



STEM Equity Pipeline

Mimi Lufkin, Project Director
National Alliance for
Partnerships in Equity
Education Foundation



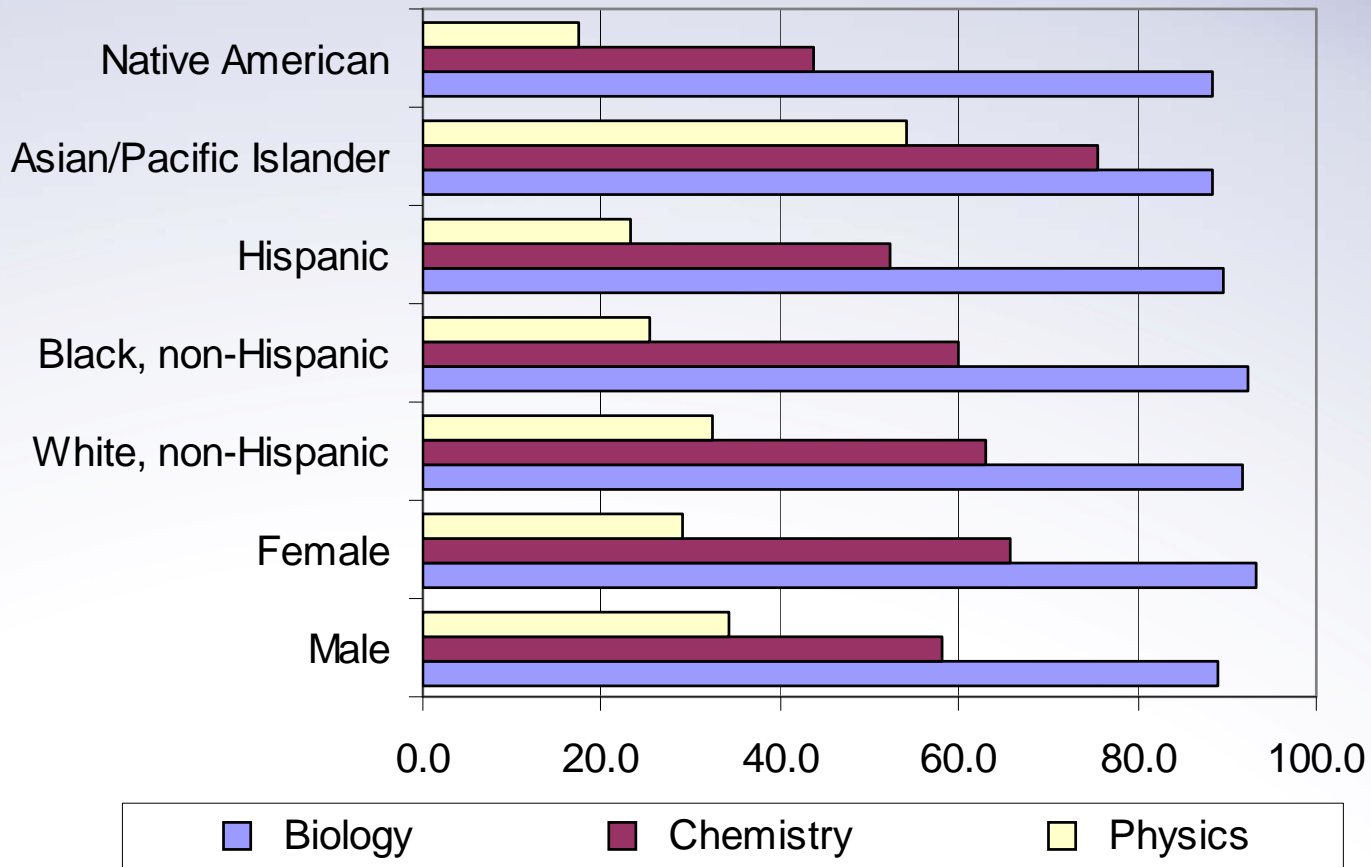
**Expanding Options for Women and Girls in
Science, Technology, Engineering and Math**



Overview

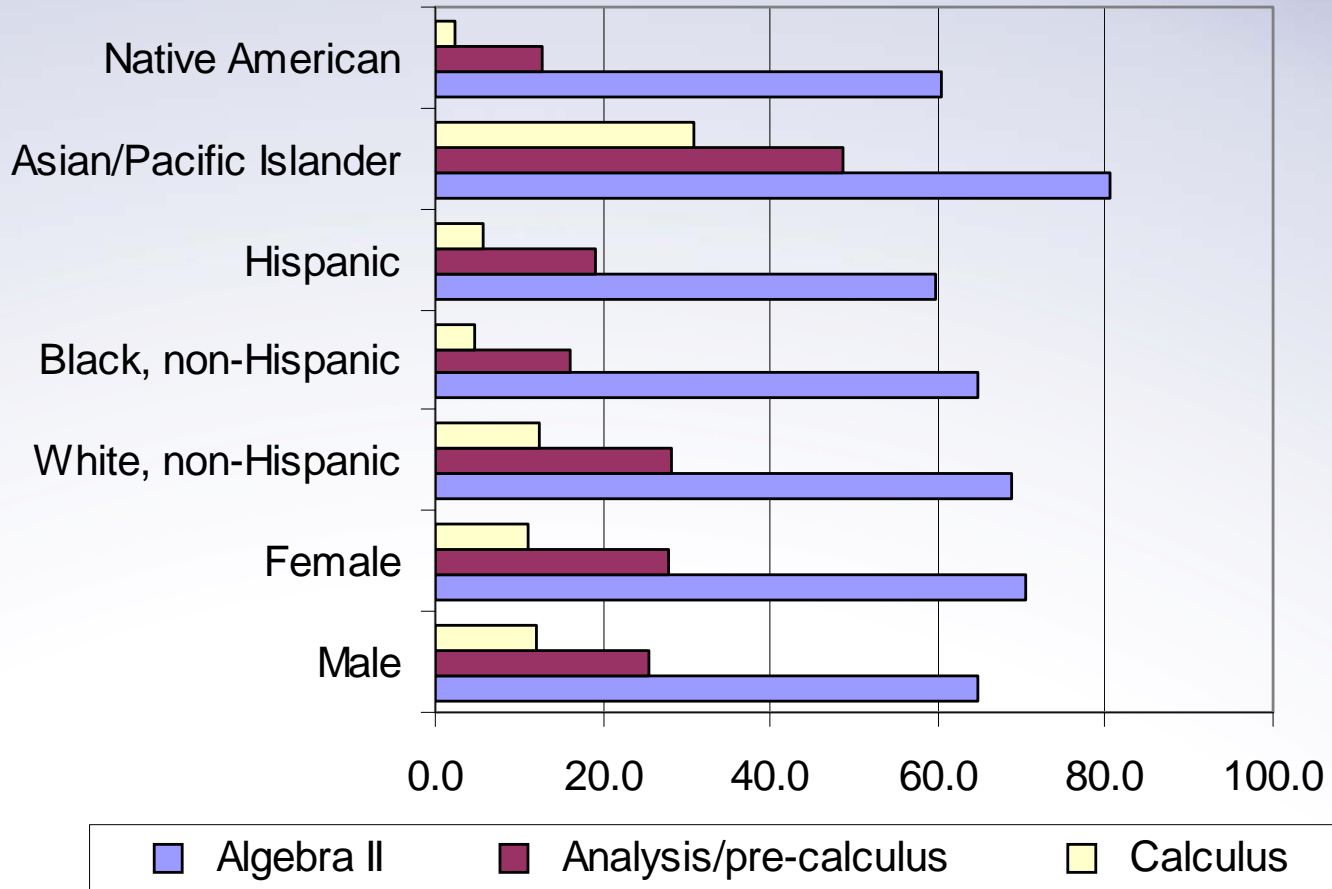
- What is the current status of women in computer science/engineering?
- What is the STEM Equity Pipeline project and how can you become involved?
- What are the research based root causes and strategies for increasing the participation of women and girls in STEM related CTE programs?

What Science Courses Are U.S. High School Students Taking? 2004



Source: CPST, data derived from National Center for Education Statistics

What Mathematics Courses Are U.S. High School Students Taking? 2004

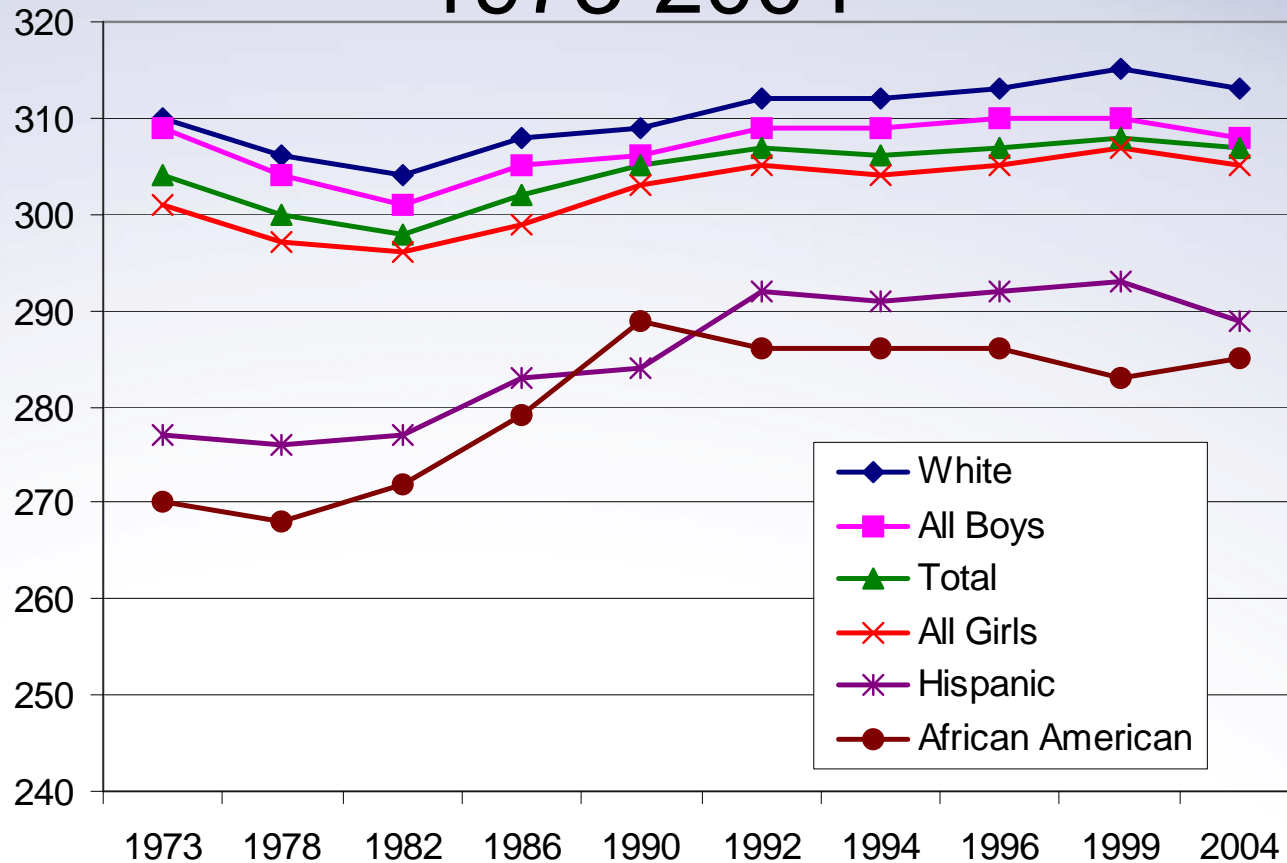


Source: CPST, data derived from National Center for Education Statistics



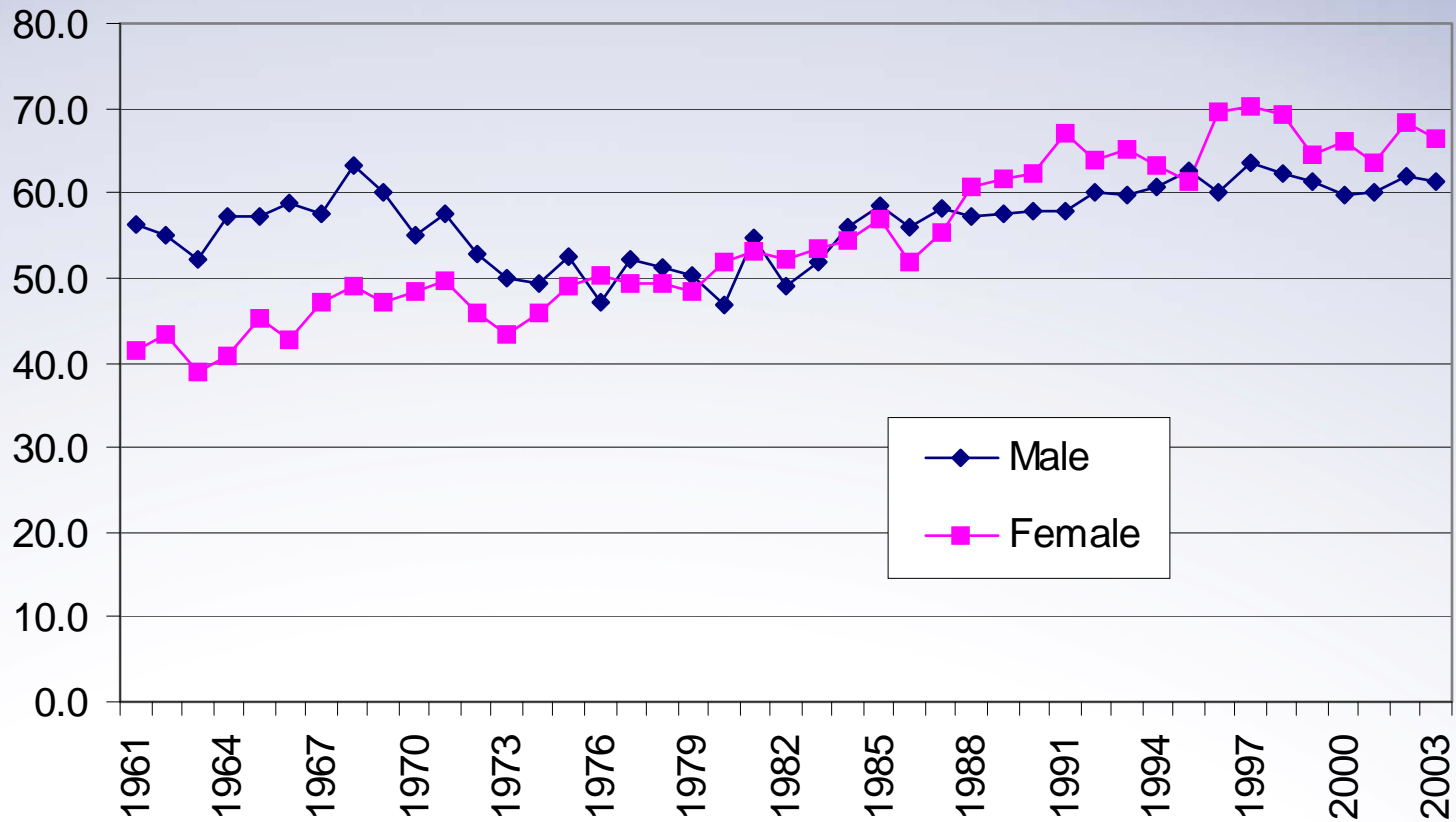
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Trends in NAEP Math Scores by Sex and Race/Ethnicity, Age 17, 1973-2004



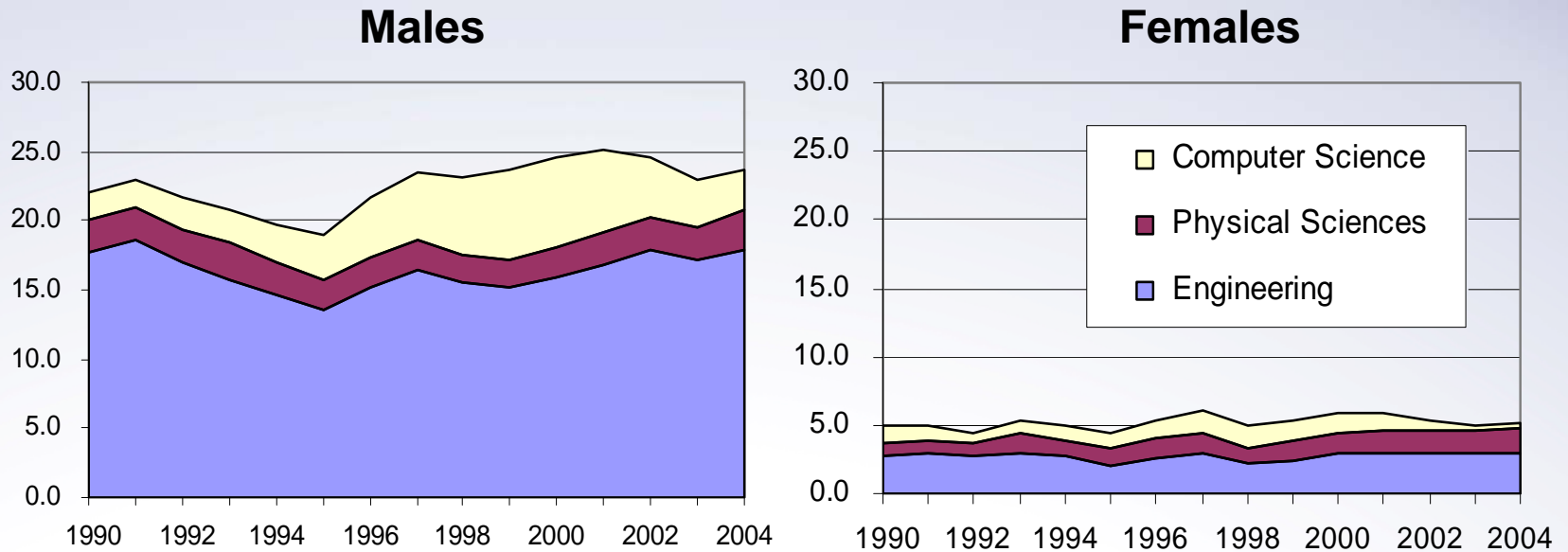
Source: CPST, data derived from National Center for Education Statistics

College Enrollment Rates by Gender



Source: CPST, data derived from National Center for Education Statistics

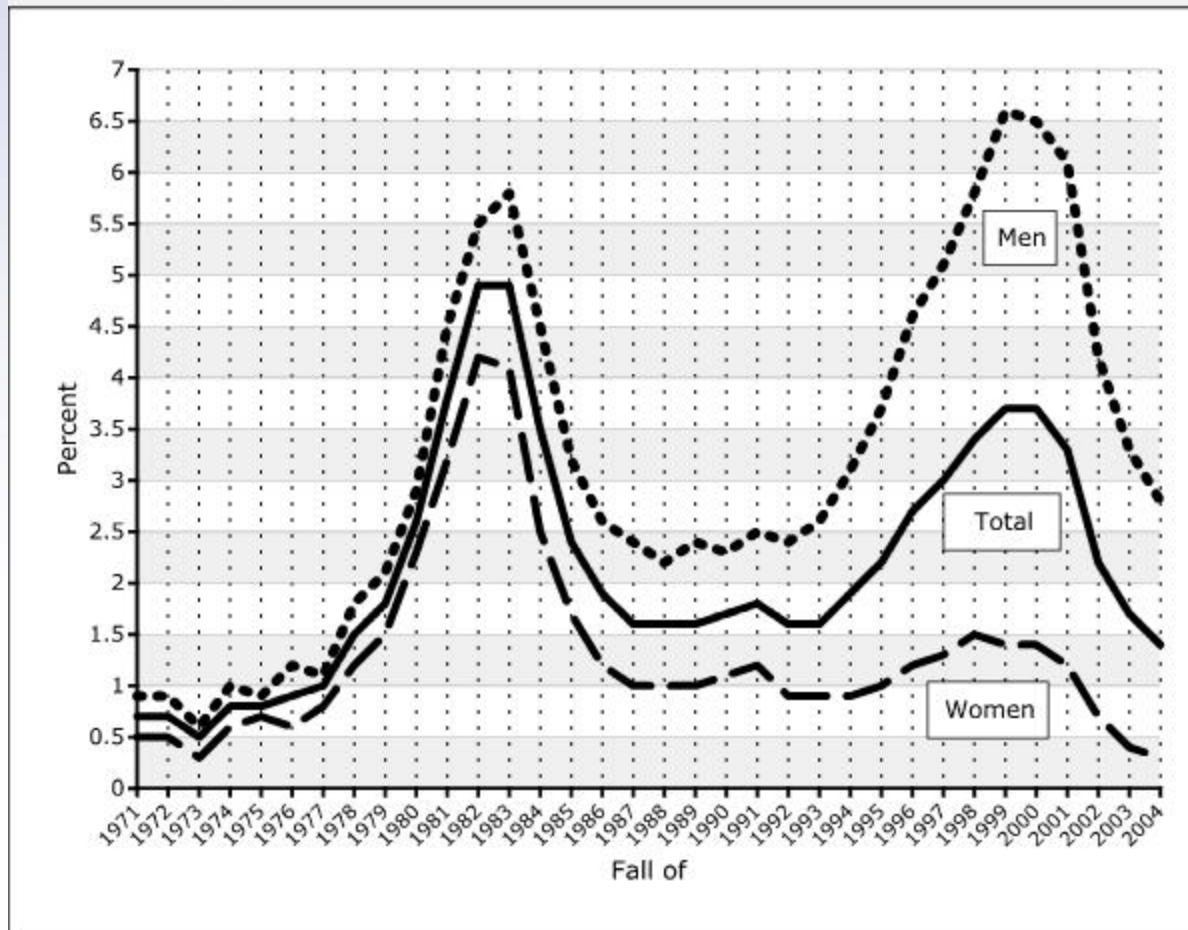
Males Far More Likely to Plan to Major in Technical Fields Than Are Females



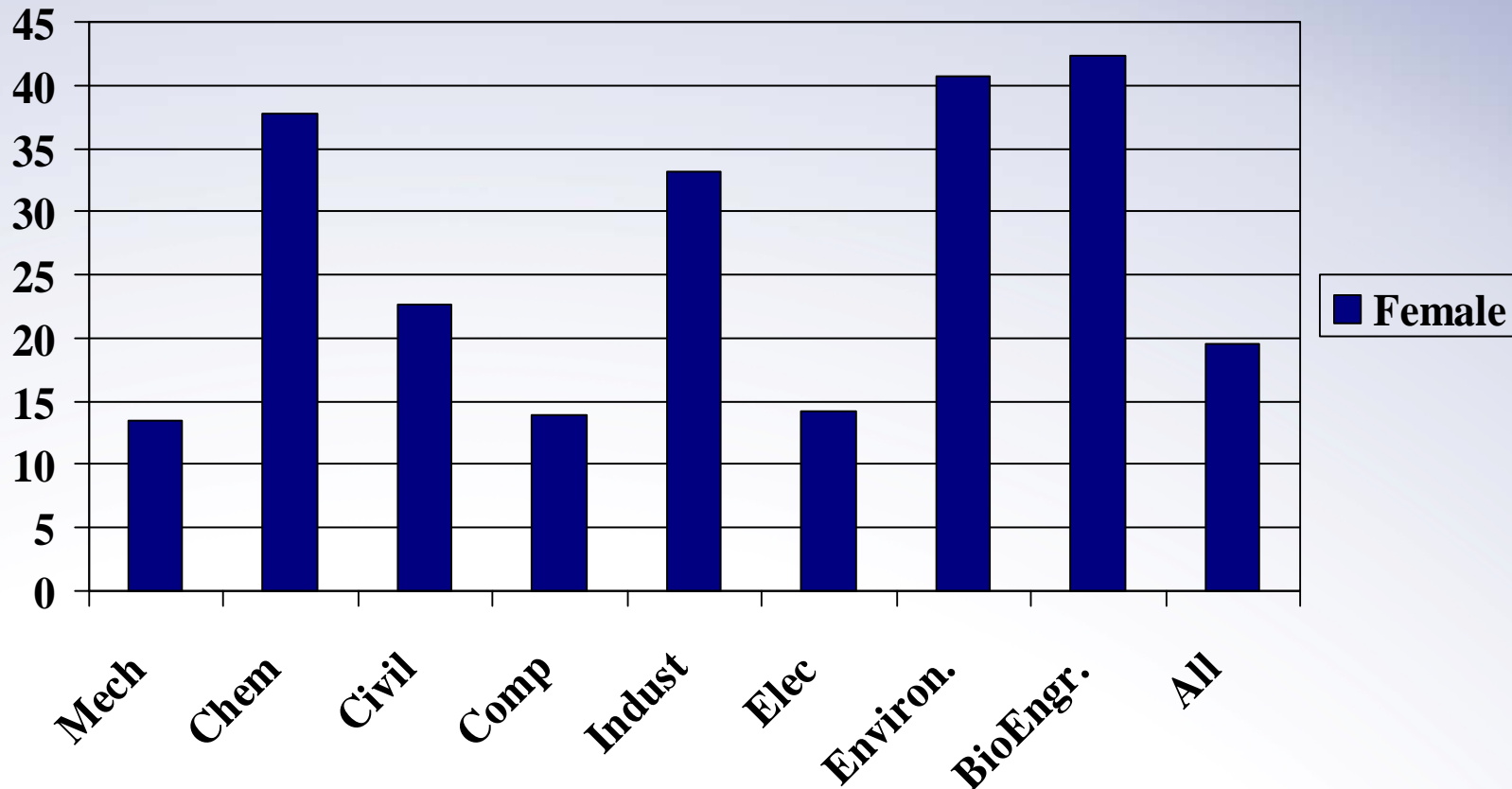
Source: CPST, data derived from Higher Education Research Institute

Interest in Computer Science Among Incoming Freshmen

Figure 1. Computer Science Listed as Probable Major Among Incoming Freshmen
Source: HERI at UCLA

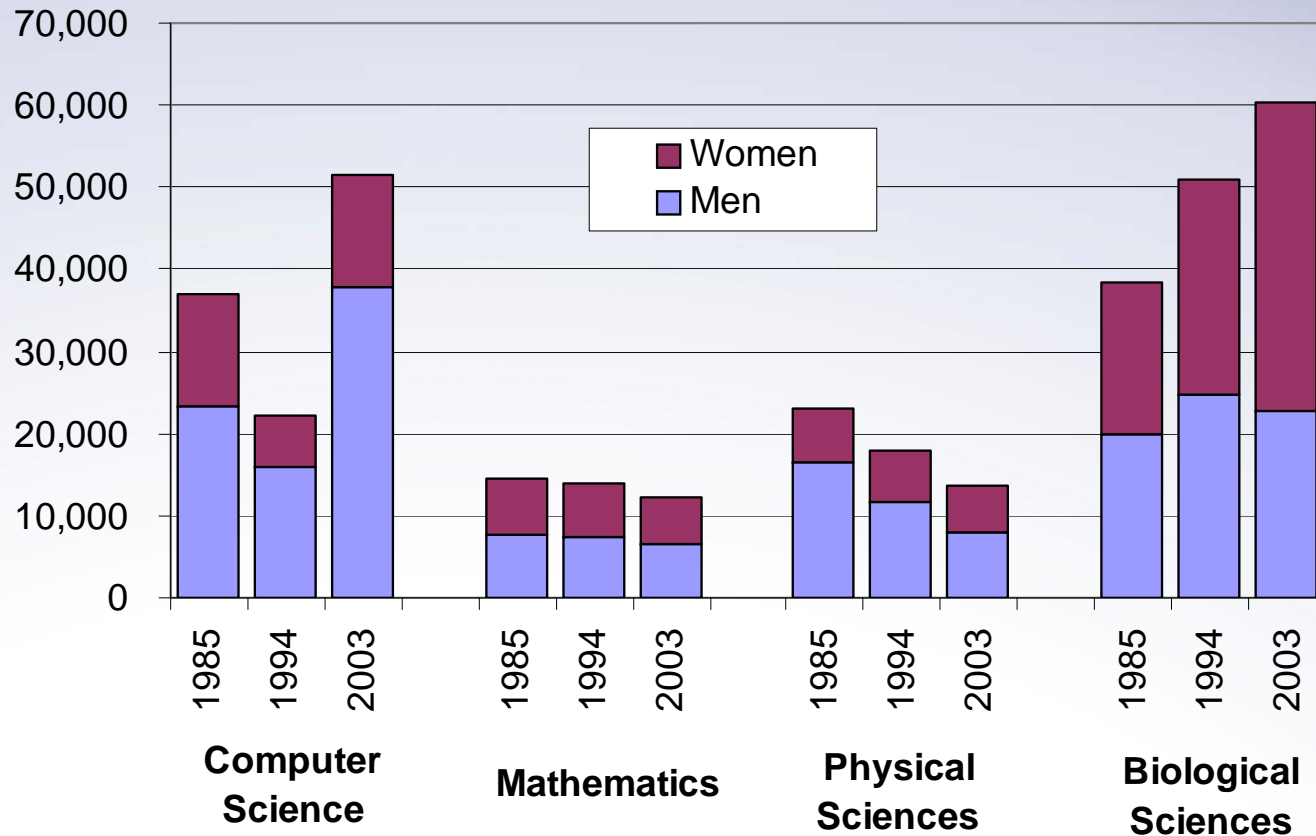


Bachelor's Degrees Granted by Engineering Discipline 2005



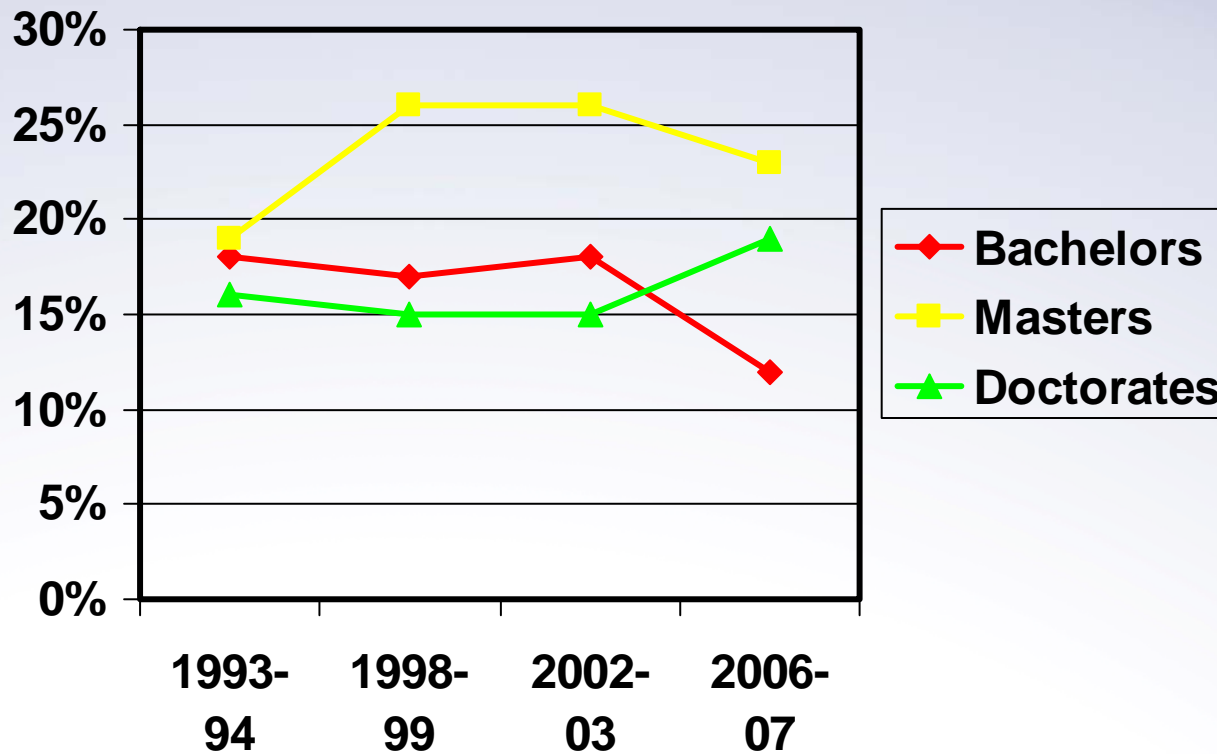
Source: CPST, data derived from Engineering Workforce Commission.

Women Increasing Their Share of Some STEM Bachelor's Degree Fields



Source: CPST, data derived from NSF and NCES

Percentage of Women Earning Computer Science/Engineering Degrees



Source: Computer Research Assoc. Taulbee Survey 2006-07

For more information

- National Center for Women in Information Technology www.ncwit.org
 - The NCWIT Scorecard – A Report on The Status of Women in Information Technology





STEM Equity Pipeline

A project of the National Alliance
for Partnerships in Equity
Education Foundation

Funded by the National Science
Foundation



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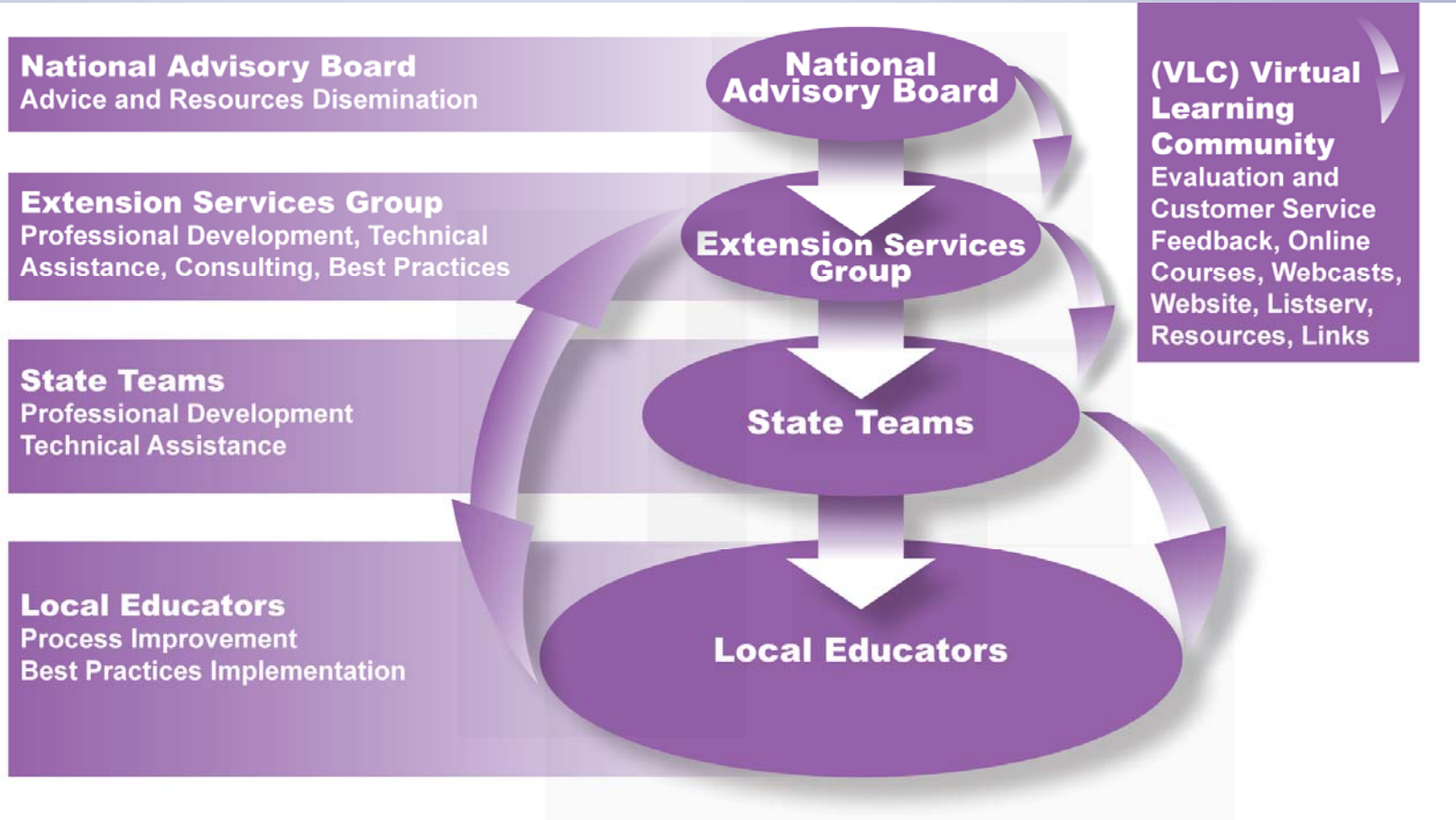
Goals

- Build the professional development capacity of the formal education community
- Institutionalize the implemented strategies by connecting the outcomes to existing accountability systems
- Broaden the commitment to gender equity in STEM education

STEM Equity Pipeline Project Methods

- Professional Development
- Consulting and Technical Assistance
- Virtual Web-based Professional Learning Community
- Best Practices Handbook

Model



State Teams

- 5 states in year one
 - California
 - Missouri
 - Illinois
 - Oklahoma
 - Wisconsin
- Secondary/Postsecondary collaboration
- Led by the State Contact(s) from the agency(ies) that administer career and technical education in the state

State Teams

- 2 states added in year 2
- 3 states added in year 3
- 3 states added in year 4
- 13 states over the life of the grant

State Team Members

- Personal Passion
- Professional or Volunteer Commitment
- Provide Professional Development
 - middle school
 - high school
 - community colleges

Virtual Learning Community

www.stemequitypipeline.org

- Public portal for the STEM equity pipeline community
 - Listserv
 - Links
 - Articles, Resources, Reports and Research
 - Calendar of Events in STEM
 - Webcasts, Webinars, Video, Podcasts, Power Points
 - Online courses and Tutorials
 - Performance Data on Women & Girls in STEM
 - Professional Development Needs Assessment
 - Project Evaluation Instruments and Surveys
 - Suggestion Box
 - More!



Register to Participate

Upcoming Events

NAEP Website

NAEP Ed Foundation Website



WHAT IS THE STEM EQUITY PIPELINE PROJECT?

The STEM Equity Pipeline project is designed to encourage women and minorities to pursue careers in STEM related occupations by providing technical assistance, professional development and resources to educators.

WHY WAS THE STEM EQUITY PIPELINE PROJECT CREATED?

Today's global economy has presented great challenges for the U.S. In order to compete effectively in the current global economy the U.S. must bring together industry leaders and educators to increase the population's skills in STEM (Science, Technology, Engineering and Math). The need for qualified individuals in scientific and engineering-related fields has far outgrown the needs of the general workforce.

OUR GOAL: The STEM Equity Pipeline project will:

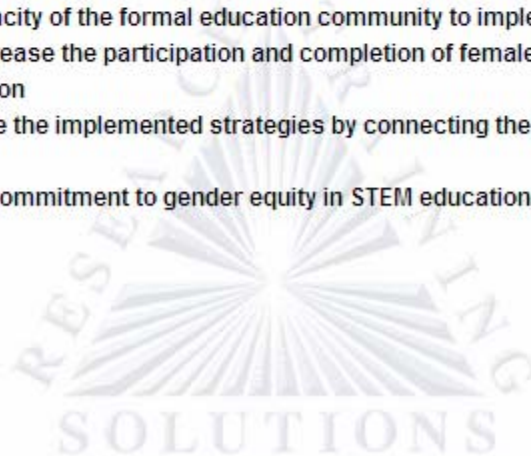
- Build the capacity of the formal education community to implement research based approaches proven to increase the participation and completion of females, including those with disabilities, in STEM education
- institutionalize the implemented strategies by connecting the outcomes to existing accountability systems, and
- broaden the commitment to gender equity in STEM education.

Search

Things to Remember
New State Request
for Applications
Due July 18, 2008

Programs and
Practices that
WORK!

EEES
Engineering Equity Extension Service
Virtual Support Network



STEP 1
Document
Performance Results

STEP 2
Identify
Root Causes

**The Five
Step
Process**

STEP 3
Choose
Best Solutions

STEP 5
Implement
Solutions

STEP 4
Pilot Test and
Evaluate
Best Solutions

Review Research Summary

Root Causes

- Chapter 6 Tables 16, 17, 19 and 20
- [Improving Performance on Perkins III Core Indicators: Summary of Research on Causes and Improvement Strategies](#)
- Authors: Robert Sheets, Mimi Lufkin, and David Stevens for the National Centers for Career & Technical Education

Root Causes

- Career Guidance Materials and Practices
- Access to and Participation in STEM
- Instructional Strategies
- Classroom Climate
- Role Models
- Early Exposure

Root Causes

- Curriculum Materials
- Occupational Choice
- School Climate
- Student Attitudes
- Support Services
- Student Isolation Based on Gender

Root Causes

- Self-efficacy
 - Attribution Theory
 - Locus of Control
- Bias and Discrimination
 - Gender schema
 - Implicit bias
 - Stereotype threat

STEP 1
Document
Performance Results

STEP 2
Identify
Root Causes

**The Five
Step
Process**

STEP 3
Choose
Best Solutions

STEP 5
Implement
Solutions

STEP 4
Pilot Test and
Evaluate
Best Solutions

Identify Potential Strategies and Models

- Review What Others Propose
 - NSF- [New Formulas for America's Workforce](#)
- Benchmark Peers and Leading Performers
 - [Programs and Practices That Work](#)
 - [Cisco's Gender Initiative](#)
 - [Best Practices in STEM Education](#)
 - [EEES Best Practices](#)
- Develop Your Own Solutions

Review Research Summary

Strategies

- Chapter 6 Tables 18 and 21
- [Improving Performance on Perkins III Core Indicators: Summary of Research on Causes and Improvement Strategies](#)
- Authors: Robert Sheets, Mimi Lufkin, and David Stevens for the National Centers for Career & Technical Education

Strategies for Recruitment

- Review career guidance materials and practices for gender bias and nontraditional exposure and support
 - [Guidelines for Identifying Bias in Curriculum and Materials](#)
Safe Schools Coalition
 - EEES-NAPE-PLTW [Guidance Counselor Presentation](#)
 - [Am I a Fair Counselor](#)
Destination Success, [MAVCC](#)
 - [Could This Be Your Life?](#)
Illinois Center for Specialized Professional Support

Strategies for Recruitment

- Invite, involve and educate parents

[Talented Girls Bright Futures](#)

Publication by Project Lead the Way

American Careers Magazine

Expanding Career Options Issue

[Career Communications, Inc.](#)

Strategies for Recruitment

- Conduct middle school programs

[Minot Public Schools](#)

[Minot, North Dakota](#)

[Programs and Practices That Work](#)

[2005 Award Winner](#)

Strategies for Recruitment

- Provide role models and mentors

[Girls E-Mentoring in Science, Engineering and Technology GEM-SET](#)

USDOL, Women's Bureau

[Engineer Girl](#)

National Academy of Engineering

Strategies for Recruitment

- Conduct targeted recruitment activities

Summer Camps

Cisco Gender Initiative

Marketing Materials

I am an Engineer

Strategies for Recruitment

- Conduct pre-technical training programs

[Rosies Girls](#)

Northern New England Tradeswomen

[TechBridge](#)

Chabot Space and Science Center

Strategies for Recruitment

- Collaborate with community-based organizations

Operation SMART, Girls, Inc.

Expanding Your Horizons

Girl Scouts

National Girls Collaborative Project

Strategies for Recruitment

- Conduct professional development with teachers at all levels

Generating Expectations for Student Achievement, Graymill

STEM Equity Pipeline

Career Technical Education Equity Council

September 11-12, 2008 Tulsa, OK



Expanding Options for Women and Girls in
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Strategies for Recruitment

- Implement and model gender-fair institutional strategies

[Checking Your School for Sexism](#)

Destination Success, [MAVCC](#)

[Gender Equity Item Bank](#)

Midwest Equity Assistance Center



Strategies for Retention

Strategies for Retention

- Evaluate all school and curriculum materials for gender bias and positive nontraditional images

[Gender Equity Tip Sheets](#)

[Bias Evaluation Instrument](#)

Nova Scotia Department of Education

[Curricular Bias](#), David Sadker

Strategies for Retention

- Increase teacher and administrator quality and equity-capacity through professional development

Gender Module

Cisco Learning Institute

NAPE Professional Development Institute

March 28-April 2, 2009 Washington, DC

Strategies for Retention

- Increase competence in diversity and sexual harassment prevention

[Gender Equity Tip Sheets](#)

[Tolerance.org](#)

Southern Poverty Law Center

[Project Implicit](#), Harvard University

Strategies for Retention

- Conduct nontraditional student support groups and peer counseling

Computer Clubhouse

Boston's Museum of Science

NASA Harriett G. Jenkins Pre-Doctoral
Fellowship Program

(Facebook Group)

Strategies for Retention

- Provide nontraditional role models, mentors, and job shadowing

[IGNITE](#), Seattle Public School System

[MentorNet](#)

[How to Plan and Facilitate a Job Shadowing Experience](#)

Destination Success, [MAVCC](#)

Strategies for Retention

- Invite, involve and educate parents

Trailblazers

VA Department of Education

Ways for Parents to Support Expanded Occupational Options

Destination Success, MAVCC

Strategies for Retention

- Provide a continuum of support services
 - Tutoring
 - Child care
 - Transportation
 - Financial Aid
 - Books, Equipment, Tools, Clothing
 - Tuition
 - Modification of Curriculum, Equipment
 - Student/Teacher Aides
 - More

Strategies for Retention

- Invite, involve, and educate business

Information Technology Association of America

Association for Women in Computing

Society of Women Engineers

How can I be involved?

- Visit the Virtual Learning Community
 - Register for the listserv
 - Complete the professional development needs assessment
 - Access resources and best practices
- Participate in a webinar/webcast/online course
- If from a participating state, participate on the state team

Questions?

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