

Empowering great teachers

Long ago, U.S. business learned the benefits of constantly soliciting advice from workers on the shop floor by studying the startling success of the Japanese automobile industry. But the vast majority of U.S. school districts have remained hierarchical operations that ignore the wisdom available from their best classroom teachers. After decades of failed top-down solutions, now is the time to create a massive national movement that empowers and deeply respects our teachers. Scientists and science teachers can lead the way.

Producing an effective system of education is an extremely complex endeavor. Yet despite this complexity, U.S. policy-makers have been employing one simplistic top-down solution after another in attempts to improve schools. The most recent fiasco has been the high-stakes test-based accountability introduced by the federal government's No Child Left Behind Act of 2001. Against the advice of experts, the nation has even been mistreating teachers by grading them according to the annual test gains of their students, ignoring dominant out-of-school influences as well as research showing that teacher differences account for only about 10% of the variance in student test score gains in a single year.* Perhaps not surprisingly, the job satisfaction reported by U.S. teachers has fallen from 62 to 39% in 5 years, and the number of young Americans planning teaching careers has plummeted. How can the United States learn from this failure and make a new start, now that the Every Student Succeeds Act of 2015 has repealed many of the 2001 act's most harmful features? It is way past time to create a major national movement that aims to have outstanding experienced teachers provide effective, regular input that powerfully steers their school district's (and their state's) policies and practices, while remaining in their classrooms with at least a part-time schedule.

Today's students need to learn how to work collaboratively and to communicate effectively using evidence and

logic, while sorting, analyzing, and critiquing information. A skilled, experienced teacher creates appropriate challenges for each student, constantly suggesting ideas and connections to follow. A wise friend, with decades of leadership experience in my local public school system, is convinced that "experienced, effective teachers are a vastly underutilized resource in education systems...perhaps the only resource that can truly create the change and improvements that students and teachers deserve." But such teachers are rarely used appropriately, and they can even be resented by school system bureaucracies.

Launching an effective national movement to empower teachers will require casting a wide net to select specific strategies. Such an effort should begin by seeking advice from the best teachers. This can be done immediately for science, where an appropriate set of networks already exists. The organizations that oversee these networks would then form a consortium to select, and strongly advocate for, a small set of specific policies.

Collaborations will need to

be developed with national institutions that represent other critical aspects of the U.S. education system—in particular, superintendents, principals, teachers' unions, school boards, education schools, parent organizations, and community groups. Such a national movement could, for example, develop a merit-based system for selecting lead teachers, define specific roles for them in schools and school districts, and find ways for them to be paid to stay in the classroom with part-time administrative/professional development roles (rather than being enticed with raises to permanently leave school sites). The situation is urgent: Unless the United States can make dramatic advances in empowering its teachers, the nation will never have public school systems that make the best decisions for their students. Nor will it be able to attract and retain the highly talented teacher corps that every nation needs.†

– Bruce Alberts



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"...now is the time to create a..national movement that empowers...our teachers."

*E. H. Haertel, 2013; www.ets.org/s/pdf/23497_Angoff%20Report-web.pdf. †This editorial is based on B. Alberts, in *Past as Prologue: The National Academy of Education at 50, Members Reflect*, 2015; www.naeducation.org/cs/groups/naedsite/documents/webpage/naed_169315.pdf.

THE THREE DIMENSIONS OF THE FRAMEWORK

PRACTICES

Scientific and Engineering Practices (SEPs)

1. Asking Questions and Defining Problems
2. Developing and Using Models
3. Planning and Carrying Out Investigations
4. Analyzing and Interpreting Data
5. Using Mathematics and Computational Thinking
6. Constructing Explanations and Designing Solutions
7. Engaging in Argument from Evidence
8. Obtaining, Evaluating, and Communicating Information

CORE IDEAS

Disciplinary Core Ideas (DCIs)

Physical Science

PS1: Matter and Its Interactions

PS2: Motion and Stability: Forces and Interactions

PS3: Energy

PS4: Waves and Their Applications in Technologies for Information Transfer

Life Science

LS1: From Molecules to Organisms: Structures and Processes

LS2: Ecosystems: Interactions, Energy, and Dynamics

LS3: Heredity: Inheritance and Variation of Traits

LS4: Biological Evolution: Unity and Diversity

Earth and Space Science

ESS1: Earth's Place in the Universe

ESS2: Earth's Systems

ESS3: Earth and Human Activity

Engineering, Technology, and Applications of Science

ETS1: Engineering Design

ETS2: Links Among Engineering, Technology, Science, and Society

CONCEPTS

Crosscutting Concepts (CCCs)

1. Patterns
2. Cause and Effect: Mechanism and Explanation
3. Scale, Proportion, and Quantity
4. Systems and System Models
5. Energy and Matter:
Flows, Cycles, and Conservation
6. Structure and Function
7. Stability and Change

