

# Taking Neuroscience to School: A White House Perspective

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# The Challenge!



- Student's are not being prepared to succeed in higher learning, especially in math and science fields
- Despite concerted efforts to improve, readiness has not appreciably improved in the last decade.
  - Especially in Biology!
- Something must be done. Neuroscience can help.



from Agriculture



to Manufacturing

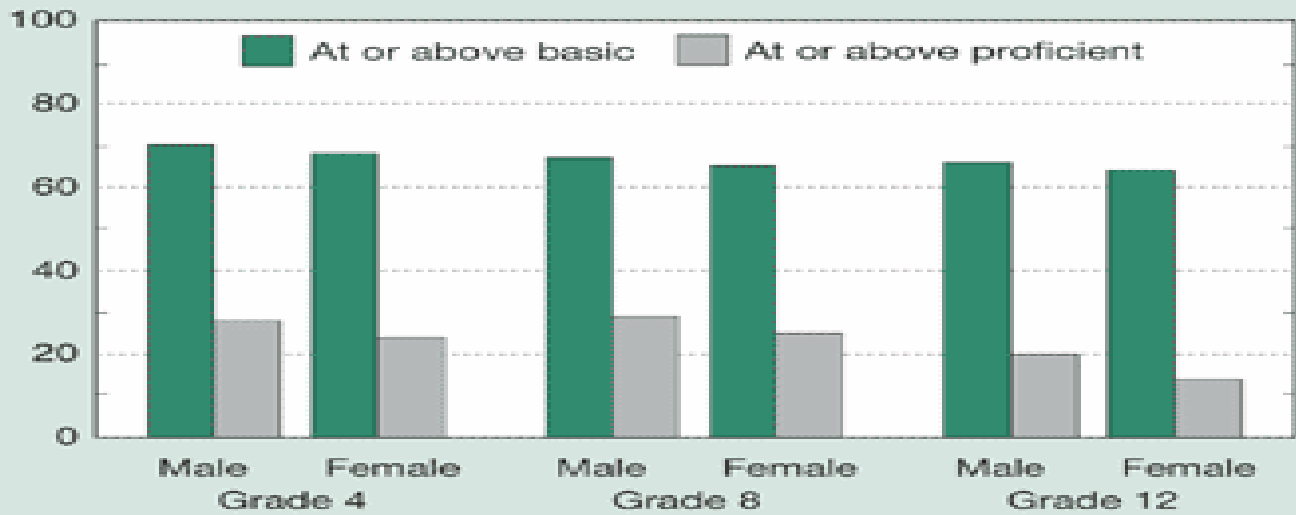
to Technology



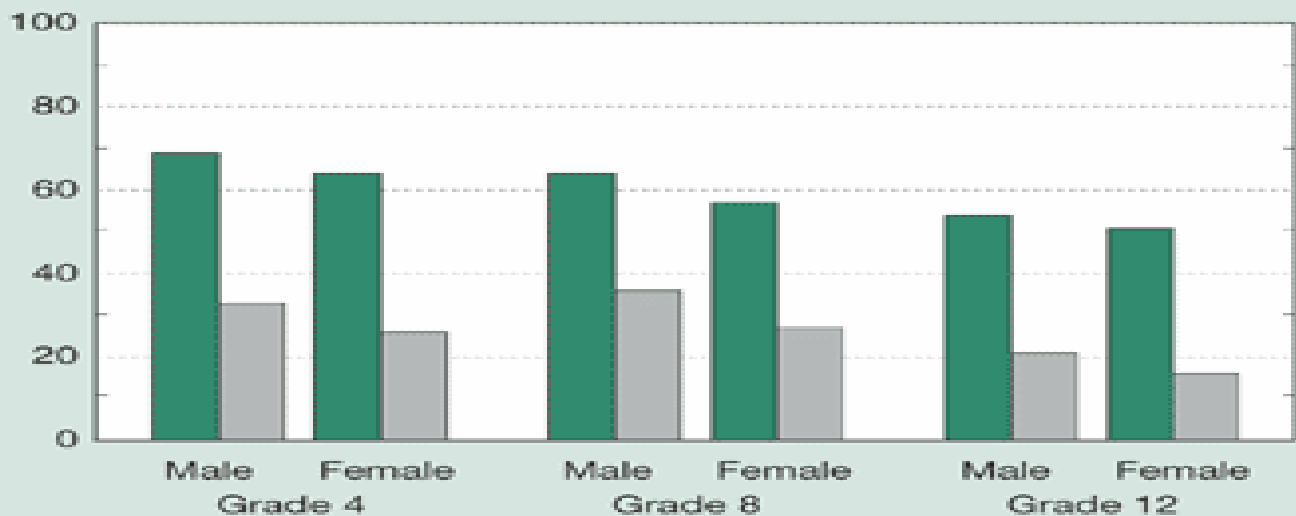
# Students At or Above Basic or Proficient Level in Math/Science: NCES, 2000



Percent

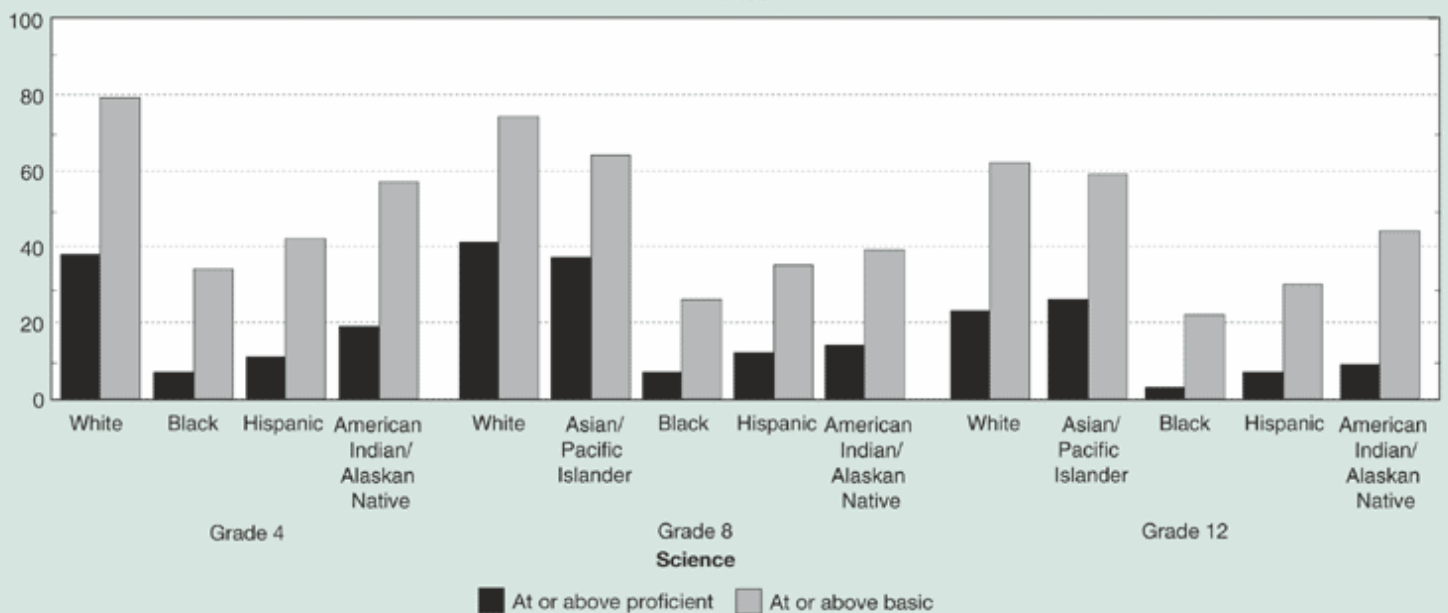
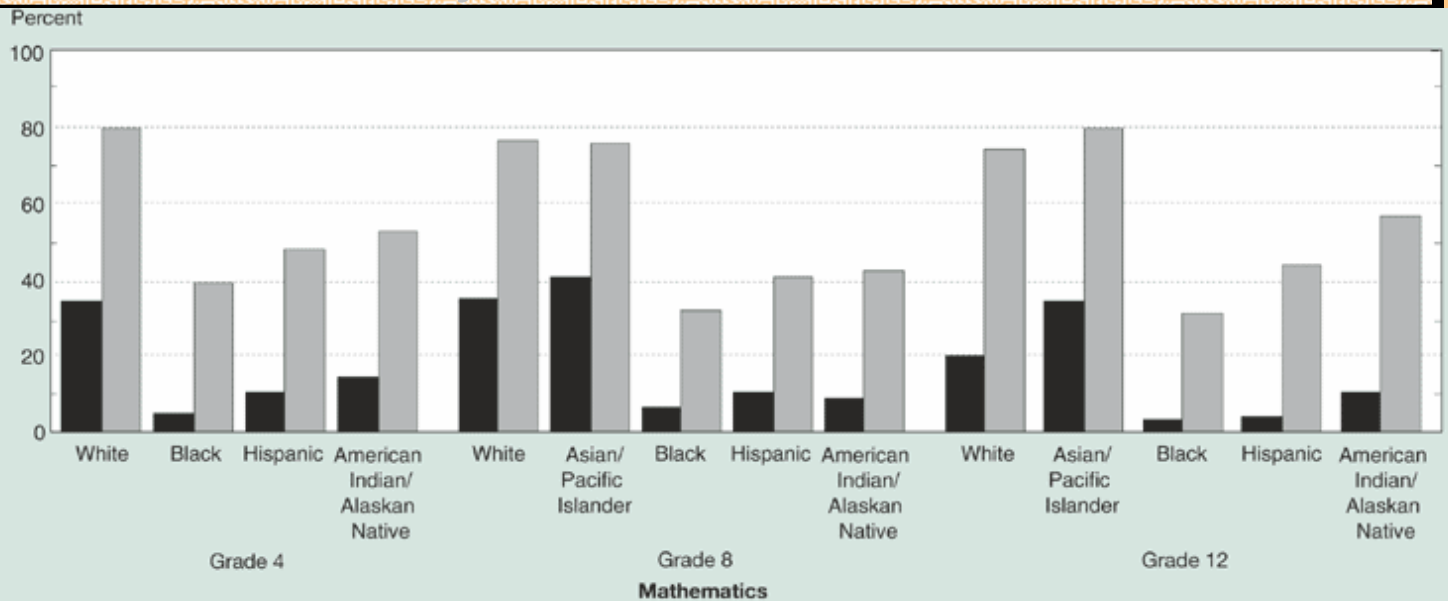


**Mathematics**



**Science**

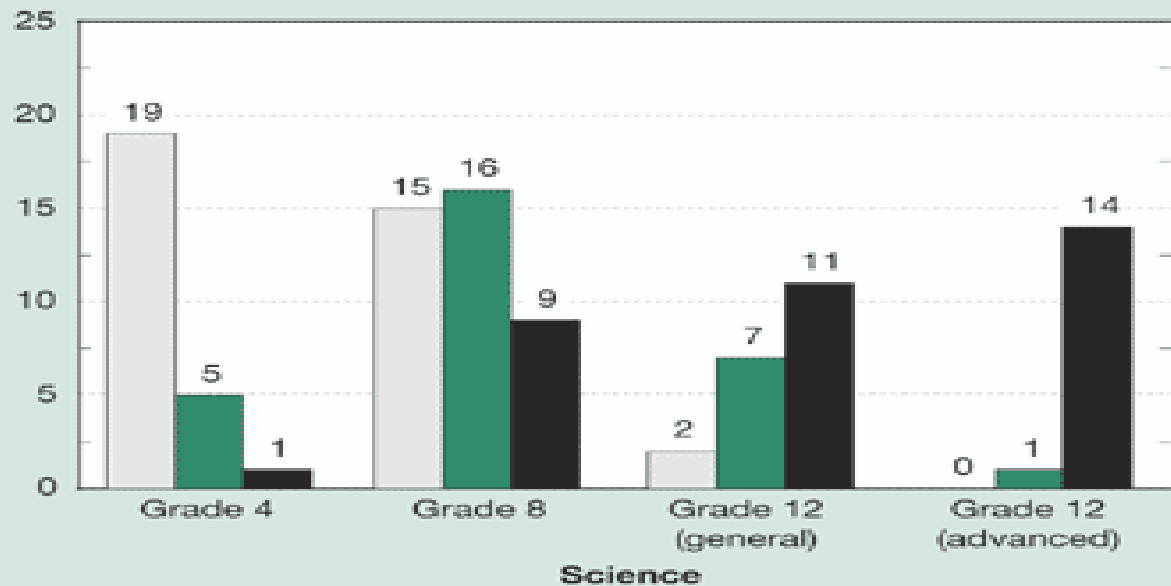
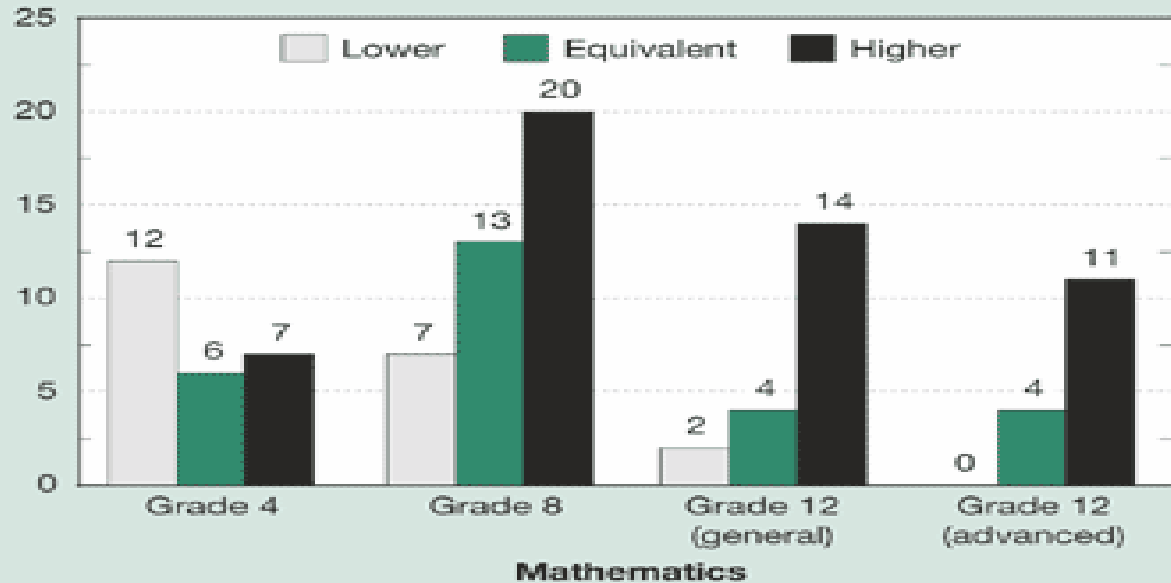
# At or Above Basic or Proficient Level by Race/Ethnicity: NCES, 2000



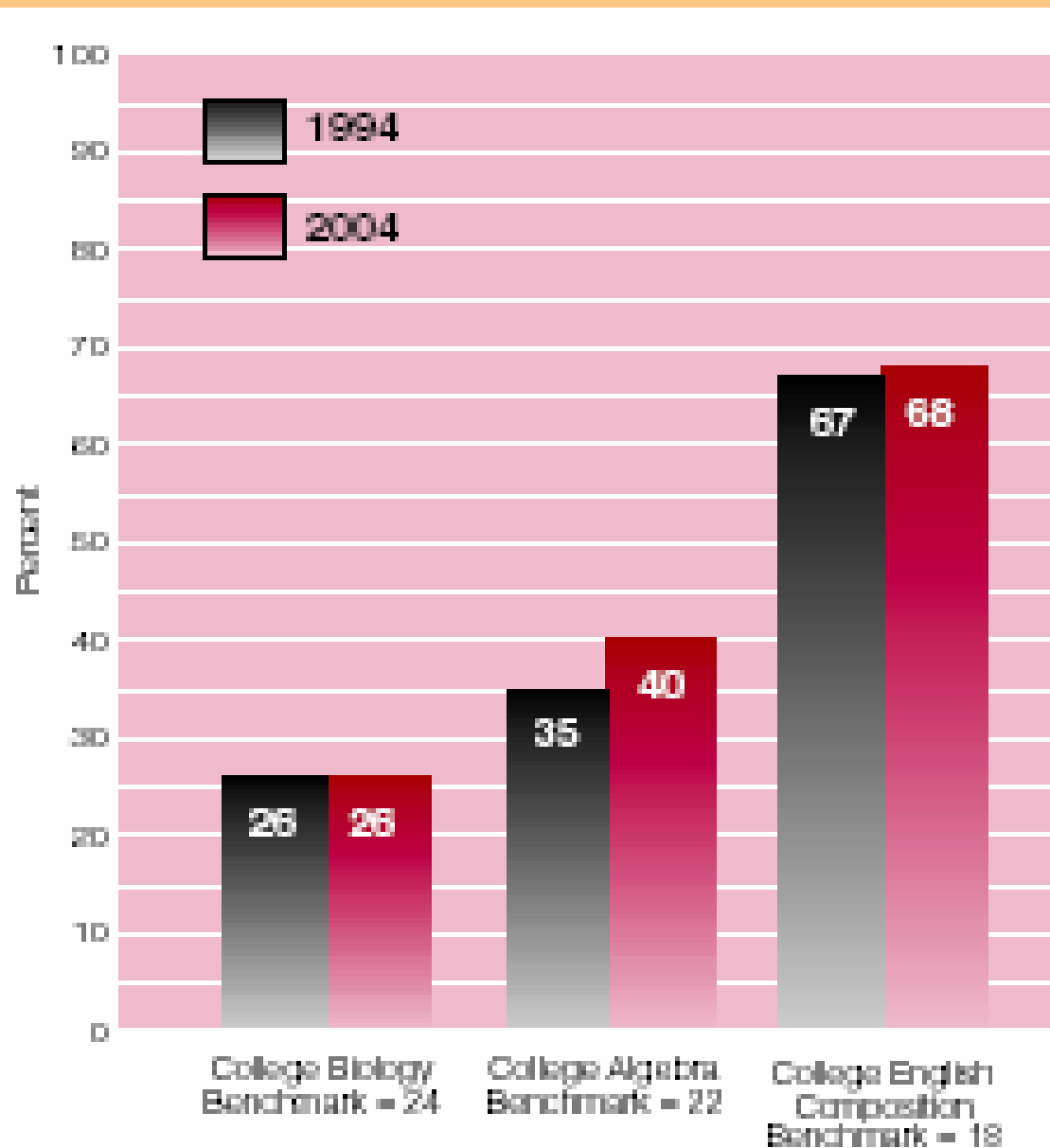
# TIMSS 1995 Scores – Other Country Scores Compared to US



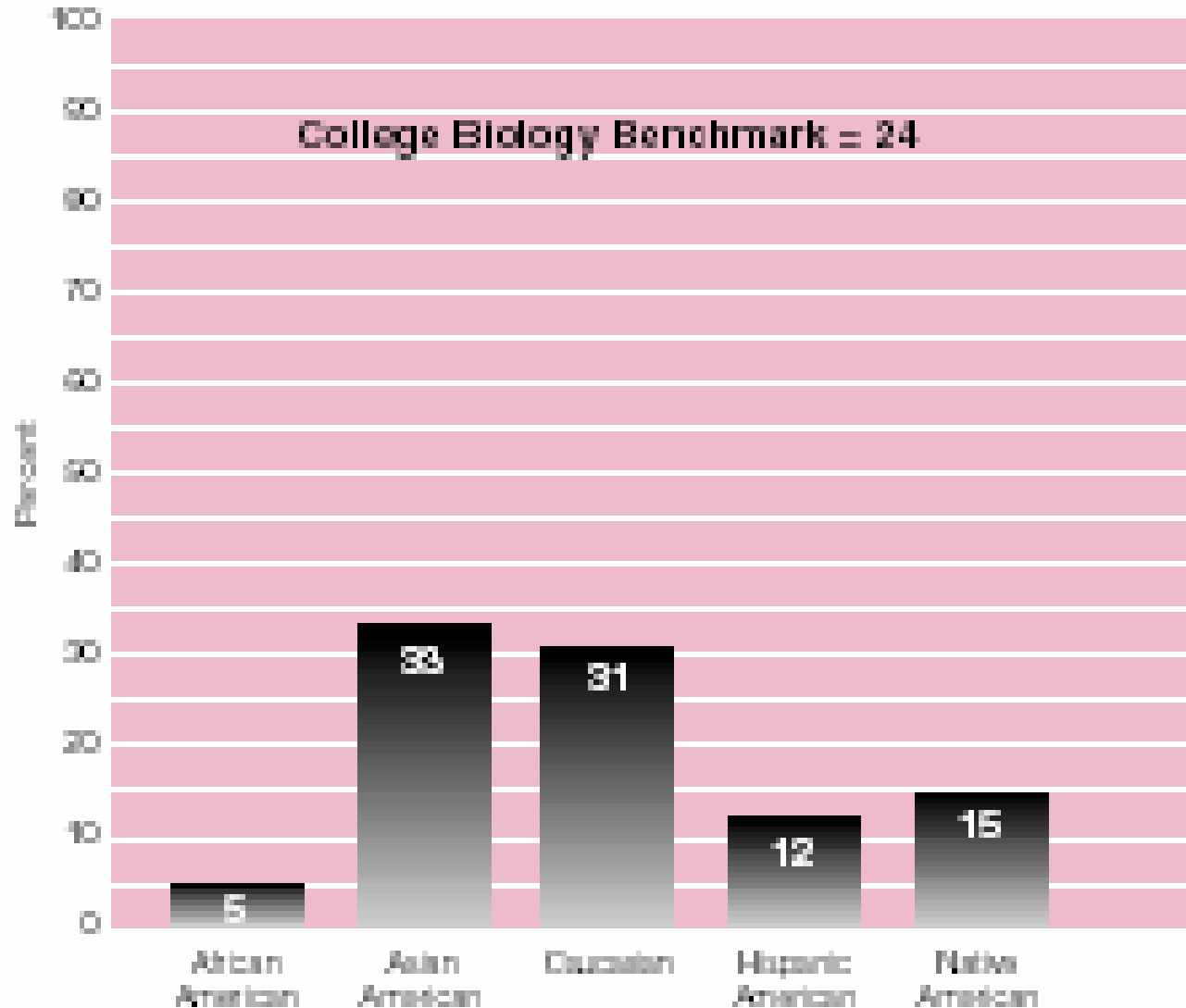
Number of countries



# ACT-tested High School Graduates Meeting College Readiness Benchmarks: 1994-2004



# 2004 ACT-tested High School Graduates Meeting College Biology Benchmark





# Improve STEM Education for Students



- **Enhance visibility through Presidential events**
  - **The Presidential Award for Excellence in Science, Math, and Engineering Mentoring (PAESMEM)**
    - recognize outstanding mentoring efforts/programs designed to enhance the participation of underrepresented groups
  - **Presidential Award for Excellence in Math and Science Teaching (PAEMST)**
    - given to approximately 200 elementary and secondary math and science teachers from all 50 states and US territories
  - **Excellence in Science, Technology, and Mathematics Education (ESTME) Week**
    - promote activities and distribute materials that are “hands-on” and excite students about math & science
    - stimulate interest in pursuing STEM careers
  - **Presidential Early Career Award for Beginning Scientists and Engineers (PCASE)**

## Improve STEM Education for Students

### Bush Initiative: No Child Left Behind Act (NCLB) of 2001

- fill classrooms with teachers who are knowledgeable and experienced
  - measure student's progress in math at regular intervals
  - provide funding only to research-based programs that are backed by good evidence.
- 
- *combines stronger accountability with greater flexibility and local control to ensure optimal use of Federal funds.*





# How Do We Get There?



- Improve Science, Technology, Engineering, Mathematics (STEM) education for students



- Improve STEM education for teachers



- Improve STEM workforce development

- Enhance the quality of popularized science and increase access for the general public



Both **PCAST** and **NSTC** are actively studying and advising on this problem

# No Child Left Behind



- The principal federal law affecting education from kindergarten through high school.
- A sweeping overhaul of federal efforts to support elementary and secondary education in the United States.
- Built on four common-sense pillars:
  - accountability for results
  - an emphasis on doing what works based on scientific research
  - expanded parental options
  - and expanded local control and flexibility

# NCLB: Requirements

- Annual testing of all students against state standards in reading and mathematics, grades 3-8 and in science three times in a student's career
- Highly qualified teachers in core subjects by 2005-06
- The use of "scientifically-based" programs and strategies
- "Verification" of each state's assessment system
- Aggregate and disaggregate analysis and reporting of student achievement results
- "Adequate yearly progress" toward 100 percent of students meeting state standards by 2013-14
- Technical assistance and then sanctions for schools





# Important NCLB Initiatives: Math Science Partnerships



- Interagency Grants Program (ED and NSF)
- Linking institutions of higher learning with K-12 districts, teachers, and administrators to improve math/science achievement
- Five key features:
  - Partnership-Driven
  - Teacher Quality, Quantity and Diversity
  - Challenging Courses and Curricula
  - Evidence-Based Design
  - Institutional Change and Sustainability
- MSP Learning Network ([hub.mspnet.org](http://hub.mspnet.org))



# Important NCLB Initiatives: Education Research

- Interagency Education Research Initiative (IERI): to support scientific research investigating the effectiveness of interventions in reading, mathematics, and the sciences as they are implemented in varied school settings with diverse student populations.
  - ED/Institute of Education Sciences
  - NIH/National Institute of Child Health & Human Development
  - NSF/Division of Research, Evaluation and Communication

# Important NCLB Initiatives: Education Research

- Additional research programs
  - NSF/Research on Learning and Education (ROLE)
    - Research on the biological, behavioral, cognitive, affective, and social aspects of human learning of science and mathematics.
  - NIH/NICHD Mathematics and Science Cognition and Learning Program
    - Studies to improve our understanding of cognitive and developmental processes involved with math and science thinking and learning







# Federal Agency Outreach Programs: NIH



## ■ Curriculum Supplements

- Interactive teaching units that combine cutting-edge science research discoveries from the National Institutes of Health with state-of-the-art instructional materials.
- Grades 9-12:
  - Sleep, Sleep Disorders, and Biological Rhythms
- Grades 7-8:
  - Understanding Alcohol: Investigations into Biology and Behavior
  - How Your Brain Understands What Your Ear Hears



# Federal Agency Outreach Programs: NIH

- Health and medical science career exploration site for students, parents, mentors, teachers, and career counselors



**LifeWorks™**  
Explore health & medical science careers...

<http://science-education.nih.gov/LifeWorks.nsf>

- Also:

- Exhibits and Conferences
- Speakers Bureau
- Science Fair Volunteers
- Women in Science Careers page

<http://science.education.nih.gov/women/>





# Federal Agency Outreach Programs: NSF



- Grants for Instructional Materials Development (IMD)

<http://www.nsf.gov/pubs/2001/nsf0160/nsf0160.pdf>



- Grants for Course, Curriculum, and Laboratory Improvement

<http://www.ehr.nsf.gov/EHR/DUE/programs/ccli/>



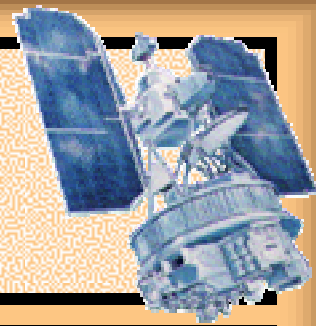
- National Science, Technology, Engineering, and Mathematics Education Digital Library

<http://www.nsd.org/>

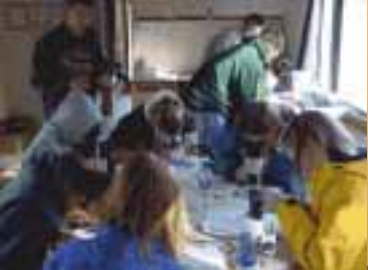


National Science Foundation  
Directorate for Education and Human Resources  
Division of Undergraduate Education

# Federal Agency Outreach Programs: NASA



- NASA CORE – Resources for Educators [Http://Core.NASA.gov](http://Core.NASA.gov)
- NASA TV  
<http://www.nasa.gov/multimedia/nasatv>
- NASA Explorer Schools  
<http://explorerschools.nasa.gov/>
- NASA Educator Astronaut Program  
<http://edspace.nasa.gov/>



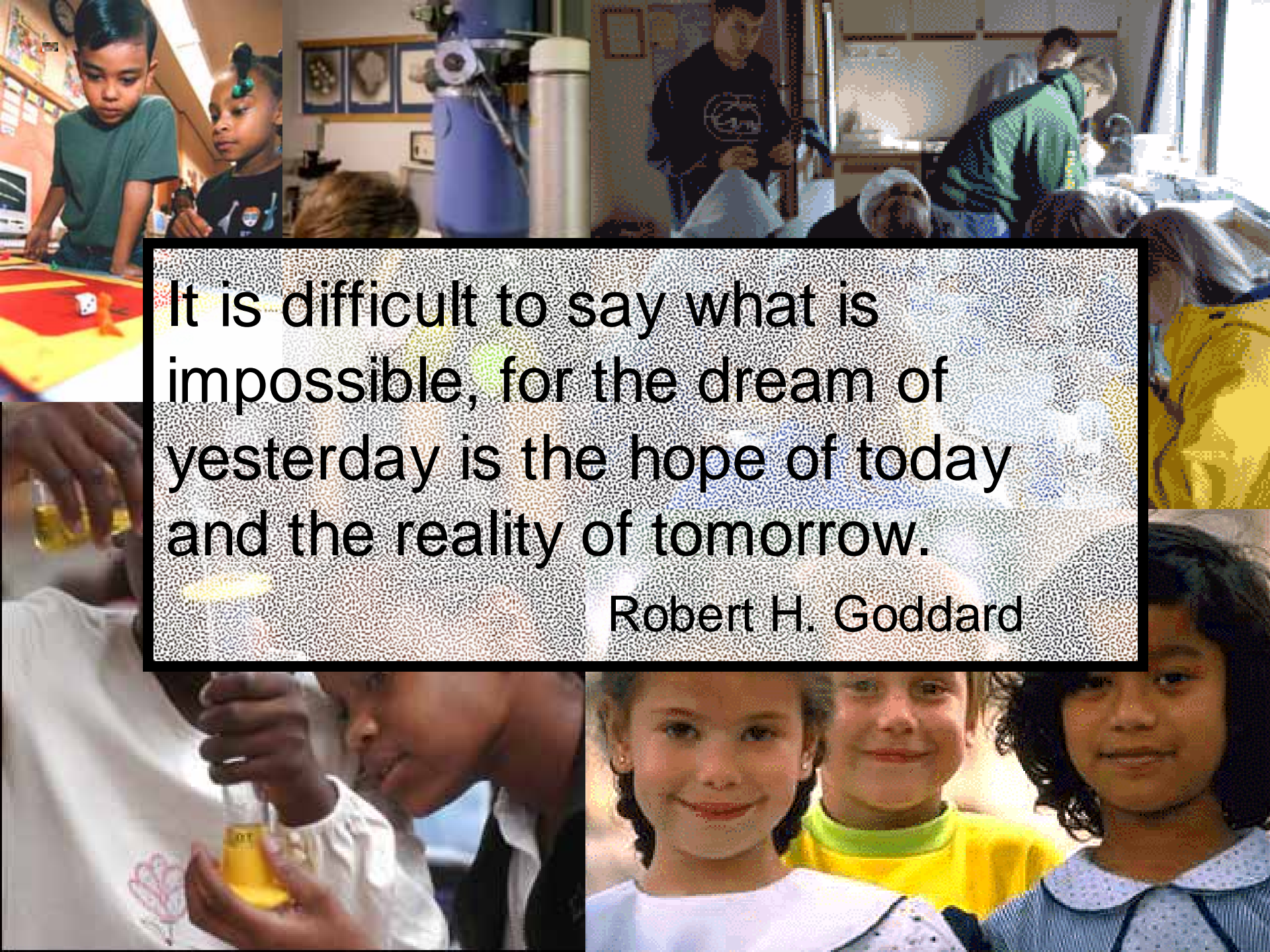


# Put Yourself in the Picture



- **Research:** How does the brain learn math and science?
- **Partner** with a local school system through MSP
- Involve yourself with your funding agency's **outreach** programs
  - Often supplemental funds for grants!
- **Volunteer** in the classroom





It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow.

Robert H. Goddard