Scientific Research in Education

Report of the National Research Council Committee on Scientific Principles in Education Research

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Background

- Sponsored by National Educational Research Policy and Priorities Board
- Prompted by Castle bill, evidence-based education, ongoing debate about quality of education research
- Committee of experts authored consensus report released 11/29/01
- Timeline quick by NRC standards (began fall 2000)
Goals

- Inform OERI reauthorization
- Inform ongoing push for ‘evidence-based policy & practice’ and ‘scientifically-based education research’
- Spark self-reflection in field
Committee Membership

- Richard J. Shavelson (Chair), Stanford University
- Donald I. Barfield, WestEd
- Robert F. Boruch, University of Pennsylvania
- Jere Confrey, University of Texas at Austin
- Rudolph Crew, Stupski Family Foundation
- Robert L. DeHaan, Emory University
- Margaret Eisenhart, University of Colorado at Boulder
- Jack McFarlin Fletcher, University of Texas, Houston
- Eugene E. Garcia, University of California, Berkeley
- Norman Hackerman, Robert A. Welch Foundation
- Eric Hanushek, Hoover Institution
- Robert Hauser, University of Wisconsin-Madison
- Paul W. Holland, Educational Testing Service
- Ellen Condliffe Lagemann, The Spencer Foundation and New York University
- Denis C. Phillips, Stanford University
- Carol H. Weiss, Harvard University
Committee Staff

- Lisa Towne, Study Director
- Tina Winters, Research Assistant
- Linda DePugh, Senior Project Assistant
Charge and Approach

- To consider scientific nature of education research and how a federal agency could support high quality science
- Did not comprehensively evaluate existing research, researchers, or agency
- Approach is forward-looking, informed by history and clear about roles of stakeholders
Framing Questions & Key Themes

- What are the principles of scientific quality in education research?
  - Science is fundamentally the same across all disciplines and fields
  - All fields are characterized by a range of legitimate methods and specialization depending on objects of inquiry and context
  - Some differences between social and natural sciences
  - As in other fields, features of education shape inquiry
How can a federal research agency promote and protect scientific quality in the education research it supports?

- Organized around conception of scientific culture
- Focused on articulating core infrastructure (people, structures, funding, flexibility)
- Emphasizes roles of policy, practice, and research communities
Framing Questions & Key Themes (cont.)

How can research-based knowledge in education accumulate?

- Science is never finished, but improves warrants for knowledge over time
- Nature of progress common in all fields:
  - Science advances in ‘fits and starts’ as researchers debate findings through norms enforced by field of researchers
  - Progress enabled by time, money, and public support
- Research-based knowledge in education has accumulated in this way, but not to the same degree as other scientific endeavors
Table of Contents

Chapter 1: Introduction

- Historical and Philosophical Context
- Public and Professional Interest in Education Research
- Committee Charge and Approach
  - Assumptions
  - Structure of Report
Chapter 2: Accumulation of Scientific Knowledge

- Illustrations of Knowledge Accumulation
- Conditions for and Characteristics of Scientific Knowledge Accumulation
  - Enabling Conditions
  - Common Characteristics
Chapter 3: Guiding Principles for Scientific Inquiry

- Pose Significant Questions That Can Be Investigated Empirically
- Link Research to Relevant Theory
- Use Methods that Permit Direct Investigation of Question
- Provide Coherent, Explicit Chain of Reasoning
- Replicate and Generalize Across Studies
- Disclose Research to Encourage Professional Scrutiny and Critique
Chapter 4: Features of Education and Education Research

- Features of Education
  - Values and Politics
  - Human Volition
  - Variability in Educational Programs
  - Organization of Education
  - Diversity

- Features of Education Research
  - Multiple Disciplinary Perspectives
  - Ethical Considerations
  - Relationships
Chapter 5: Designs for the Conduct of Scientific Education Research

- What Is Happening?
  - Estimates of Population Characteristics
  - Simple Relationships
  - Descriptions of Localized Educational Settings
- Is There A Systematic Effect?
  - Causal Relationships When Randomization Is Feasible
  - Causal Relationships When Randomization Is Not Feasible
- How Or Why Is It Happening?
  - Mechanism When Theory Is Fairly Well-Established
  - Mechanism When Theory Is Weak
## Table of Contents (cont.)

**Chapter 6: Design Principles for Fostering Science in a Federal Education Research Agency**

- Leadership and Staffing
- Structures
- Political Insulation
- Research Portfolio
- Funding
- Infrastructure