Bringing Under-represented Populations into the Sciences:
What Difference Does *Difference* Make?

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Perspectives on *Difference*

- The educational value of diversity (Justice Sandra Day O'Conner)
- Diversity as a key tenet of invention and innovation (Joseph DeSimone)
- *The Difference: How the power of diversity creates better groups, firms, schools and societies* (Scott E. Page)

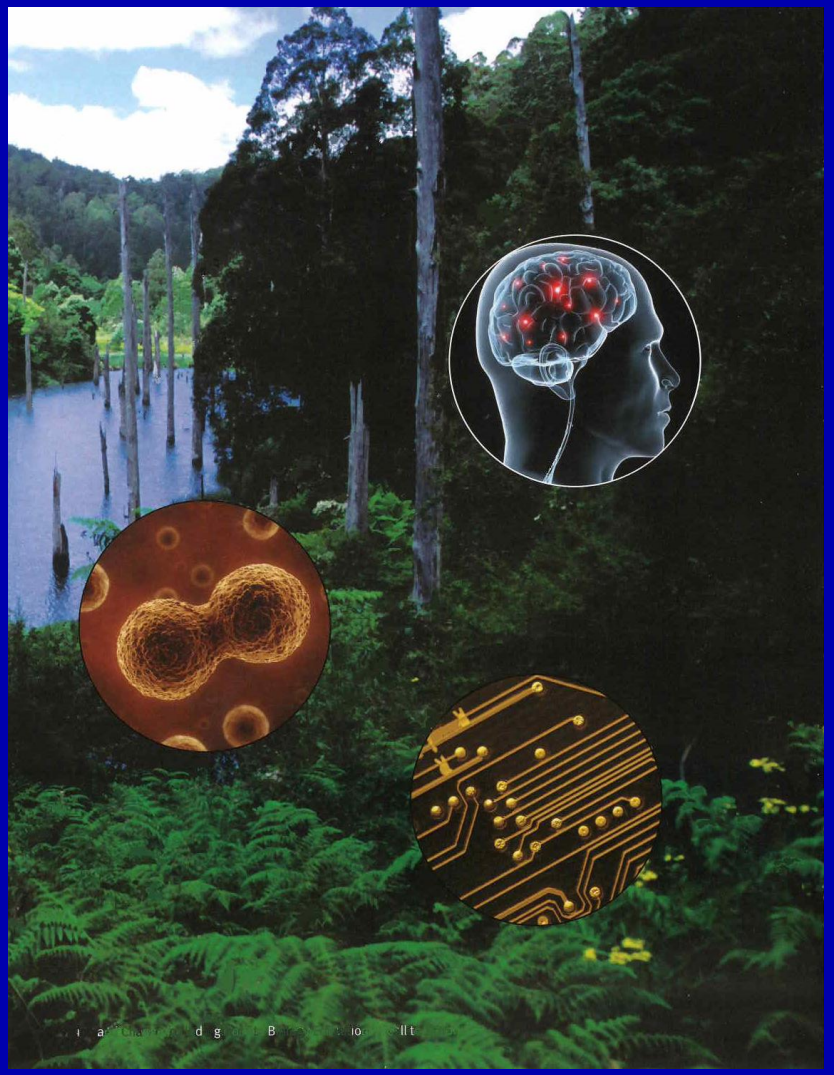
How the Power of Diversity Creates Better Science

- It's not just about workforce numbers
- Women's health
- Health disparities
- Faculty diversity
- Relating to diverse populations
- Variation among and within populations (genetic, genomic, cultural, etc.)

Looking at the Challenges of Under-represented Populations in STEM through Different Lenses

- Civil rights
- Social Justice
- Research priorities
- Research necessity

An Ecosystems Perspective



Why Doesn't the Faculty Look Like the Students?

- Undergrad
- Graduate
- Postdoctoral
- Faculty

The Largest Points of Loss

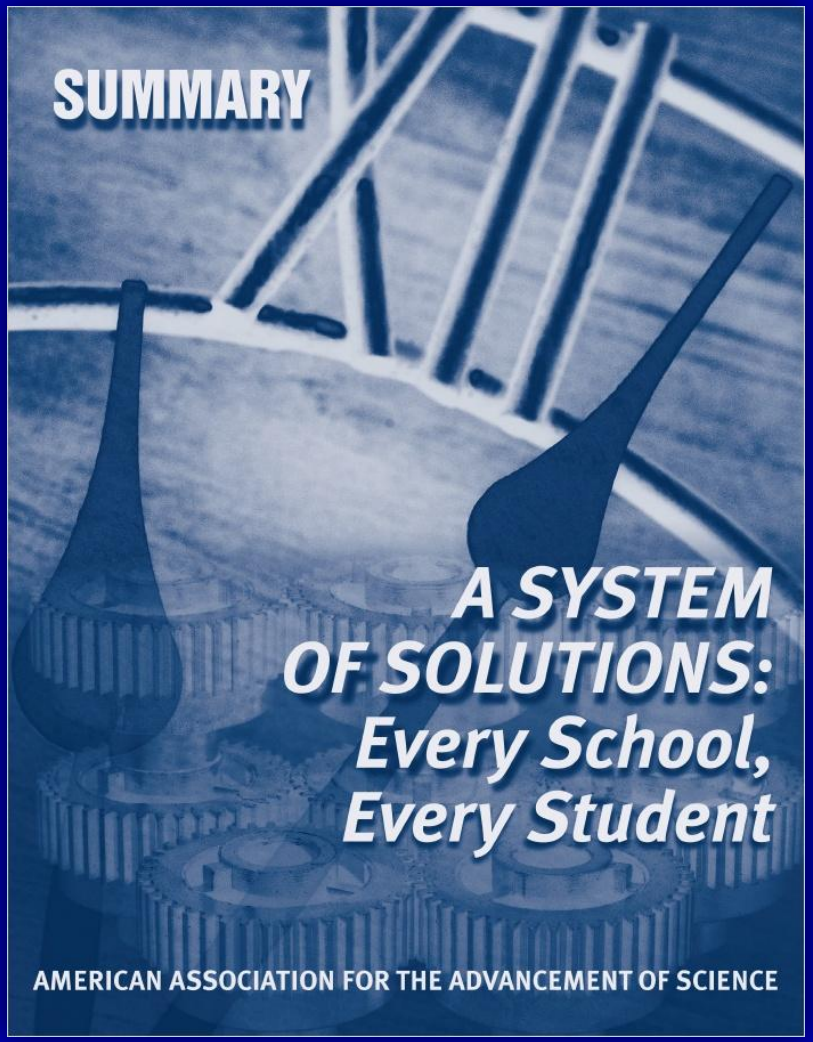
- Different for different groups
- The need to understand pathways and points of loss
- The importance of disaggregated data

The Challenges for Under-represented Minorities in STEM

- Retention of interested, capable students
- Relevant experiences
- Context
- Debt
- Science identity and becoming something you've never seen

Looking at K-12 STEM Education as a Systems Problem

Transformation as a "Systems Problem"



Understanding the Dynamics of the System: A Couple of “Thought Experiments”

- Small class sizes in California
- An almost exclusive focus on sports, or on reading and mathematics
- Produce 100,000 STEM teachers

The Story of NCLB

Policy: Assessment in mathematics and reading; reporting for sub-populations

Practices: Teaching to weak tests

Programs: Focusing on short-term strategies to raise test scores

People: Demoralized teachers, blamed for low performance, forced to faddism, driven to cheating

……

Consequences: Science, arts, music, other subjects are not taught; loss of confidence in public education; teachers lost from system, etc.

Schools as Complex Adaptive Systems

- Parts react to each other
- Behavior of individuals and schools shaped by incentives
- Negative consequences from good intentions

Need for “Translational Research” in Education

- Looking for examples from other communities also trying to affect complex systems (e.g., public health)
- Re-inventing and responding to local context rather than “scale-up”
- Developing interventions that can scale

Holes in Our Knowledge and Implementation

- Understanding and using research
- Researching the things we need desperately to understand
- Understanding learning
- Understanding organizations and organizational behavior
- Research to practice, and practice to research
- Stakeholder involvement

Small Actions, Large Consequences

For want of a nail the shoe was lost.

For want of a shoe the horse was lost.

For want of a horse the rider was lost.

For want of a rider the battle was lost.

For want of a battle the kingdom was lost.

And all for the want of a horseshoe nail.

Politics in Policymaking

Why are we still struggling with standards? What does "local" mean in a country with lots of mobility?

- Federal, national, nationwide
- State and local
- *Unfunded mandates*; local control and funding

Racial/Ethnic Diversity and Public Education

- Judicial rulings and legal challenges
- Persistence of the performance gap and NCLB

Politics in Policymaking, continued

Textbook Adoption

The fight for local control

- Re-writing history; excising evolution; *we don't believe in climate change*
- Textbook publishers accommodations to varied state standards = too much material at too shallow a level and veto power (anti-evolution) by large states
- Will technology make this a "non-issue?"

Neither Silver Bullets nor Boiling the Ocean: The Need for Experiments

The Teachers We Have; The Teachers (and their working conditions) We Wish We Had

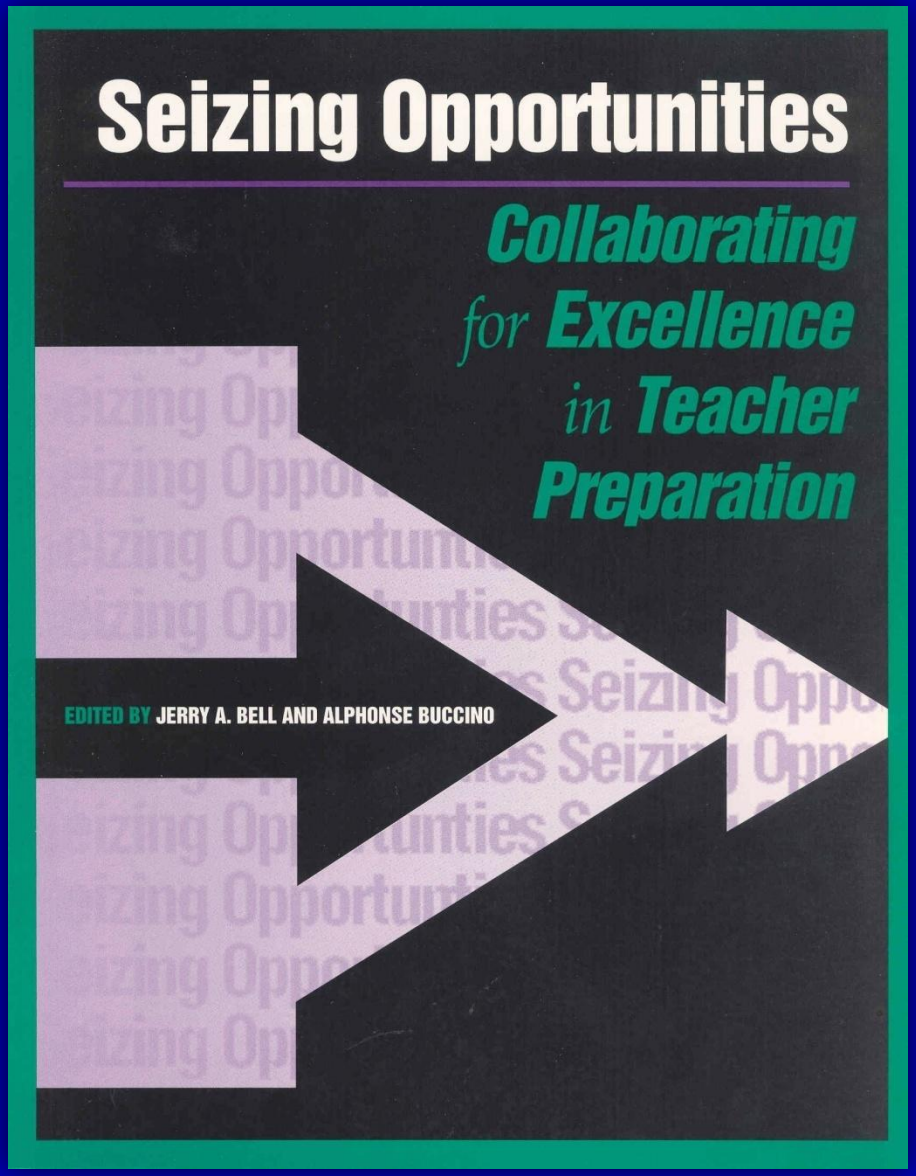
- Teach For America
- 100,000 STEM teachers
- Board certification of teachers

Alternatives to the Schools We Have

- Charter school movement
- Vouchers
- Magnet schools
- Small schools
- Selective schools

Assigning Blame and Taking Responsibility: Teacher Quality

- Teacher education — schools of education and arts and sciences?
- Opportunities for continuing education?
- Schools organized to support professional communities?
- Autonomy?
- A supportive environment??
- Socio-cultural factors?
- Unions?


Seizing Opportunities
Collaborating for Excellence in Teacher Preparation
EDITED BY JERRY A. BELL AND ALPHONSE BUCCINO

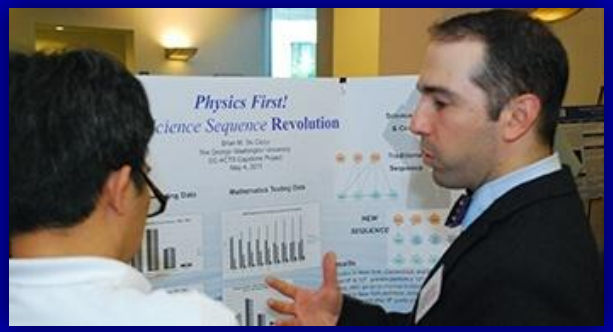
DC ACTS and DC FAME

Lisa Suben

5th grade teacher at KIPP DC.
Finished her master's;
became head of her school's math dept., and received
the Presidential Award for
Excellence in Mathematics
and Science Teaching

Rowland Webb

6th grade earth sciences & 8th grade physics
at Paul Public Charter School



Brian DeCicco

Teacher at Phelps
High School

Aude Seigneur

6th grade teacher at Elsie Whitlow School
Community Freedom Public Charter School

Factors Supporting Sustainable System-Wide Change

- Ownership and accountability
- Resources, notably time
- Data and research-based practices
- High expectations and high standards
- Management and system capacity
- Implementation and technical assistance: going to scale

Why We Have Not Been Able to Get Traction in Education Reform

- Failure to consider the *systems* nature of the problem
- Structural weaknesses in current systems
- Not enough time to get everyone on board
- Top down without bottom up
- No overwhelming demand for reform *in the right direction*
- Resistance to reform that will move toward a more level playing field?

Gaining Ground in a System

- Leadership *at every level and looking for local champions — one size does not fit all*
- Widely shared agreement on goals and design principles within what scale?
- Local efforts to get buy-in, involvement and agreement on responsibilities
- Focus on *high leverage factors*, ends rather than means
- Variability on means, local context
- Evidence-based actions
- Prepare people for “worse before better”

It’s About Learning, Not Just About School – Taken Together, It’s About Democracy

- Getting parents on board
- Universities and colleges
- Community assets
- Technology

Do the Thought Experiment, First!!

- Everything is not about incentives, but many things are
- Money is not the only incentive, thank goodness, because we don’t have any
- First, doing better with what we have
- Do not let the perfect be the enemy of the good, but do not let good enough prevail over continuous improvement
- Focus on cooperation, not just competition

How Can NIH Contribute?

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