What Happens When You Treat Teaching (and Educating Teachers) As a Practice That Can Be Studied and Improved?

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James Hiebert, University of Delaware

Mid-Atlantic Center for Math Teaching and Learning, NSF
Research Colleagues: Tonya Bartell, Dawn Berk,
Amanda Jansen, Anne Morris

Plan For Today

- Why ask the question: What happens when you treat teaching as an object of study?
- Identify two converging streams of thought that create a conceptual framework within which to address the question
- Describe a few particulars from our experience at U of Delaware of studying our own teaching (when educating teachers)
- Engage in a discussion of these and related issues

Stream 1: What Is An Appropriate Goal for Teacher Preparation?

- "Many people, including future teachers, expect that preservice training is a preparation for teaching. That seems unrealistic on several counts. Informal influences are too strong, the time is short, and preparing for teaching inevitably continues on the job. It would be far more realistic to think about preparing people to begin a new phase of learning to teach." (Sharon Nemser, "Learning to Teach," 1983, p. 157)

- How does one learn to teach on the job?
  - This happens all the time, but in mostly haphazard ways
  - What would it mean to *plan* to learn to teach while teaching?

Stream 2: How Can One Build a Useful Knowledge Base for Teaching (and for Teacher Education)?

- A useful knowledge base for teaching is surprisingly elusive, even with years of research on teaching
  - Without such shared knowledge, each teacher must start over; lasting improvement is impossible
- Most explanations focus on the mismatch between researchers' productions and the knowledge teachers need
- What kind of knowledge *would* be useful?

A Convergence: Knowledge Acquired from Planned Experience

- The knowledge needed for teaching is the knowledge gained by studying teaching, on the job, in a *planned, intentional* way
  - The goal for teacher preparation is becoming a student of teaching; learning how to become an expert teacher, over time, by studying practice
  - Knowledge is built for teaching by harvesting what teachers learn from studying practice

- "Men have always been capable of some mental processes of the kind we call 'learning from experience.' Doubtless this experience was often a very imperfect basis and the reasoning processes used in interpreting it were very insecure . . . Experimental observations are only experience carefully planned in advance, and designed to form a secure basis of new knowledge" (R. A. Fisher, *The design of experiments*, 1949, p. 8).

- What kind of useful knowledge for teaching can be acquired when teachers plan to learn from teaching?

The University of Delaware Experience

- Features of the Mathematics Portion of the K-8 Teacher Preparation Program
  - 200+ graduates each year
  - 3 math content courses and 1 methods course
  - 3 to 6 sections of each course per semester
  - Instructors for each course are faculty and doctoral students who meet weekly to study their teaching and work together to improve the course (i.e., instructors plan to learn from their teaching)
- Parallel goals for faculty and for pre-service teachers (PSTs): Improve teaching by studying practice
  - Focus now on what we are learning about the process
  - Save for later how PSTs are developing the same skills

Early Lessons Learned

- Effective teaching is teaching that is effective for *particular* learning goals
  - Consequently, useful knowledge for teaching is knowledge linked to particular learning goals
  - Taking seriously the link between knowledge and learning goals might be the most difficult aspect of the process
- Learning from planned experience ("experiments") is most productive when framed as testing hypotheses about the connections between specific instructional activities and students' achievement of learning goals

Characteristics of Useful Knowledge for Teaching: Some Conjectures

1. *Unit:* A useful unit for planning, implementing, and reflecting on teaching is the daily lesson
2. *Representation*: Knowledge about teaching can be represented as cause-effect hypotheses with supplementary information
3. *Vetting*: Vetting knowledge requires replicating across different settings—empirical tinkering

Unit: The Daily Classroom Lesson

- A unit that is the 'just the right size'
  - Large enough to contain critical interactions
  - Small enough to examine details of teaching
- Learning goals are lesson-specific (but nested within larger goals)
- Cause-effect hypotheses are often about teaching-learning connections *within* lessons
- Lesson plans become repositories for knowledge acquired with respect to particular learning goals
- (see sample)

Representation: Cause-Effect Hypotheses With 'Just-In-Time' Information

- Instructional activities carry (implicit) hypotheses, subject to test, that they facilitate students' achievement of learning goals (sample lesson, p. 2, implicit hypothesis regarding benefit of confronting errors)
- Providing rationale and raising questions make hypotheses more explicit (sample lesson: p. 3, query regarding adding a missing factor problem; p. 4, rationale for activity)

- 'Just-In-Time' information includes
  - Responses students are likely to give and suggestions for how instructors might reply (sample lesson, p. 3)
  - Misconceptions to watch for (see predicted student responses)
  - Information that students need at exactly this time (sample lesson, p. 2, bottom italics linking these ideas to those in previous course)

Vetting: Replicating Across Settings

- Replication is *the* underappreciated strategy for generating research-based knowledge
- Replicating lessons across settings, sometimes with small *planned* variation, but always measured against the same learning goals, allows increasing refinement of lessons
- This process of 'empirical tinkering,' used in many other professions interested in steady, lasting improvement, warrants an additional comment

Empirical Tinkering

In 1989, N. L. Gage, a persistent advocate for building a scientific basis for teaching, imagined a resolution of the paradigm wars in research on teaching. By 2009, he said, researchers might realize

> they had mistakenly loaded onto scientific method a lot of ontological baggage that was unnecessary in gaining the advantages of scientific method in objectivity and trustworthiness. They might concede that scientific method could be used for purposes other than building a 'science'--a network of laws that would hold forever everywhere. Rather, scientific method could be used for "piecemeal social engineering" as envisioned by Karl Popper, namely, for making "small adjustments and readjustments which can be continually improved upon."

Concluding Thoughts

- Studying teaching as a mechanism for improving students' learning rests on radically different assumptions than those underlying most U.S. intervention and reform programs
  - Clear, precise, measurable, shared learning goals for students are the only criterion against which all changes are measured
  - Lasting, widespread improvement is driven by increasingly useful shared knowledge, not by debates about the essential qualifications of teachers, the rigor of certification programs, etc.
  - Research-based improvements are gained by empirical tinkering over time rather than by a few large-scale trials
- We could just ask ourselves this simple question and probably arrive at the same point: How do you know your teaching (and that of the profession) is getting better?
- For more information: http://www.udel.edu/soe/mathed/