Selected STEM Occupations, 2008-2018



Source: Bureau of Labor Statistics. 2010b. *Occupational Outlook Handbook, 2010-11 Edition*.



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Why Do We Need to Encourage Students to Study STEM?

- “ In the last 50 years, more than half of America’s sustained economic growth was fueled by engineers, scientists and advanced-degree technologists, a mere 5% of America’s 132 million-person workforce. ⁽¹⁾
- “ Aging STEM workforce- DOD, NASA and NIH STEM workers eligible to retire will more than double by 2012. ⁽¹⁾

Source: See Notes Page

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Why Do We Need to Encourage Students to Study STEM?

- “ The National Bureau of Labor Statistics projects that our greatest needs will be in computer-related field that propel innovation across the economy.
- “ By the year 2050, 85% of the entrants into the workforce will be people of color and women.
- “ Promoting scientific literacy among all the nation’s people integral to an educated citizenry



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Why Do We Care if Women and Minorities Become Engineers and Scientists?

“ As a consequence of a lack of diversity we pay an opportunity cost, a cost in designs not thought of, in solutions not produced.

Source: Dr. Bill Wulf, Past President, National Academy of Engineering

“ If we do not engage women and minorities in the engineering enterprise, we are ignoring more than 50% of America’s intellectual talent.

Source: Bostonworks.com



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Status of Women and Girls in STEM



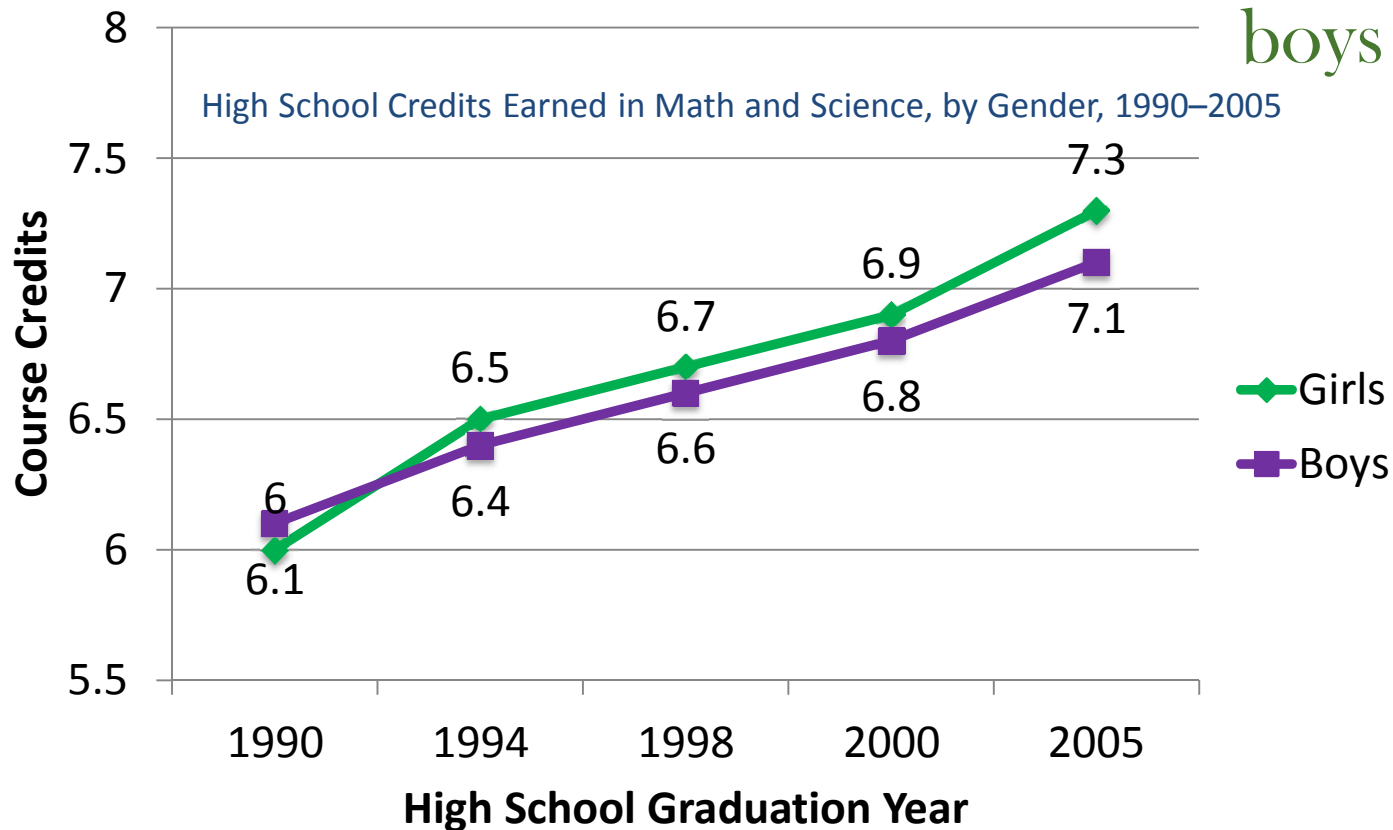
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Girls' performance and participation in
math and science subjects
in high school has improved over time
and, in some cases, has surpassed that
of boys.



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In high school, both boys and girls are earning more credits in math and science over time, and girls earn more credits than boys do.



Source: U.S. Department of Education, National Center for Education Statistics, 2007, *The Nation's Report Card: America's high school graduates. Results from the 2005 NAEP High School Transcript Study*, by C. Shettle et al. (NCES 2007-467) (Washington, DC: Government Printing Office).

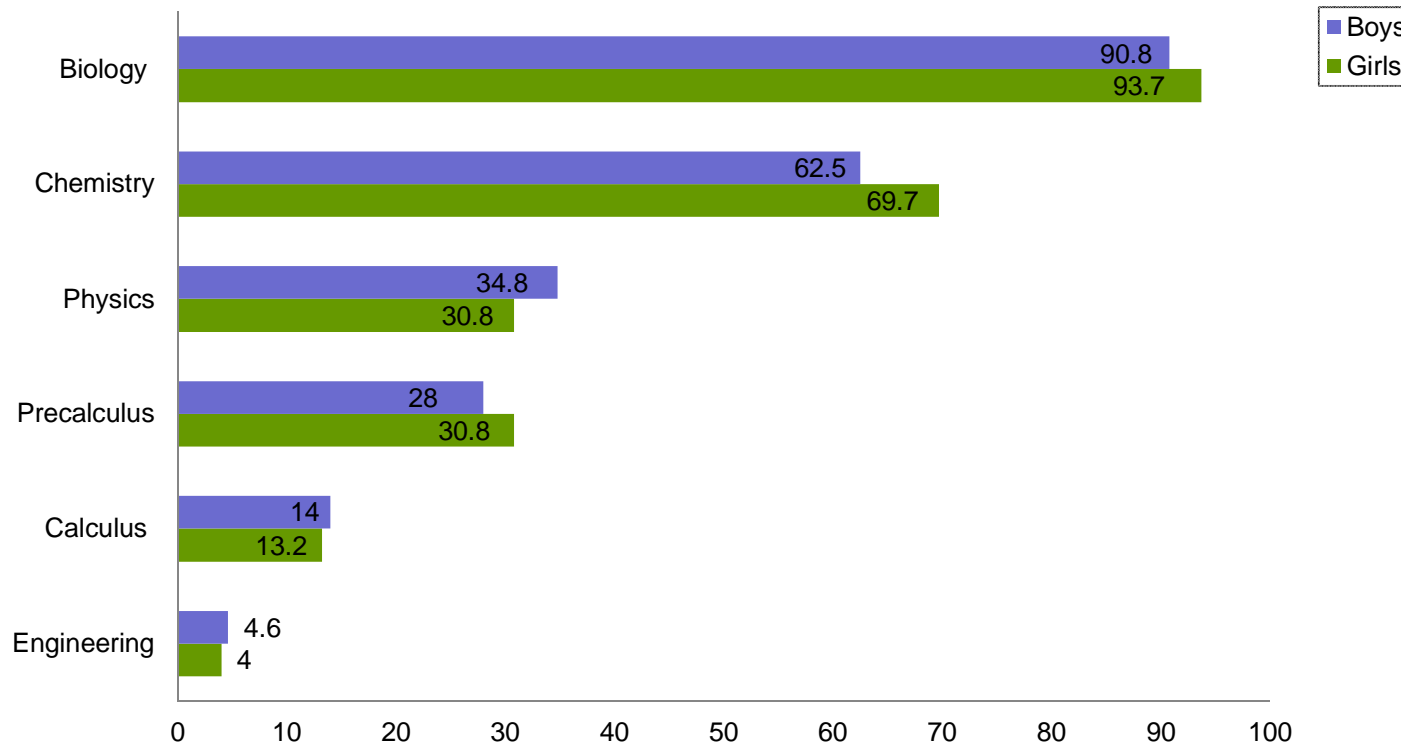
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High school girls are more likely to take biology, chemistry, and pre-calculus than boys are, but girls are less likely to take physics.

Percentage of High School Graduates Who Took Selected Math and Science Courses in High School, by Gender, 2005



Source: National Center for Education Statistics. (2007). *Digest of Education Statistics*.

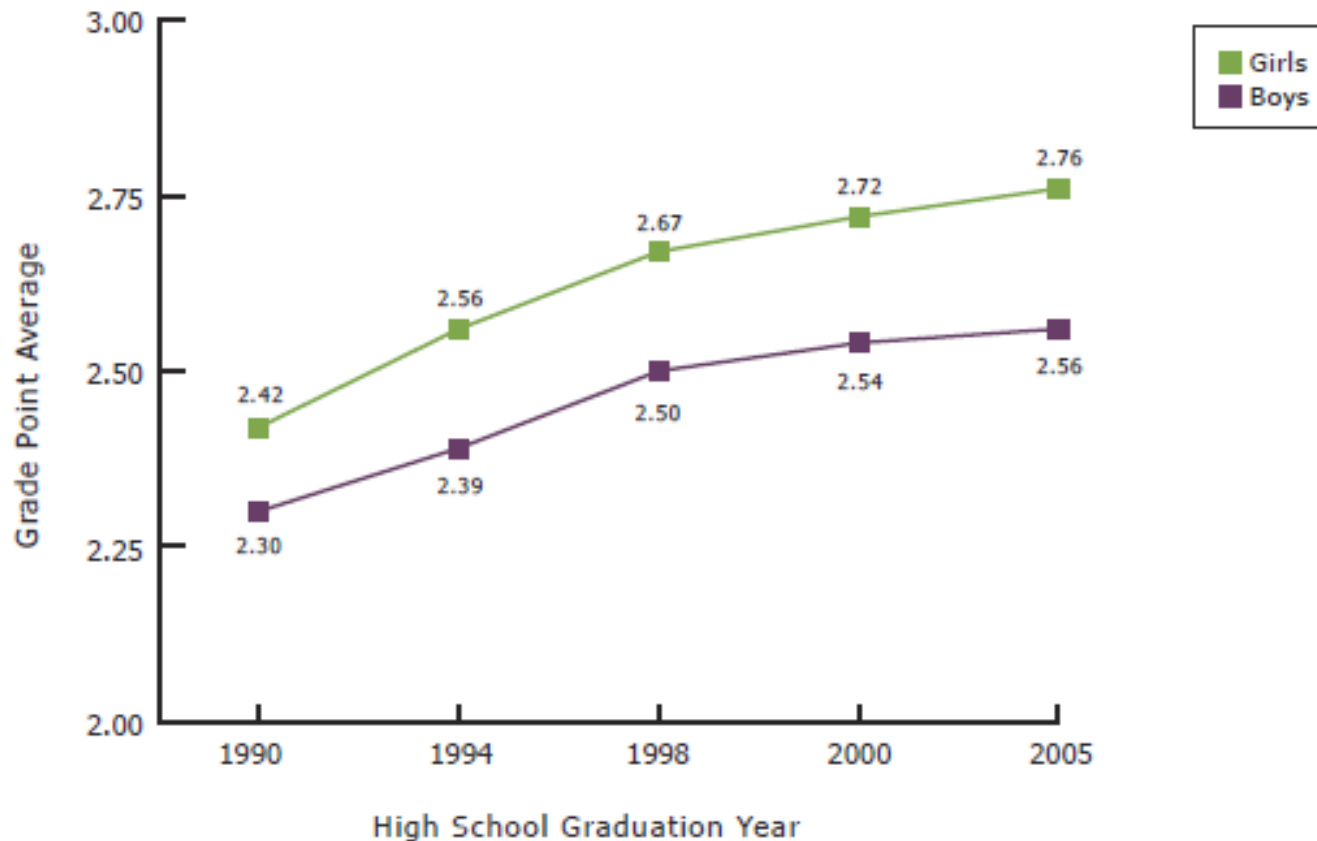
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Female high school graduates now also earn higher GPAs, on average, in math and science, than their male peers do.

Grade Point Average in High School Mathematics and Science (Combined), by Gender, 1990–2005



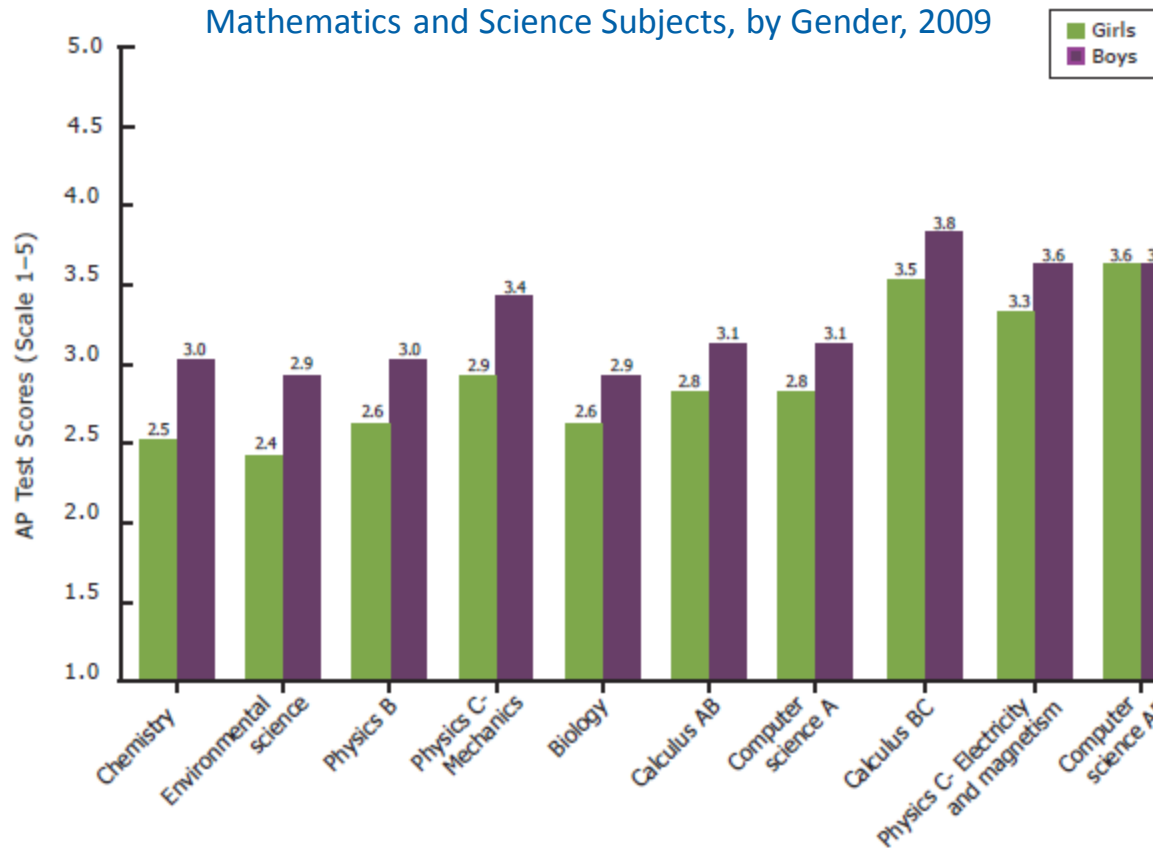
Source: U.S. Department of Education, National Center for Education Statistics, 2007, *The Nation's Report Card: America's high school graduates: Results from the 2005 NAEP High School Transcript Study*, by C. Shettle et al. (NCES 2007-467) (Washington, DC: Government Printing Office).



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On average, boys perform better than girls do on Advanced Placement (AP) tests in math and science.

Average Scores on Advanced Placement Tests in Mathematics and Science Subjects, by Gender, 2009

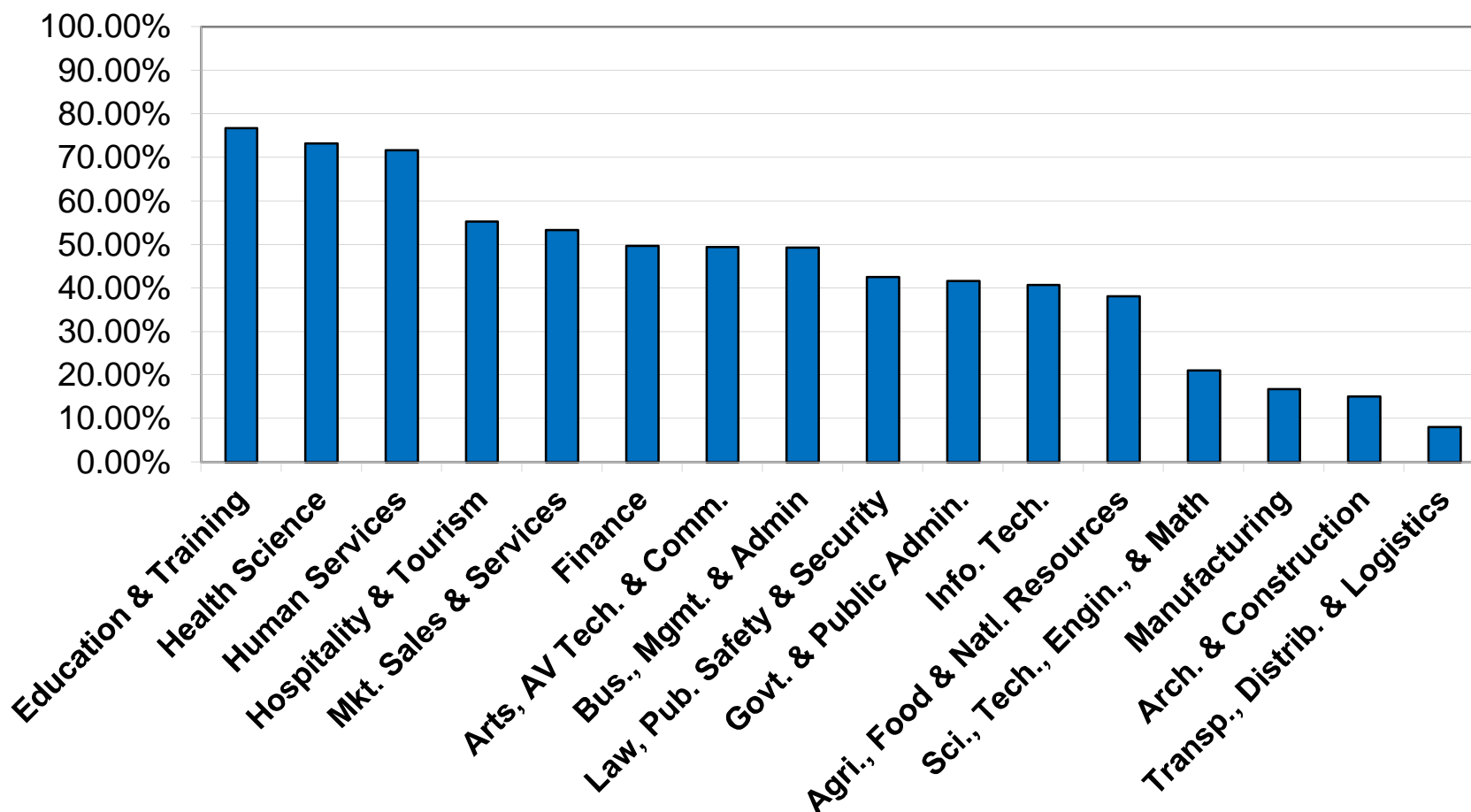


Source: Retrieved November 11, 2009, from the College Board website at www.collegeboard.com.



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CTE Secondary Female Enrollment in U.S. by Career Cluster, 2009-2010





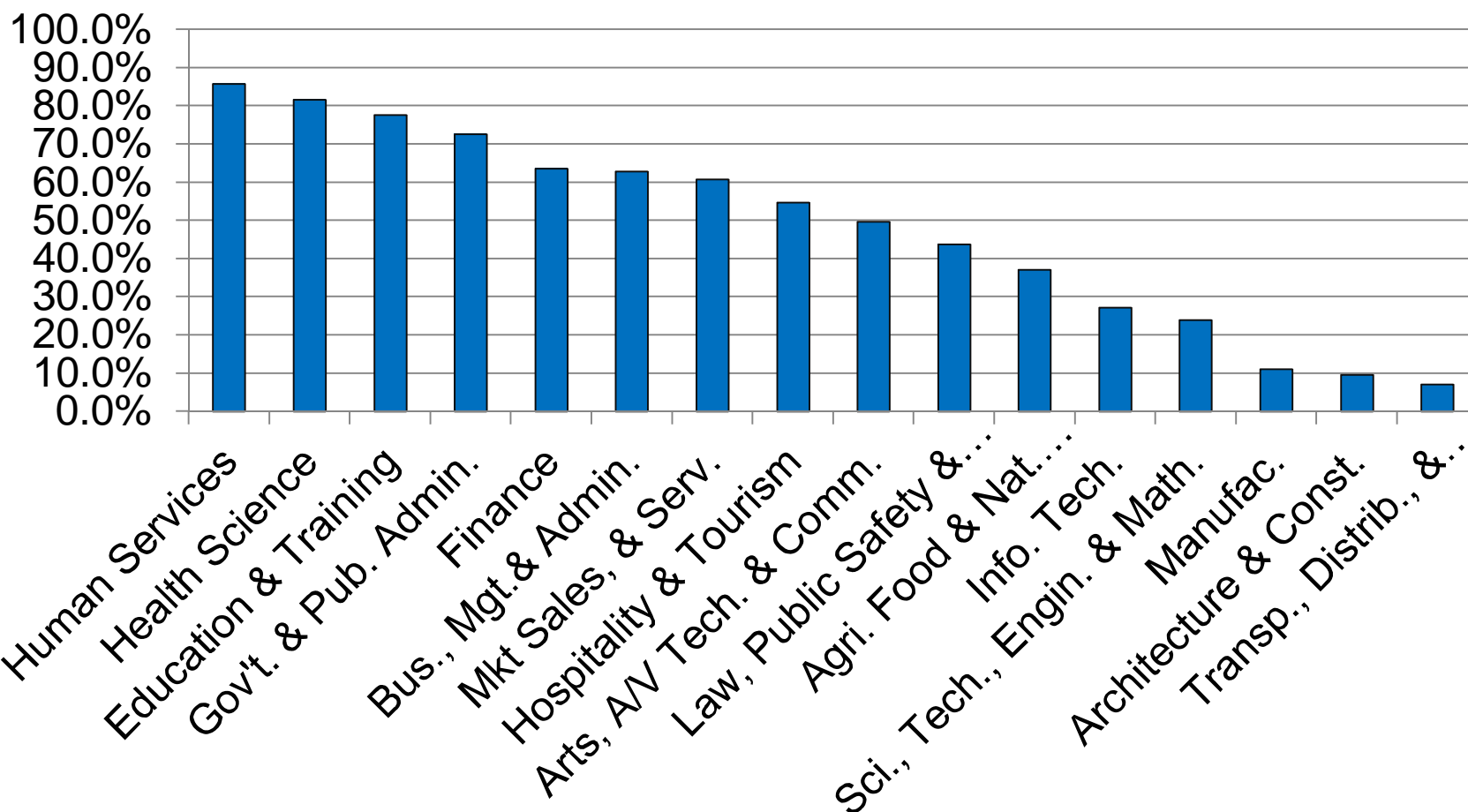
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Despite the positive trends in high school, the transition from high school to college is a critical time for young women in STEM (science, technology, engineering, and mathematics).



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CTE Post-Secondary Female Enrollment in U.S. by Career Cluster, 2009-2010

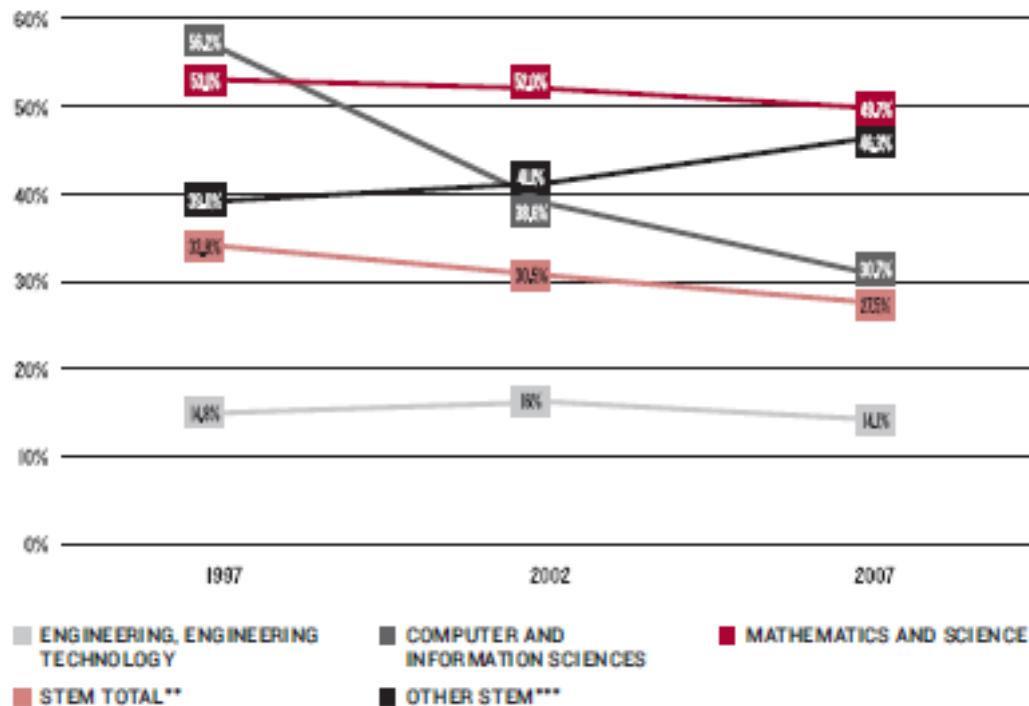




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In 2007, women earned 27.5% of all sub-baccalaureate awards in STEM, down from 33.8% in 1997

FIGURE 4
Women's Share of Subbaccalaureate Awards in Selected STEM Fields, 1997, 2002, 2007*





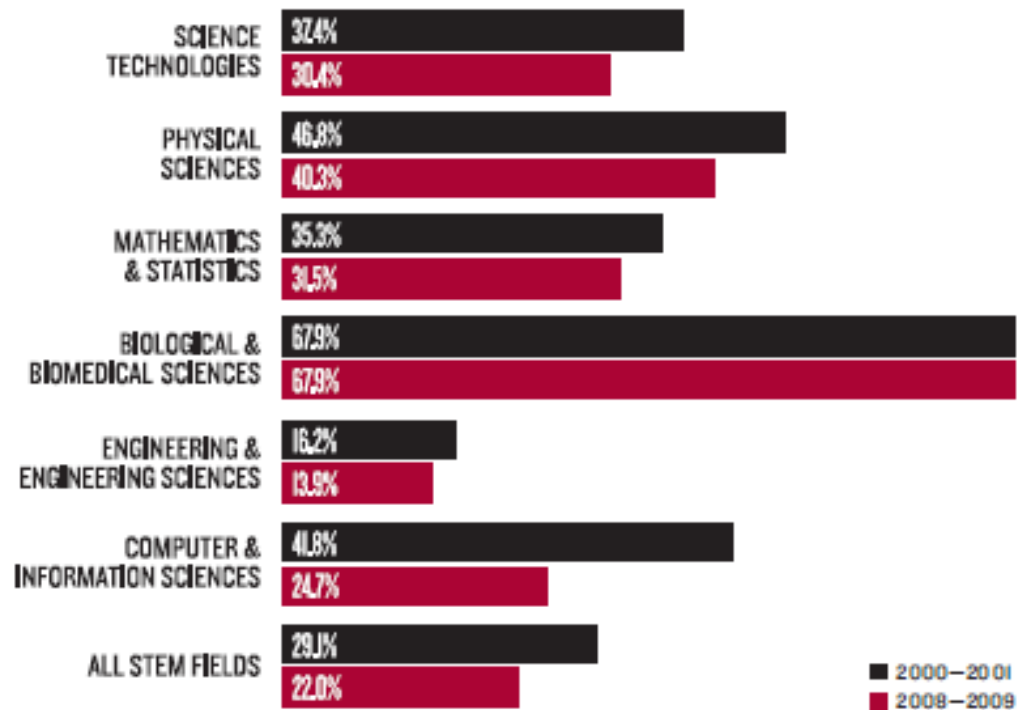
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Percentage of associates degrees awarded to women in STEM has declined in the past 8 years

- “ 14% to White women
- “ 3.3% to African American women
- “ 2.2% to Hispanic women
- “ 1.3% to Asian, Native Hawaiian, and Pacific Islander women

FIGURE 5

Percentage of Associate's Degrees Awarded to Women by STEM Field, 2000-2001 and 2008-09

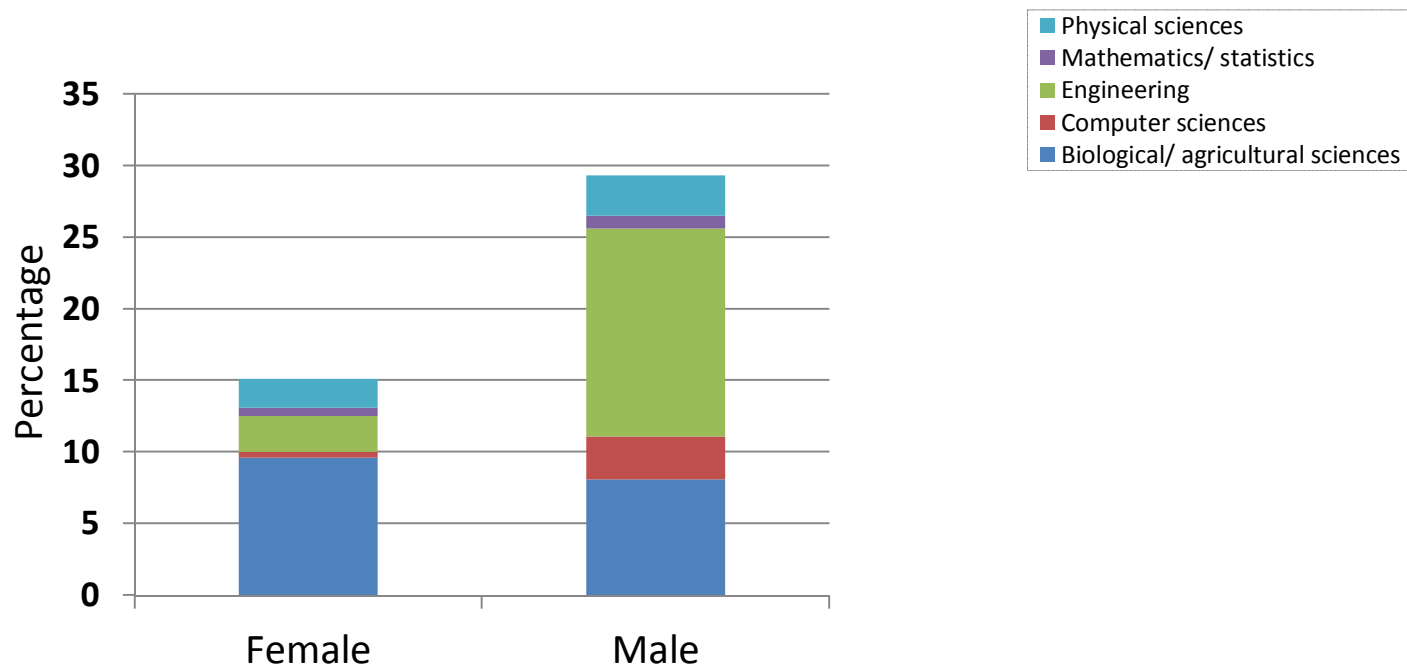


Source: U.S. Department of Education, National Center for Education Statistics, Postsecondary Awards in STEM by State, 2001 and 2009 (NCES 2011-226), Tables 9b and 9d.



Women are less likely than men are to declare a STEM major in college.

Intent of First-Year College Students to Major in Science and Engineering Fields, by Gender, 2006



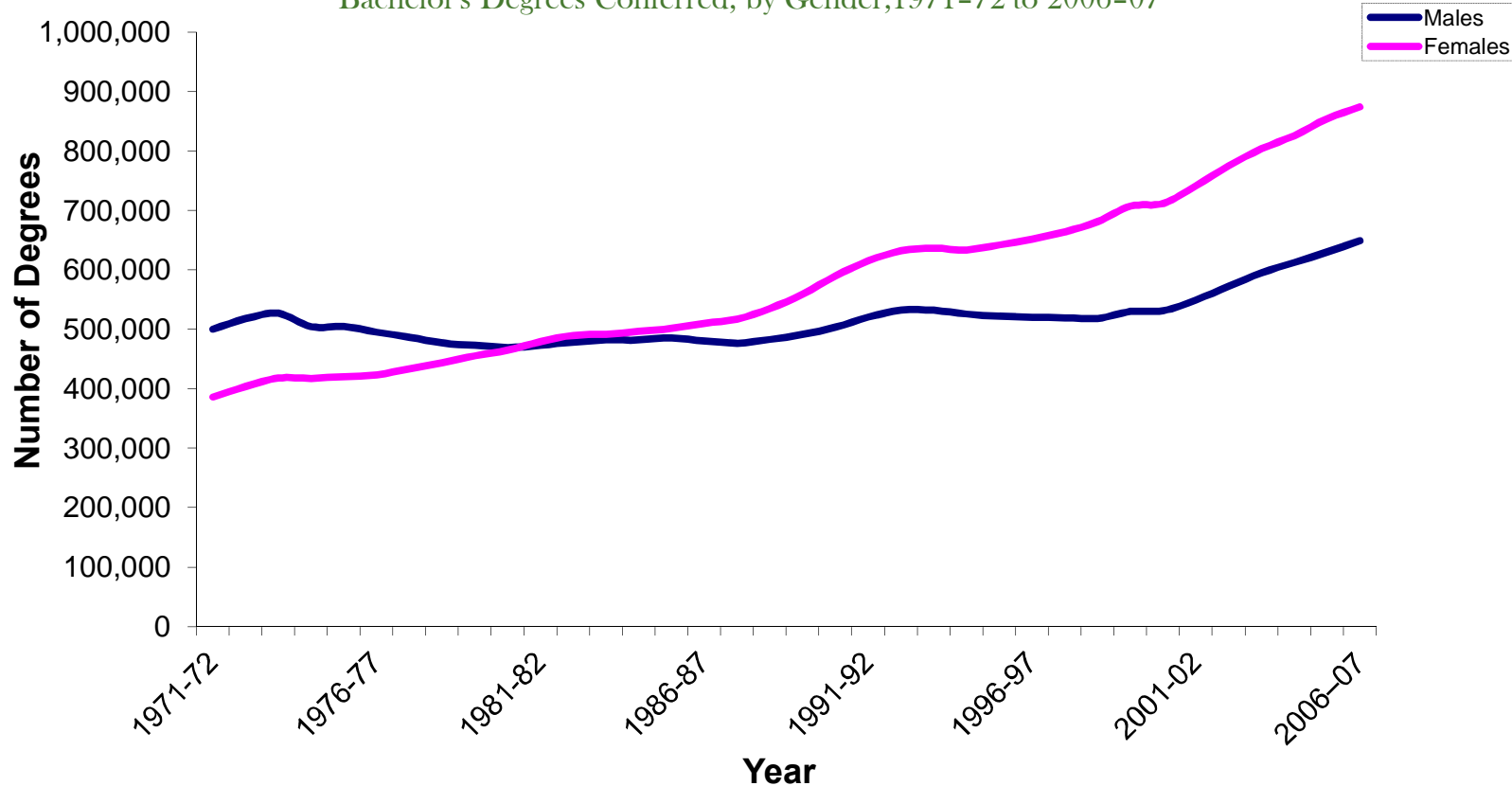
Source: Commission on Professionals in Science and Technology. Data derived from Cooperative Institutional Research Program, Higher Education Research Institute, Graduate School of Education and Information Studies, University of California, Los Angeles, *The American Freshman: National Norms for Fall 1990 through Fall 2006*, www.gseis.ucla.edu/heri/heri.htm.



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Women have earned the majority of bachelor's degrees since 1982.

Bachelor's Degrees Conferred, by Gender, 1971-72 to 2006-07



Source: Snyder, T.D., Dillow, S.A., and Hoffman, C.M. (2009). *Digest of Education Statistics 2008 (NCES 2009-020)*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

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Women's representation among STEM bachelor's degree holders has improved over time but varies by field.

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70.0%

60.0%

50.0%

40.0%

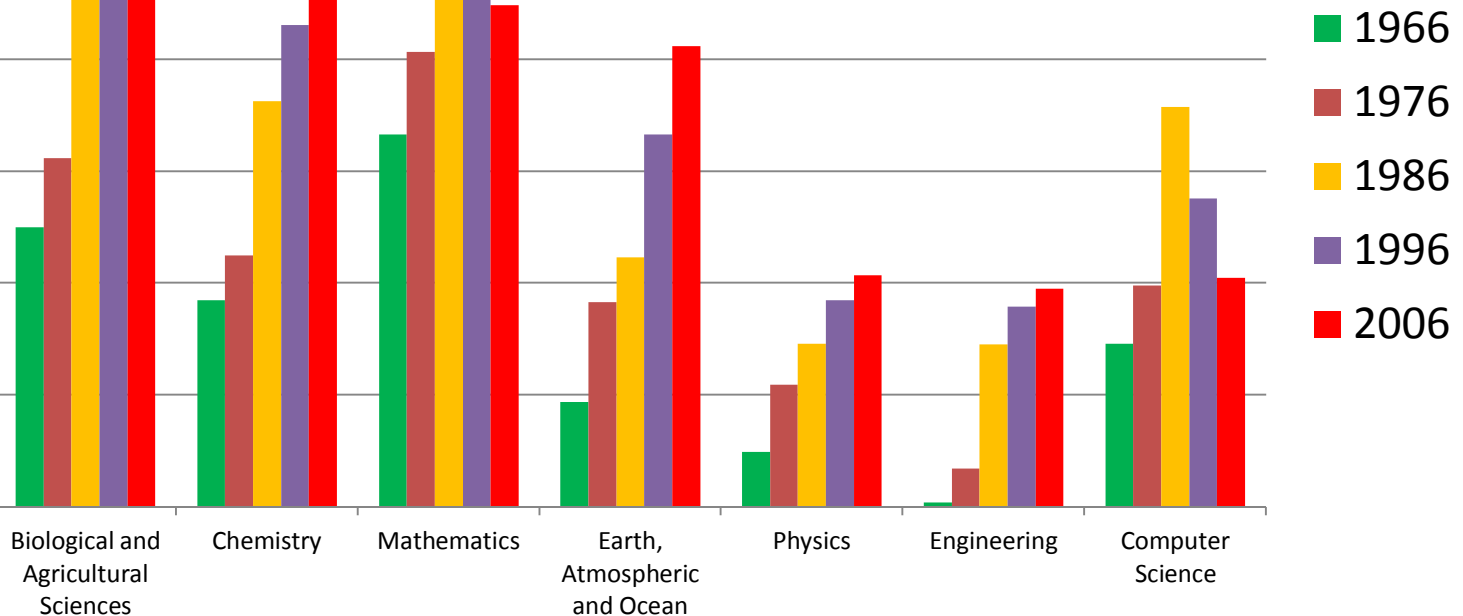
30.0%

20.0%

10.0%

0.0%

Bachelor's Degrees Earned by Women in Selected Fields, 1966–2006



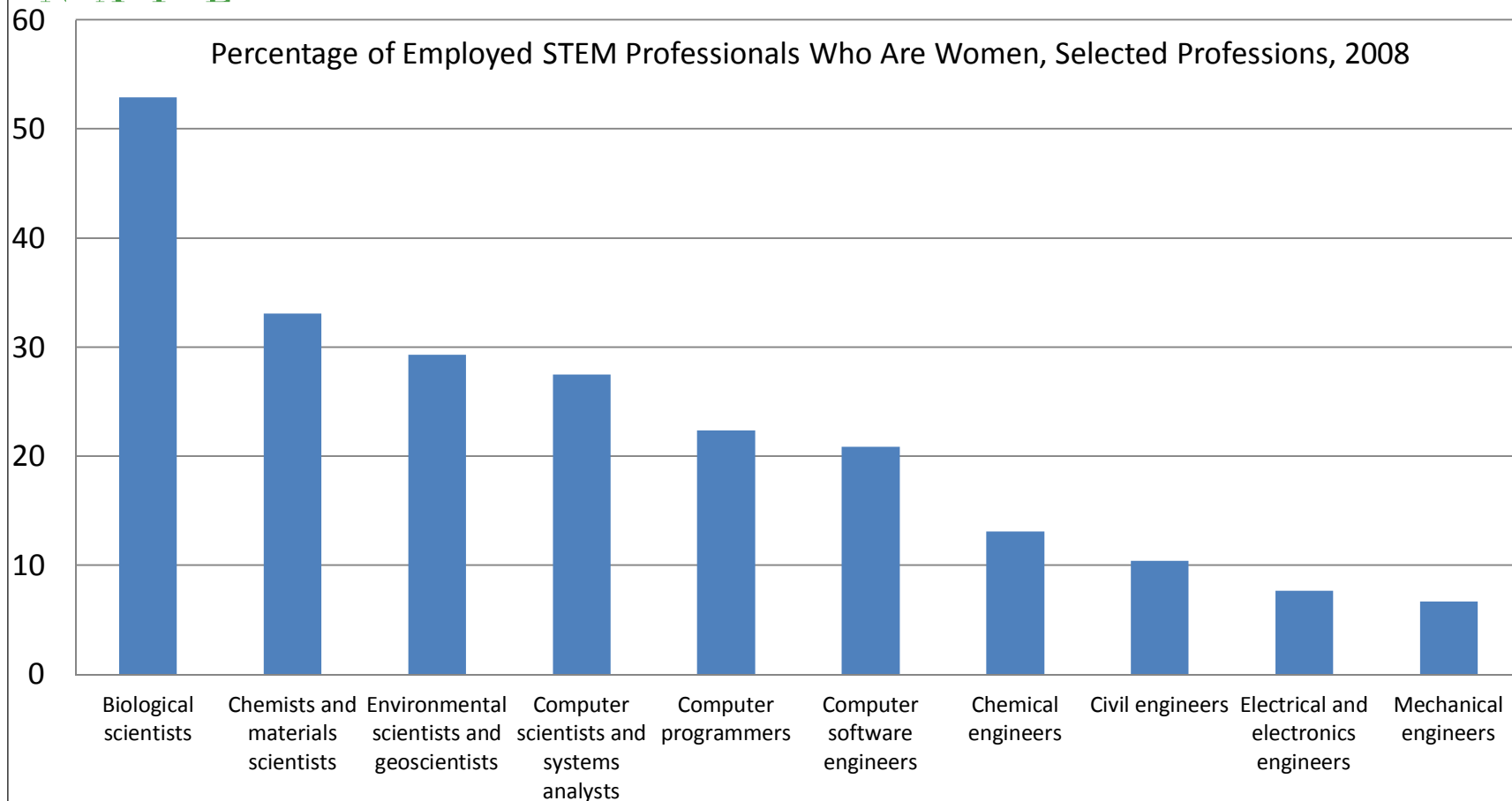
Source: National Science Foundation, Division of Science Resources Statistics 2008, *Science and engineering degrees: 1966–2006* (Detailed Statistical Tables) (NSF 08-321) (Arlington, VA), Table 11, Author's analysis of Tables 34, 35, 38, & 39.

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Women are underrepresented in many science and engineering occupations.



Source: U.S. Department of Labor, Bureau of Labor Statistics, 2009, *Women in the labor force: A databook* (Report 1018) (Washington, DC), Table 11.

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What is NAPE doing to move the
needle?





STEM Equity Pipeline Goals

To increase the
academic performance,
retention, completion and
transition of significantly more
diverse female students in
STEM programs of study



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STEM Equity Pipeline Goals

- “ Build the capacity of the formal education community to provide high quality professional development on gender equity in STEM education
 - . Institutional transformation
 - . Classroom transformation
- “ Institutionalize the implemented strategies by connecting the outcomes to existing accountability systems
- “ Broaden the commitment to gender equity in STEM education



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Professional Development for Educators: STEM (including CTE) Access, Equity, Diversity

STEM Equity Pipeline™

STEM Equity Training for Inst. Change

Working with institutional leaders (administrators, dept heads, etc.) to improve enrollment, retention & completion of girls & under-represented populations in STEM courses

STEM Equity Teacher Training

Training teachers to use pedagogy that improves enrollment, retention & completion of girls & under-represented populations in STEM courses

STEM Equity Counselor Training

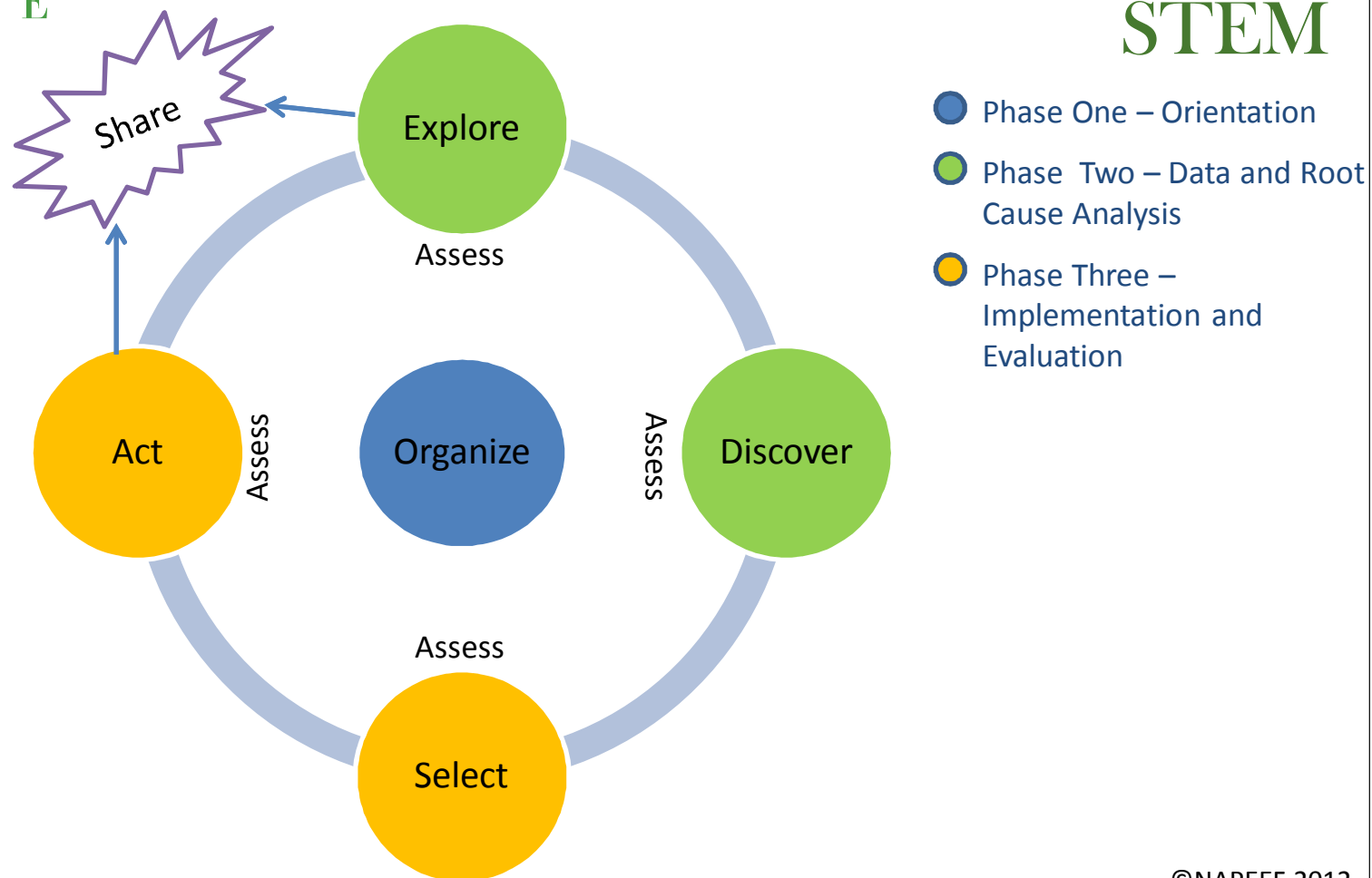
Coaching counselors to encourage girls and under-represented populations in STEM careers

Tools & Resources

Tools to support teachers' & counselors' learning and assist their students, e.g., camps, partner orgs, books



PIPE-STEM: Program/Pedagogy Improvement Process for Equity in STEM





Micromessaging to Reach and Teach Every Student™

Transforming Pedagogy

- “ Phase I : Data Collection and Analysis
- “ Phase II: E-Learning Content Knowledge
- “ Phase III Workshop
- “ Phase IV: Capstone - Action Research Project
- “ Phase V: Implementation Plan



Micromessaging to Reach and Teach Every Student™

Instructional Units

- ” Setting the Stage – Women in STEM
- ” The Influence of Micromessages
- ” Neuroscience Link to Learning
- ” Social Theories of Achievement
- ” Influence of Culture
- ” Career Development
- ” The Equitable Classroom



STEM Careers Counselor Training

- ” Goal: to support career counselors efforts to highlight STEM careers in a context that appeals to a diversity of students, their cultures, and their values.
- ” Currently a high quality workshop focusing on engineering.
- ” 2012 – 2013 building an intensive equity professional development program for secondary and college career counselors.



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IMPACT

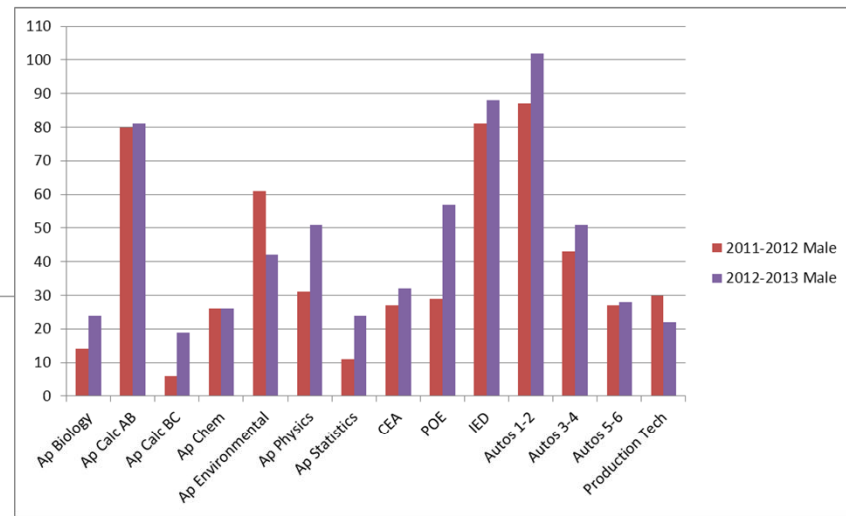
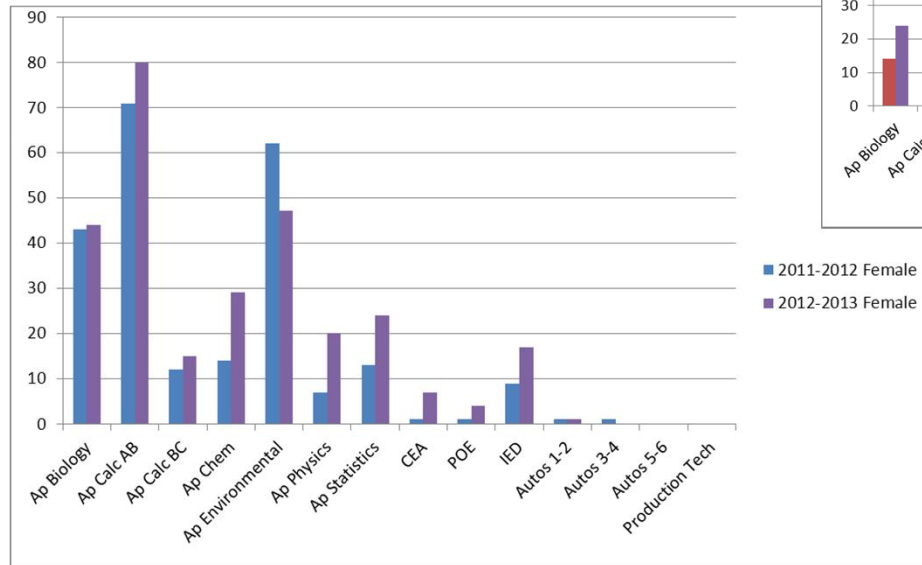
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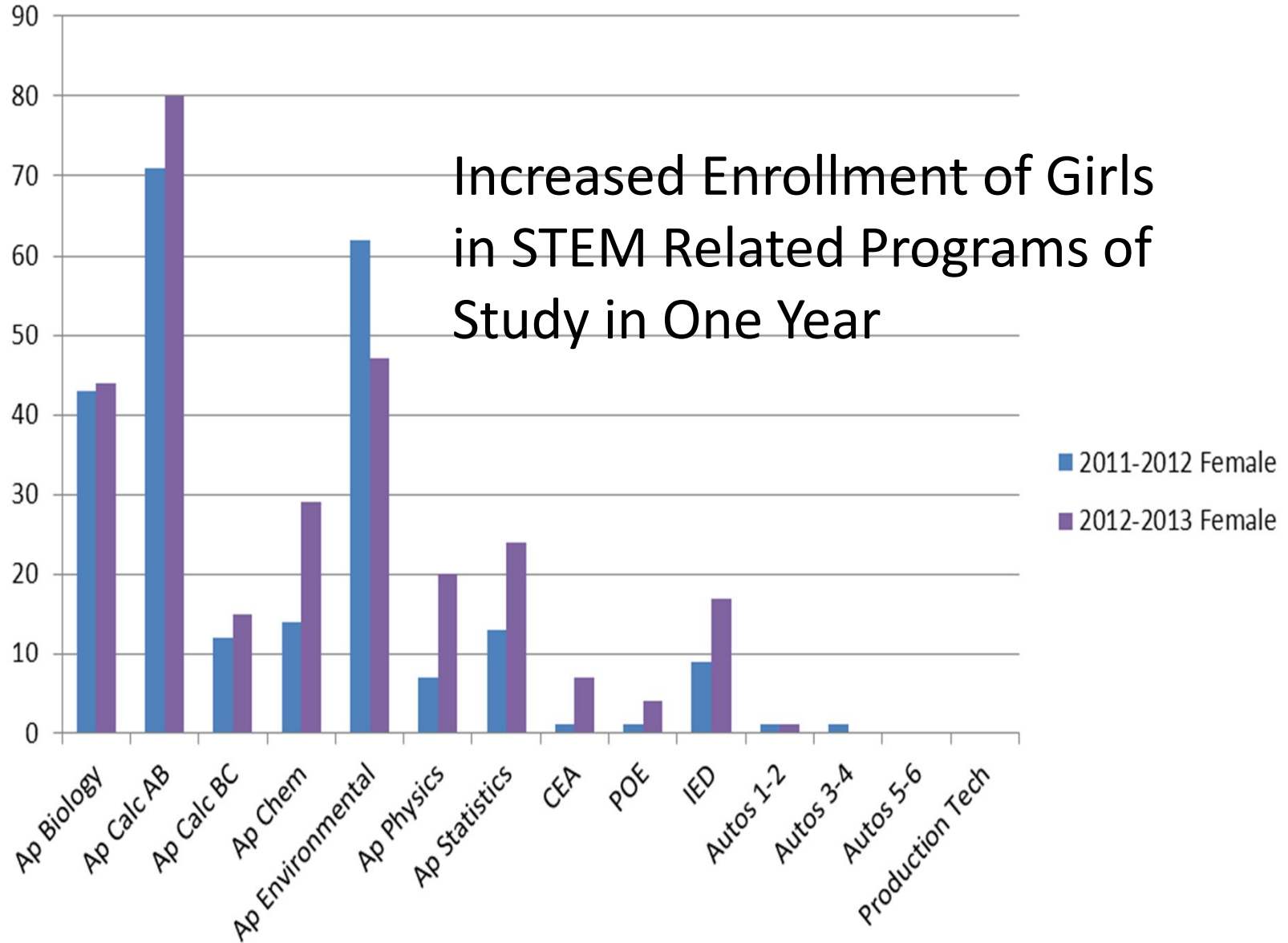
Summative Measurement

Increased Enrollment Females



Males

Increased Enrollment of Girls in STEM Related Programs of Study in One Year





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Significant results to note

High School female enrollment increases-

- " AP Physics: 18% -> 28%
- " AP Chemistry: 35% -> 53%
- " IED: 10% -> 16%
- " CEA: 4% -> 18%
- " POE: 3% -> 7%





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Results

Community college invited middle school girls enrolled in the PLTW Gateway program to the campus where they were introduced to various engineering career fields through speakers and projects.

- “ 40% said they would like to pursue a STEM career, with 11% specifically stating Engineering
- “ 83% of the girls said that they would like to take an engineering class in high school.
- “ The next fall, 7 ninth grade girls enrolled in the PLTW introduction to engineering course (previously there was only one ninth grade girl enrolled) and 18 ninth grade girls enrolled in beginning drafting.



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Results

“ After hiring a female teachers aide in the auto technology program enrollment of women increased from 4-15 in one semester





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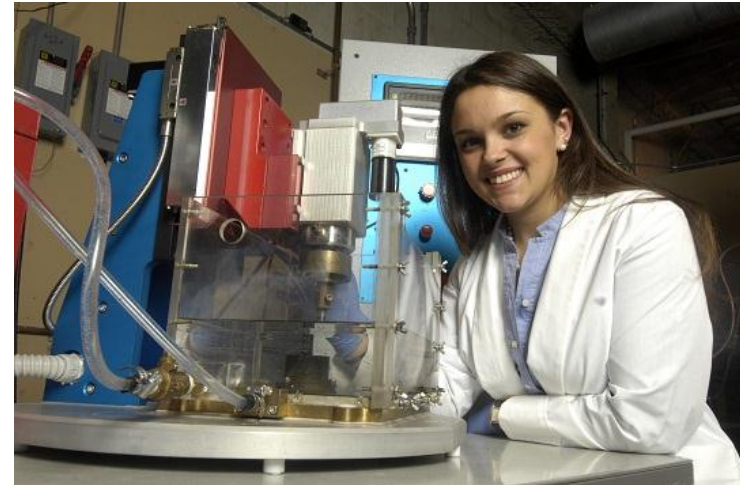
After conducting targeted recruitment events the aviation maintenance program had 7 women enroll after never having women in the program



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Results

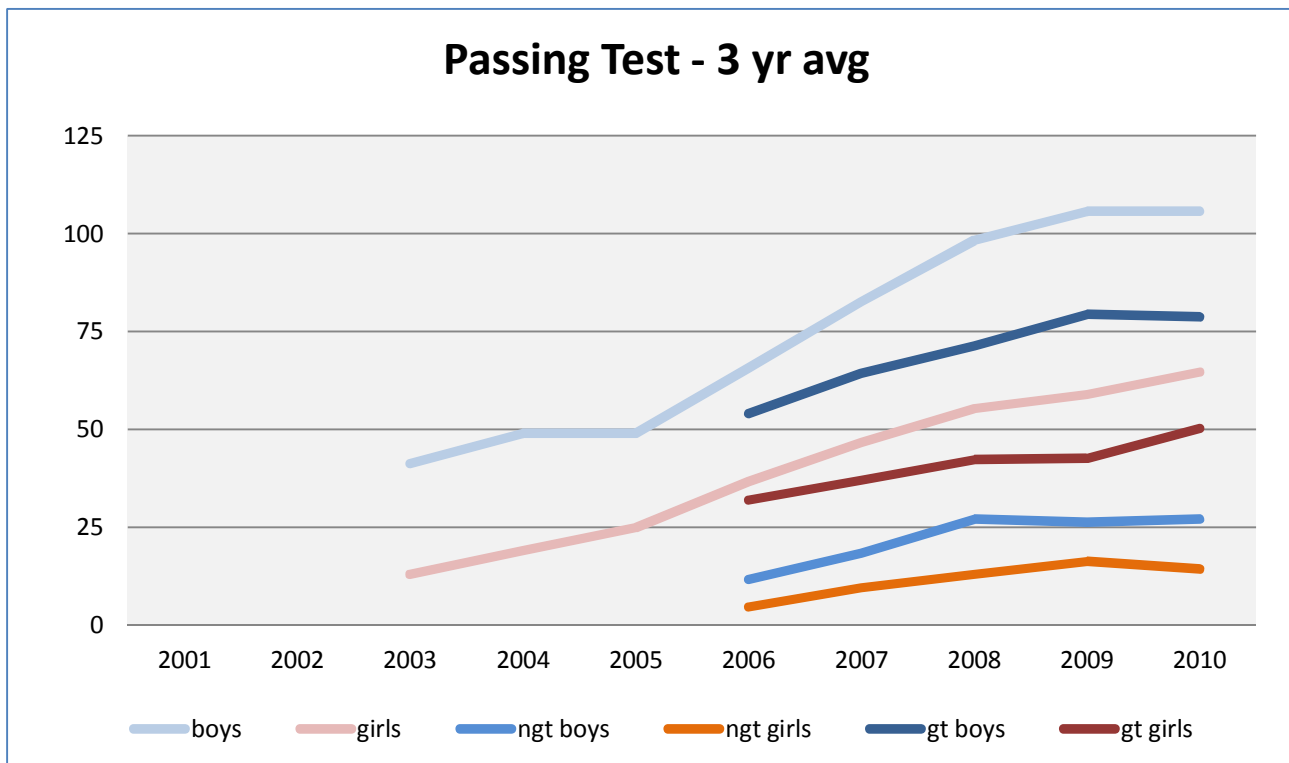
“ Nuclear engineering program graduated its first class in 2012 including 6 (25%) women and 7 (30%) women are enrolled this Fall



“ After implementing a capstone project faculty are reporting increased achievement (grades) and retention of female students . data to be collected in January 2013.



Micromessaging Training

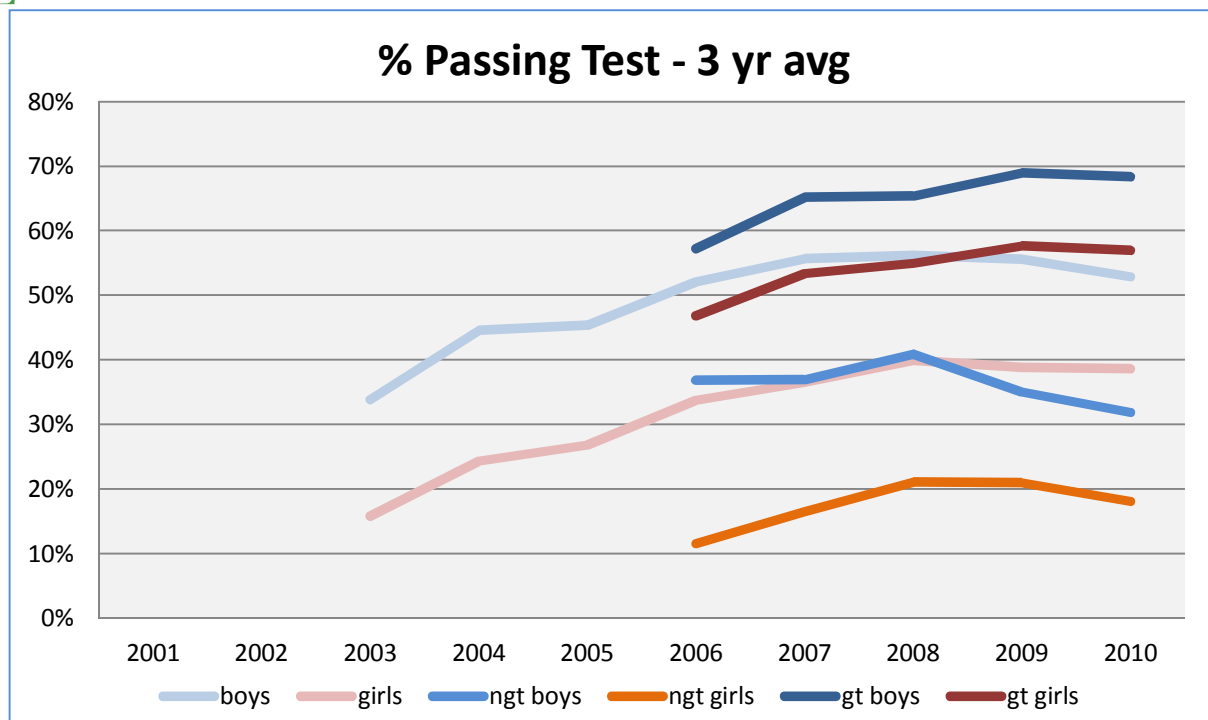


Comparing the number of AP Physics tests passed by all girls in 2003,(before the programs started) and 2010, there is a 5x increase.



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Gender Equity Training



Both boys and girls of the teachers that had Gender Equity training are passing at 20-30% points higher than students of teachers without the training



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Increased Achievement

- “ Micromessaging curriculum implemented with physics teachers student passage rates on the AP physics exam increased
- . 4 times more female students
 - . 4 times more African Americans students
 - . 6 times more Hispanic students



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Have Your School Become and
Affiliate Member



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Resources

www.napequity.org

www.stemequitypipeline.org



STEM Equity Pipeline

- Home
- About Us
- Contact Us
- Experts
- State Teams
- Resources
- Professional Development



Register to Participate

Upcoming Events

For more events go to the [STEM Equity Pipeline Calendar](#)

November 8-10, 2012
Annual Conference for Women Engineers: WE12
Science professors at American universities widely regard female undergraduates as less competent than male students with the same accomplishments and skills, a new study by researchers at Yale concluded. The bias was pervasive and probably reflected subconscious cultural influences rather than overt or deliberate discrimination.

[More Information](#)

November 12-13, 2012
PLTW STEM Connection Conference

Search





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Resources

- ” Online Resource Collection
- ” NAPE Developed Tools
 - . Taking the Road Less Traveled
 - . Destination Success
 - . Parent Magazine
 - . Tip sheets
 - . Training modules
 - . More
- ” Webinars . Live and Archived
- ” Listserv



STEM Equity Pipeline

- About Us
- Contact Us
- Experts
- State Teams
- Resources

- STEM Equity Pipeline Calendar
- STEM Equity Pipeline Archived Webinars
- Other Organizations Archived Webinars
- National Outreach Presentations
- Online Courses
- General Resources
- Promising Practices
- The Five Step Program Improvement Process
- Needs Assessment
- Tools
- Materials Use Policy

Upcoming Events

For more events go to the [STEM Equity Pipeline Calendar](#)

November 8-10, 2012

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Science professors at American universities undergraduates as less competent than male counterparts. The study concluded that the bias was pervasive and probably subconscious cultural influences rather than discrimination.

[More Information](#)

November 12-13, 2012

PLTW STEM Connection Conference



Participate



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Partners in California

- ” California Joint Special Populations Advisory Committee
- ” Linking Education and Economic Development
 - . Folsom Cordova Unified School District
- ” San Jose Unified School District



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Questions

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National Alliance for Partnerships in Equity

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