



Improving Student Learning

A Strategic Plan for Education Research and Its Utilization

Committee on a Feasibility Study for a
Strategic Education Research Program

Commission on Behavioral and
Social Sciences and Education

National Research Council

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NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

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The National Research Council was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Bruce M. Alberts and Dr. William A. Wulf are chairman and vice chairman, respectively, of the National Research Council.

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Preface

It has been my good fortune to chair the National Research Council (NRC) for the last 6 years. The NRC is the operating arm of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicinefour nongovernmental organizations that are collectively referred to as the National Academies. The NRC focuses on harnessing the best science in order to improve the general welfare. At the request of the government, we carry out studies that cover an enormous variety of important issuesbiodiversity, global warming, human nutritional requirements, health and behavior, and human learning to name a few. Many thousands of the nation's leading scientists, engineers, medical experts, policy experts, and practitioners contribute their time and knowledge to these projects every year. In nearly every study we do, we are building new collaborations across disciplines and professions, so as to bring the best resources to bear on important problems.

Over the last decade, education has become a central element in the NRC program. In 1996, we completed a 4-year project to develop national standards for science education in the primary and secondary grades. Hundreds of scientists and educators were involved in developing these standards, and the draft standards were sent to 40,000 people for comment. At about the same time, we established a

new Center for Science, Mathematics, and Engineering Education. In addition, our Commission on Behavioral and Social Sciences and Education has undertaken many important studies on issues in testing and assessment, education finance, preventing reading difficulties in young children, and human learning and educational practice.

As I survey the work of the National Research Council, it is poignantly clear that research has not had the kind of impact on education that is visible in medical practice, space exploration, energy, and many other fields. My personal experience as a scientist who worked to improve science instruction in the San Francisco public elementary schools in the 1980s and early 1990s gave me a sense of how difficult and complicated it is to reform education. Over the past 6 years of my presidency, my conversations with educators, reform leaders, and researchers in virtually every part of the country have convinced me that even the most successful innovations will fail to take root and spread unless the reform dynamic changes substantially.

This small book has a very big ambition: to increase the usefulness and relevance of research to educational practice. The report outlines a highly focused program of research designed to support improved student learning, proposing a new model drawn in part from the MacArthur Foundation research networks for carrying out that research. Most significantly, this Strategic Education Research Program (SERP) calls for a new kind of collaboration that will respect and involve not only the many scientific disciplines that have something to contribute to education, but also those individuals who understand education from the inside: teachers, administrators, and policy makers.

The idea for this Strategic Education Research Program came from a very unlikely source: highway research. In the 1980s, highway research had very little impact on the construction and repair of the nation's highways and roads. The research that was done was disconnected from the needs of the practitioners—those who build highways. As a result, state agencies saw each dollar spent on research as one dollar less for badly needed construction, as did the construction industry. And yet the nation's roads were poorly built. The NRC undertook a study to see if the disparate interests could unite to support a research agenda of great practical importance. As a consequence of that study, Congress enacted a 10-year, \$150 million Strategic Highway Research Program (SHRP) in 1985. The SHRP was administered by the NRC's Transportation Research Board, and it brought the research, policy, and practice communities together in a concerted effort that all could support. By the time it ended, SHRP had not only produced results that were widely recognized as useful, it had also created stronger links among the research, policy, and practice communities.

What do U.S. highways and education have in common? Both are administered by the states. Both involve a large public investment. Both badly need research that speaks to the needs of everyday practice. There are obvious limits to the analogy, but the success of SHRP led us to wonder if a similar effort could propel a widespread process of education reform. The presidents of the National Academies underwrote this project to explore the feasibility of mounting a strategic program of research in education. I joined the group of educators, policy experts, and researchers who undertook the study at many of their meetings. We think we have a

powerful idea and at least the beginnings of a plan.

But such a large research effort and the new kinds of collaborations it will require are unlikely to spring fully formed from the work of one committee. It is now time to engage in a larger conversation among educators, policy makers, and researchers as well as with the public- and private-sector organizations that are the SERP's likely sponsors. On behalf of the National Academies, I invite all interested parties to join in a year of public dialogue concerning a Strategic Education Research Program. How can we best work together to build a science of education that optimizes the potential of students, teachers, and schools creating a practice of education that continually improves as it incorporates the best available knowledge about learning and teaching for all kinds of children? Knowing that there is no more important question for the future of our nation, I hope that this report will catalyze new partnerships and major new investments in education to provide the badly needed answers.

Bruce Alberts
President, National Academy of Sciences
Chair, National Research Council

Acknowledgments

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the Report Review Committee of the National Research Council. The purpose of this independent review is to **provide candid and critical comments that will assist the institution in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge.** The **review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.**

We thank the following individuals for their participation in the review of this report: Christopher Cross, Council for Basic Education, Washington, D.C.; Jay W. Forrester, Sloan School of Management, Massachusetts Institute of Technology; Timothy H. Goldsmith, Department of Biology, Yale University; Paul Goren, John D. and Catherine T. MacArthur Foundation, Chicago, Ill.; Donald Kennedy,

Institute for International Studies, Stanford University; Michael W. Kirst, School of Education, Stanford University; Gardner Lindzey, Center for Advanced Study in the Behavioral Sciences, Stanford, Calif.; Lorraine McDonnell, Department of Political Science, University of California, Santa Barbara; and William Morrill, Mathtech, Inc., Princeton, N.J.

Although the individuals listed above have provided constructive comments and suggestions, it must be emphasized that responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Executive Summary

Education in the United States currently consumes about 7 percent of the gross domestic product, yet the state of education is increasingly an issue of deep concern to parents, political leaders, employers, and the public generally. The recognition that many big-city schools, particularly the schools that serve poor children, have become failures for almost all students has given particular urgency to the issue of school reform. As *Education Week* (1998:6) put it recently, "It's hard to exaggerate the education crisis in America's cities."

One striking fact is that the complex world of education unlike defense, health care, or industrial production does not rest on a strong research base. In no other field are personal experience and ideology so frequently relied on to make policy choices, and in no other field is the research base so inadequate and little used. Comparatively little research is funded, and the task of importing even the strongest research findings into over a million classrooms is daunting.

In 1996 the National Research Council, the operating arm of the National Academy of Sciences and the National Academy of Engineering (henceforth, the Academies), launched a study to determine the feasibility of mounting a long-term, strategic program of research focused on a limited number of topics judged to be of crucial importance for improving student learning in the nation's schools. The study was conducted by a multi-disciplinary committee composed of education researchers, practitioners, policy makers and other experts chosen to bring the widest possible range of perspectives to this task.

Four Key Questions

The result of the committee's deliberations is a proposal for an ambitious and extraordinary experiment: the establishment of a Strategic Education Research

Program (SERP) that would focus the energies of a significant number of researchers, practitioners, and policy makers on obtaining the answers to four specific, interrelated questions. The first three questions address fundamental issues in education:

- **How can advances in research on human cognition, development, and learning be incorporated into educational practice?**
- **How can student engagement in the learning process and motivation to achieve in school be increased?**
- **How can schools and school districts be transformed into organizations that have the capacity to continuously improve their practices?**

The committee selected these three questions for a number of reasons. Together they lie at the heart of education. It is possible, in seeking answers to them, to draw on substantial research as well as to imagine the outlines of future studies. They speak directly to the problems that teachers and school officials encounter and to the concerns of parents and the public more generally. Perhaps most important, they hold the potential for leveraging large improvements in student performance.

There is no doubt that educational practice can be strengthened by careful scientific research

How to realize this potential is not self-evident. There is no doubt that educational practice can be strengthened by careful scientific research. But it is not clear how to make the integration of research findings an organic part of the education system. Therefore, the committee proposes a fourth and overarching research question:

- **How can the use of research knowledge be increased in schools and school districts?**

This question, expressed variously as knowledge utilization or knowledge mobilization, raises issues about the preparation of teachers so that they can be consumers of research, about the design of schools to create effective learning environments, and about bringing policy into alignment with new strategies for teaching and learning. Above all, however, it is about the translation of research findings into forms useful for educational practice. It will require large-scale, systematic experimentation and demonstration to transform knowledge about human learning and the development of competence into the working vocabulary of teachers and schools.

The Proposed Strategic Education Research Program

To address these questions, the committee calls

Much of the work

for a large-scale and sharply defined **program** of research, demonstration, and evaluation. **Much** of the work will need to be embedded in **school** settings; all of it should be informed by the needs of the most challenging schools, in particular, high-poverty urban schools. The likelihood of **real accomplishment** will be increased to the extent that a process of continuous incorporation of findings is used to create a flexible design for the array of SERP **investigations**.

will need to be embedded in school settings

To initiate and guide these activities, the committee proposes the establishment of four interconnected networks:

- a learning and instruction network,
- a student motivation network,
- a transforming schools network, and
- a utilization network.

Each network will include distinguished researchers working in partnership with practitioners and policy makers and supported by a national coalition of public and private funding organizations and other stakeholders, including legislators, state education agencies, teacher associations, organizations representing the research community, and other groups. Members of the four SERP networks would conduct research designed to help answer each network's hub question. They would also stimulate other researchers to undertake relevant studies, synthesize findings from their own and others' work, and plan future investigations. In addition, a major preoccupation of all four networks, but especially the fourth, would be to find ways to ensure utilization of the research by practitioners. A core premise of the plan is that the program of research, synthesis, and implementation activities will be strengthened by the interactions among researchers, practitioners, and policy makers in the networks.

Given the complexity of the issues, the magnitude of the research challenge, and the stakes involved, the committee strongly recommends that this program be implemented with the expectation that it will continue for at least 15 years. The committee is confident, however, that significant contributions to educational systems will be possible within the first 5-7 years because a considerable body of potentially useful research already exists in each area.

The committee offers suggestions for organization and management of the overall program in the body of this report. The suggestions do not add up to a blueprint for SERP; a detailed plan can only emerge through discussions among all the professional groups in education and the potential funders of the program—federal, state, and private. But we are proposing a new model for education research as the heart of the SERP idea. This new model has six of the crucial features: (1)

This new model [for education research] has . . . a built-in partnership with the practice and policy communities

(2) promotion of collaborative and interdisciplinary work; (3) provision of constant, ongoing commitment on the part of core teams of researchers; (4) a built-in

partnership with the practice and policy communities; (4) iterative and interactive interplay between basic and applied research in a structure that combines the richness of field-initiated research and the purpose of program-driven research; (5) a plan that is sustained over a long enough time for results to be cumulative; and (6) an overall structure that is cumulative in nature each step planned to build on previous steps.

Our excitement about the idea of a Strategic Education Research Program has not blinded us to the risks. It is clear that the quality of both scientific and organizational leadership will determine its success. The intellectual and management challenges that will have to be met are formidable and will demand exceptional talent, commitment, and perseverance on the part of all of those responsible for it.

How This Plan Differs from Other Efforts

Many individuals and organizations have recognized the potential importance of research to education. There have been numerous university-based and district-based efforts to narrow the gap between research and practice. At the national level, the U.S. Department of Education and the National Educational Research Policy and Priorities Board have constructed a broad framework for education research,

identifying seven broad challenges that warrant public investment. All these efforts continue to make important contributions to the nation's education, but they do not rigorously focus the nation's knowledge, resources, and energies in order to improve student learning. They do not promote the systematic use of research by teachers, administrators, and policy officials to improve student achievement. And because political priorities tend to change frequently, they tend not to produce sustained and cumulating knowledge.

By design, the SERP plan is focused, collaborative, cumulative, sustained, and solutions oriented

The Strategic Education Research Program proposed in this document represents the first large-scale effort of its kind. By design, the SERP plan is focused, collaborative, cumulative, sustained, and solutions oriented.

- **Focused** SERP targets four hub research questions that hold great promise for strengthening learning in U.S. schools. This strategic focus will help harness the nation's powerful intellectual resources and expertise, making the networks more productive, more closely linked to classroom practice, and more accountable for demonstrable progress.
- **Collaborative** Finding answers to each of the hub research questions will require the combined insights of many fields including cognitive functioning, social processes, and organizational changes as well as the deployment of the full array of research methods. Asking the right questions will require the wisdom of those who are deeply engaged in practice and the insights of policy makers. The organization of the effort through carefully coordinated networks of researchers, educators, and policy experts will promote the

needed cross-fertilization that is commonly missing from current research efforts.

- **Cumulative** SERP recognizes that the traditional linear model of research from basic research to applications has not been productive in changing complex social systems like education. It envisions a new model of research, combining elements of field-initiated and program-driven research within a structure that will encourage a continuous process of taking stock so that each stage builds on what has been learned. Research or demonstrations in applied settings are as likely to define the next basic research questions as vice versa.
- **Sustained** SERP will function over a 15-year period (with decision points about continuation along the way), with constant, ongoing commitment on the part of its participants. Network members will maintain their own identities and activities in their particular professions and disciplines, but they will commit a substantial portion of their time and effort to network activities for more than a decade.
- **Solutions Oriented** SERP involves practitioners and policy makers in helping to define problems, devise solutions, and monitor the effects of research-based approaches. This built-in partnership with the policy and practice communities should have the healthy side-effect of cultivating a greater readiness on the part of local communities and schools to view research as a source of solutions for educational problems.

How This Plan Relates to Other Efforts

For the SERP idea to come to fruition, education leaders will need to see its potential for leveraging existing investments by federal and state governments, school systems, and private-sector organizations. The idea is not to replace important research and reform programs, but to strengthen them by finding unrealized synergies, providing a powerful focus for the related activities, synthesizing what is known, and filling in gaps in the research. SERP could, for example, become a conduit for synthesizing and transmitting the findings from research, development, and demonstration projects supported by the Department of Education through its regional laboratories and research and development (R&D) centers; by the National Science Foundation through its cognitive research program, its new technology and learning centers, its Statewide Systemic Initiative (SSI); and by the National Institute for Child Health and Human Development, which has a strong program of research on the mechanisms of cognition and learning. SERP could also support the translation of research findings into practice by linking up with or supporting demonstration projects. Not least, it would support fledgling efforts to build better bridges, based on a foundation of mutual respect, between the practitioner and the research communities.

Why a Strategic Plan Is Needed

In part, the need for a strategic research plan

grows out of the highly decentralized organization of education in the United States. More concretely, the answer lies with American students and American schools. Many students perform at high levels, but the nation's continued vitality as a democracy and its productivity in a global economy will hinge in coming decades on the knowledge and skills of the majority ~~the tens of millions of children who are not realizing their full capacities and are therefore unable to meet the intellectual demands of modern life and work.~~

More concretely, the answer lies with American students and American schools

Imagine what could be accomplished if the nation committed itself to a concerted effort to find out what needs to be known in order to improve achievement among these children. Imagine what they might achieve if the nation's leading researchers and education experts were to concentrate not just for a month or a year, but for more than a decade on how to facilitate ~~and motivate their learning.~~ **That is the mission of the strategic plan for education research and its utilization presented in this report.**

Next Steps

In the Preface, Bruce Alberts expresses his hope that this report will catalyze major new investments in education. As a first step, the National Academies propose to launch a year-long national dialogue **during which the idea for a Strategic Education Research Program is discussed with all of the professional groups involved in education.**

This committee strongly endorses that plan: We urge the federal government in particular, the Department of Education and the National Science Foundation major foundations whose mission includes **improving education**, state and local education leaders, and education research organizations **to join the Academies in this year of dialogue to see if, together, we can transform the SERP idea into a productive collaboration to use the power of science to improve education in the United States.**

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