Teaching Practice: Creating a Skilled Teaching Force

Deborah Loewenberg Ball

Dean, School of Education, University of Michigan

William H. Payne Collegiate Professor

in Mathematics Education and Teacher Education

Wolverine Caucus Forum • Lansing, MI • January 28, 2009

SCHOOL OF EDUCATION UNIVERSITY OF MICHIGAN

Solving the quality problem by "opening classroom doors"

- Suppose Colin Powell tires of giving $100,000-a-pop speeches and wants to teach high school social studies. Suppose Meryl Streep has a hankering to teach drama. Alas, they would be "unqualified" for a public school. Elite private schools would snap them up, of course, but public schools that are begging for teachers would have to turn them away because they don't have teacher certification. That's an absurd snarl in our education bureaucracy. Let's relax the barriers so people can enter teaching more easily, either right out of college or later as a mid-career switch. Sure, there are lots of other problems in the U.S. education system. But this is one of the easiest to solve.
- . . . applicants should be eligible for teaching jobs if they have graduated from a recognized college, have passed a competency test in their field and have passed a rigorous background check.

(Nicholas Kristof, April 30, 2007; New York Times op-ed)

Would we do this in any other occupation or profession?

- Put untrained people to work, and in settings where skillful performance is most needed
- Allow standards of good practice to vary by income, race, or geography
- Believe that skillful performance depends on being smart and having common sense

An alternative (stealth) title:

In Praise of Prescriptiveness and Training in Teacher Education

SCHOOL OF EDUCATION UNIVERSITY OF MICHIGAN

School of Education • University of Michigan • Ann Arbor, MI 48109-1259 • (734) 615-7235 • mtlt@umich.edu

Main argument

We need a system of initial and continuing teacher education that can reliably help prepare ordinary people for effective professional practice in teaching.

- Doing that requires
  - Basing teacher education on the *work of teaching*;
  - Focusing developmentally on the highest-leverage practices;
  - Emphasizing the *performance of teaching* in the curriculum and in assessments.

This must draw on past accomplishments and progress. But it will also require significant change.

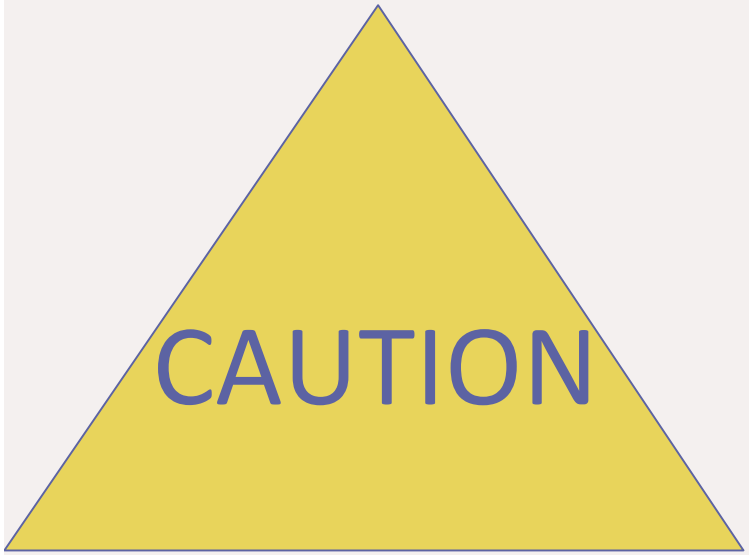
The urgency

1. Enormous gaps in learning opportunities and disparities in achievement (within U.S. and in international comparisons)
2. Rapidly changing school population
3. Higher, more complex academic goals
4. High expectations for all students

The U.S. has a long history of trying to fix schools…

…and an equally long history of failing to fix them.

What are some of the most widely-touted strategies for educational improvement?



1. Reorganize schools.
2. Install a more challenging curriculum.
3. Increase accountability.
4. Pay teachers more.
5. Recruit teachers: lower the barriers for entry to teaching.

Overview

1. What is "teacher quality"?
2. Relating content knowledge and teacher quality: The case of mathematics
3. From "teacher quality" to "teaching quality": Professional education for practice

Teachers matter — a lot

Persistent evidence that a large proportion of the variability in student achievement gains is due to the teacher:

- Differences in teachers account for 12%-14% of total variability in children's math achievement in each of grades 1, 2, and 3.
- Children assigned to three effective teachers in a row score at the 83rd percentile in math at the end of 5th grade; children assigned to three ineffective teachers in a row score only at the 29th percentile.
- Highly effective teachers can substantially reduce differences in student achievement that are due to family background.

(Nye, Konstantopoulos, & Hedges, 2004; Sanders & Rivers, 2006; Rivkin, Hanushek, & Kain, 2005)

Content knowledge and teacher quality

- Common measures of teachers' knowledge (courses taken, degree) of mathematics do not predict student achievement at K-8, only unevenly predictive at high school
- But content knowledge that teachers actually use in teaching is related to student achievement (MKT)

What *is* "mathematical knowledge for teaching"?

Knowing multiplication

$$\begin{array}{r} 49 \\ \times\ 25 \\ \hline \end{array}$$

Knowing multiplication *for teaching*

What steps produced each of these answers?

(a)

$$\begin{array}{r} 49 \\ \times\ 25 \\ \hline 405 \\ 108 \\ \hline 1485 \end{array}$$

(b)

$$\begin{array}{r} 49 \\ \times\ 25 \\ \hline 225 \\ 100 \\ \hline 325 \end{array}$$

(c)

$$\begin{array}{r} 49 \\ \times\ 25 \\ \hline 1250 \\ 25 \\ \hline 1275 \end{array}$$

Linking teacher knowledge (MKT) and student achievement

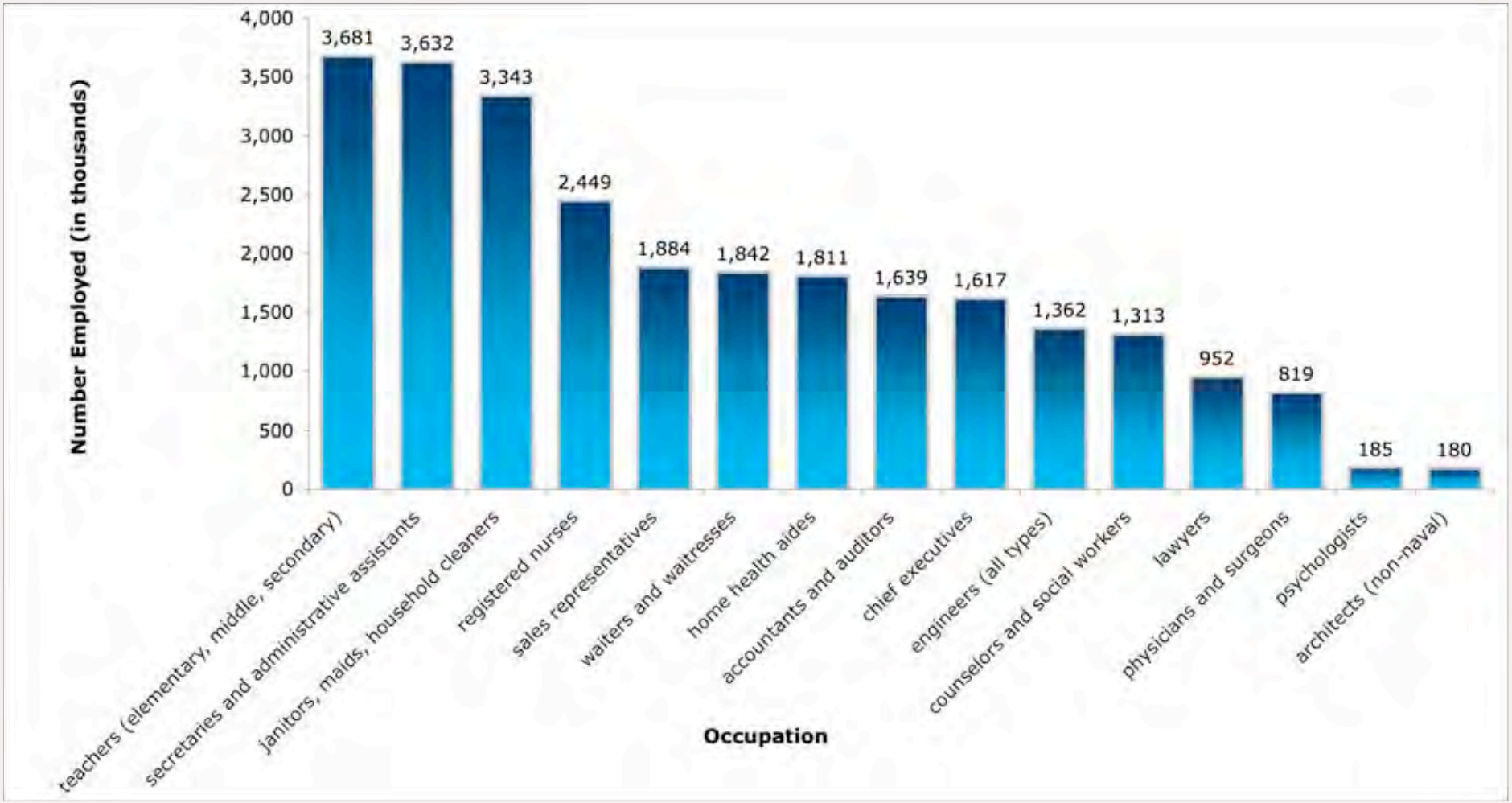
- MKT significant in predicting student achievement gains
  - Effect size translates into differences similar to having had 2-3 weeks of instruction
  - Similar effect size as the prediction of student SES on achievement
- MKT works as it affects the mathematical quality of instruction (MQI)
  - e.g., choice of examples, use of representations, errors, facility in diagnosing pupils' difficulties

(Hill,Rowan, and Ball, AERJ, 2005; Hill, et al, 2008)

Why the problem is one of professional training

- The scale of the need
- (Effective) teaching as unnatural and intricate work

The realities of scale



(Effective) teaching as unnatural and intricate work

- Anticipating and probing students' thinking
- Diagnosing student difficulties
- Getting to the point in a lesson
- Posing good questions, choosing strategic examples
- Explaining content in terms that students can understand
- Assessing and keeping track of student progress
- Creating and managing a respectful learning environment
- Interacting with students' parents and caregivers

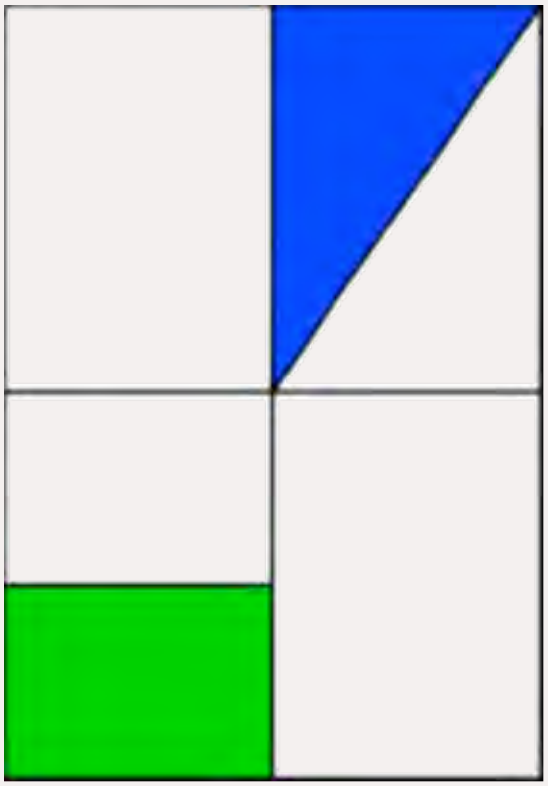
. . .

Choosing examples

Which of the following lists would be best for assessing whether your students understand decimal ordering?

A.	.5	7	.01	11.4
A.	.60	2.53	3.12	.45
B.	.6	4.25	.565	2.5

Anticipating and responding to pupils' difficulties, knowing the mathematical point



What fraction of the big rectangle is shaded blue?

What fraction of the big rectangle is shaded green?

What fraction of the big rectangle is shaded altogether?

Building a reliable system of training ordinary people to teach effectively

1. Focus teacher preparation and continuing education on practice:
   - Content knowledge for teaching
   - Instructional practices, treatments, procedures, routines, professional judgment
2. Support early career teaching, years 0 – 5
3. Build common assessments of content knowledge for teaching and performance assessments; conduct research on relationship of scores to student achievement
4. Invest in research on on instructional practices ("treatments", routines, etc) to build a solid base for teacher training)

Rebuilding teacher education at Michigan: The Teacher Education *Initiative*

- Centering teacher training on the essential skills needed in practice
- Equipping teachers with flexible knowledge of the subjects they teach
- Preparing teachers to be part of a larger interconnected system for our youth—families, health care, social services, religious institutions and communities

- Multiple entry paths
- Alternative program structures
- Stringent performance-based exit requirements

The Teacher Education Initiative: Some key problems

1. Identifying the work of teaching, and determining what beginning teachers need to learn to do
2. Creating activities and special settings that will support the development of competent beginning practice
3. Creating a curriculum for our own learning

1. Identifying what to teach

- Decompose the work of teaching into smaller practices that:
  - can be articulated, unpacked, studied, and rehearsed
  - can be reintegrated into real-time teaching
- Choose practices that are "high-leverage" for beginners
  - Occur frequently in teaching
  - Core to different approaches to teaching
  - Crucial to improve the learning and achievement of all students
  - Can be articulated and taught
  - Accessible to preservice teachers

A few examples…

- Leading a conference with parents/care-givers
- Scanning the classroom while working with an individual student
- Asking questions of pupils about the content
- Designing careful representations and tasks
- Assessing and diagnosing pupils' skills and knowledge
- Learning about pupils' contexts

2. Creating activities and settings for learning practice

- *How* can practice be practiced?
  - Rehearsal
  - Approximations to real practice
  - In real time
- *Where* can practice be practiced?
  - Virtual, designed, real settings (Lampert)

The Elementary Mathematics Laboratory

- A live laboratory for the design and study of teaching
  - Direct program for children in local school district
  - Live setting for the study of teaching, learning, and mathematics by teachers, researchers, teacher education students, mathematicians, university faculty, visitors from the public
  - Source of unusual and valuable records of practice

A glimpse of the classroom

The observers in the laboratory classroom

3. Creating a curriculum for instructors' learning

- Studying the work that is involved in coaching student teachers' practice and in narrating one's own practice
- Studying examples of practice-based professional education in other fields
- Creating structures for doctoral students' and other new instructors' learning

Materials development, supply, and support

- Design powerful resources for teacher education: curricula, activities, materials, assessment tools
- Make resources available for check-out or purchase—many housed in a digital archive
- Provide in-house and off-site training

Education and training

- Develop and host several special settings for the close study of teaching and teacher education--including laboratory classes and clinics that will serve K-12 pupils as well as teachers
- Provide specialized training for researchers from other institutions

Our goal:
The Teacher Education Institute

The "go-to" place for reliable and up-to-date Information about what works in teacher education

Why do this at Michigan?

- The expertise of our faculty--leading research on instruction and school improvement; innovative work with digital records of practice
- The quality of the arts and sciences
- The Michigan tradition of outstanding professional education
- The commitment to building a "college-going culture" and what it would take not to need affirmative action