



an AMERICAN IMPERATIVE



BUSINESS-
HIGHER EDUCATION
FORUM™

Creating Solutions. Inspiring Action.

Transforming the
Recruitment, Retention,
and Renewal

*of Our Nation's Mathematics
and Science Teaching Workforce*

The Business-Higher Education Forum (BHEF)

BHEF is an organization of Fortune 500 CEOs, prominent college and university presidents, and foundation leaders working to advance innovative solutions to our nation's education challenges in order to enhance U.S. competitiveness.

Current BHEF Initiatives

- The College Readiness Initiative (CRI): An Agenda for Educational Success
- The STEM Initiative (Science, Technology, Engineering, and Mathematics)

The College Readiness Initiative (CRI)

The CRI is a dynamic platform for business and higher education to work together to promote college readiness, access, and success for underserved populations, particularly in science and math.

Implementation Strategies:

1. Engagement of CEOs
2. Convenings
3. A Web-based Resource Center
4. Advocacy and Action On-the-Ground
5. A Public Awareness Campaign

BHEF's STEM Initiative

- Calls for doubling the number of U.S. students earning STEM degrees by 2015
- Six priorities:
 - Raise student achievement and interest in STEM careers
 - Attract more students women and minorities into STEM
 - Align/strengthen linkages across P-16 educational system
 - Improve the recruitment, retention and renewal of K-12 mathematics and science teachers
 - Advance federal and state STEM policies that allow U.S. to compete globally
 - Stimulate a national dialogue while encouraging local, grass-roots initiatives and action



The Teacher Quality and Quantity Problem

- Research has established that the quality of P–12 mathematics and science teaching is the single most important factor in improving student mathematics and science achievement
- There are simply not enough highly skilled mathematics and science teachers entering the profession
- The problem of attracting highly qualified candidates into the mathematics and science teaching workforce is overshadowed by the difficulty of retaining experienced teachers



Three Key Recommendation Areas: **Recruitment, Retention, and Renewal**

- **RECRUITMENT**, including teacher enlistment strategies, preparation programs, and licensure.
- **RETENTION**, encompassing strategies and programs to keep new teachers in the classroom and retain experienced teachers.
- **RENEWAL**, a focus on teacher professional development, license renewal, and assessment of teacher quality and student outcomes.

Efforts Converging on a Solution

- National Commission on Teaching and America's Future (1996)
- National Commission on Science and Mathematics Teaching for the 21st Century (2000)
- The Teaching Commission (2004 & 2006)
- Committee on Prospering in the Global Economy of the 21st Century (2005)
- College Board (2006)
- BHEF (2005) *A Commitment to America's Future*

RECRUITMENT

Recommendation: Strengthen teacher recruitment policies in mathematics and science.

- Implement a comprehensive package of mathematics and science teacher education recruitment strategies, starting in P–12 and extending through graduate school, that include incentives such as scholarships, signing bonuses, and differential pay.
- Strengthen the content and pedagogy of teacher preparation programs to ensure a national mathematics and science teacher workforce capable of preparing P–12 students for success in higher education and the workplace.
- Expand strategies to attract talented individuals in STEM-related professions to teaching and ensure they are adequately trained for the classroom.

RETENTION

Recommendation: Improve the retention of both new and experienced teachers and address the causes of teacher dissatisfaction.

- Develop and implement research-based induction programs for all new mathematics and science teachers.
- Implement comprehensive policies and programs that address the leading causes of teacher job dissatisfaction, including inadequate compensation, lack of administration support, and professional isolation.

RENEWAL

Recommendation: Ensure that all mathematics and science teachers participate in renewal activities that support their effectiveness in the classroom.

- Provide ongoing, research-based professional development programs, focused on both content and pedagogy, for all mathematics and science teachers.
- Revamp teacher license renewal programs to incorporate measures of teacher effectiveness.
- Establish comprehensive statewide data collection systems that track student progress, teacher effectiveness, and employment trends of mathematics and science teachers.

Five Key Stakeholder Roles

Federal Government

- Bolster research efforts to identify and disseminate promising practices
- Support programs that are effective in increasing student achievement in mathematics and science

State Governments

- Establish more coherent statewide policies
- Coordinate the efforts of other stakeholders

School Districts

- Establish district-wide policies
- Suited to local needs and conditions
- Aligned with federal and state guidelines

Five Key Stakeholder Roles (con't.)

Higher Education

- Invest in and strengthen teacher preparation and professional development programs in mathematics and science
- Expand research on effective teaching and learning methods

Business and Foundations

- Publicly champion policies
- Support effective programs



The Report Identifies Promising Strategies

Recruitment	Retention	Renewal
<ul style="list-style-type: none">• UTeach• New York City Teaching Fellows• Governor's Science and Mathematics Teacher Initiative of the Higher Education Compact of 2004• Teachers for a New Era	<ul style="list-style-type: none">• e-Mentoring for Student Success• National Commission on Teaching and America's Future/Georgia State University Induction Project• U.S. Department of Energy's Academies Creating Teacher Scientists• Guilford County Schools Mission Possible	<ul style="list-style-type: none">• Industry Initiatives for Science and Math Education (IISME) Summer Fellowship Program• Project SOAR (Schools' Online Assessment Reports)• Math for America Newton Master Teacher Program• Data Quality Campaign• New Mexico 3-Tiered Licensure System

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STEM

STEM Education Modeling Project

- **Goal**
 - Assist policymakers, educators, and researchers in understanding the complex nature of the U.S. education system
 - Help identify potential solutions that could help strengthen U.S. STEM outcomes
- **Approach**
 - Create a dynamic systems engineering-based model of the P-16 STEM education system and beyond
 - Develop a community of researchers/model users to test and validate the model
 - After further development, transition the model to open source use

Simulating Interventions

- Proposed policy interventions and strategies can be overlaid on the baseline model to simulate the impact—both intentional and unintentional—on the number of STEM-able and interested students.
- Hypotheses currently being examined:
 - Impact of teacher quality on K-12 student interest and capabilities in STEM
 - Impact of teacher salary
 - Class size reduction
 - STEM undergraduate persistence



High School Academic Preparation and Subsequent University Achievement in Calculus: A Tale of Two High Schools

Urban High School A Suburban High School B

Number of Students Enrolled 2002 and 2006

12

11

Number of Students who Anticipate a STEM Major

9

8

Number of Students With Grade of B or Higher in Calculus

1

7

Number of Students With Grade of B or Lower in Calculus

8

1

Contact Information

Dr. Brian K. Fitzgerald
Executive Director
Business-Higher Education Forum
2025 M Street, N.W., Suite 800
Washington, DC 20036
Brian.Fitzgerald@bhef.com
www.bhef.com