Stepping up, Breaking it Down: The Problem of Teacher Preparation in the United States



Presentation to the
Michigan House Education Committee
Lansing, Michigan

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"Step up to it. You are going to be part of the solution or you won't be renewed."

-Superintendent Flanagan

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Overview

1. Teacher preparation and certification: What is the scope of the problem?

2. What would it mean to be "part of the solution"?

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What is the scope of the problem?

- U.S. schools not serving all children well
- Dearth of teachers in disadvantaged areas and in math & science
- Broad public acknowledgement that teacher quality is part of the problem

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What is wrong with teacher education in the U.S.?

- Inappropriate subject matter preparation
- Inadequate preparation for diversity of U.S. classrooms
- Lack of focus on practice
- No professional system for training, licensure, certification, ongoing professional education

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What would it mean to be "part of the solution?"

- What do teachers need to know, and know how to do?
- How will we know if teachers know and can do what is required?
- What structures do we need - curricula, relationships with K-12 schools, faculty incentives - to support effective teacher education?

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Clarifying the problem: The example of mathematics teaching

What math do teachers need to know, and what does it mean to know how to use that math in teaching?

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U.S. teachers often lack sufficient mathematical knowledge

- What's the evidence?
  - Anecdotes
  - Research
- What does it tell us and what is not well understood?
  - Lack of a system
  - This is a societal problem, widespread

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Some approaches to solving the problem

- Require more mathematics for certification
  - More mathematics courses
  - A major (or minor) in mathematics
  - Mathematics test
- Recruit mathematically trained people into teaching
  - Engineers, accountants, mathematicians, …
- Fund mathematically focused professional development

But -- these approaches assume we know what mathematical knowledge and skill is needed for high-quality teaching.

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Mathematical knowledge for teaching

What do we mean when we use this term, "**mathematical knowledge for teaching**"?

- Mathematical knowledge, skill, habits of mind that are entailed by the work of teaching

What do we mean by the "**work of teaching**"?

- The tasks in which teachers engage, and the responsibilities they have, to teach mathematics, both inside and outside of the classroom

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"Knowing" multiplication (yourself)

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

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Analyzing student errors

(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)

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

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Common Content Knowledge

The mathematical knowledge and skill expected of any well-educated adult

Teachers need to be able to:

- Recognize wrong answers
- Spot inaccurate definitions in textbooks
- Use notation correctly
- Do the work assigned to students

Example Items

What is $1\frac{1}{4} \div \frac{1}{2}$?

What number is halfway between 1.1 and 1.11?

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Specialized Content Knowledge

The mathematical knowledge and skill needed by teachers in their work and beyond that expected of any well-educated adult

Teachers need to be able to:

- Analyze errors and evaluate alternative ideas
- Give mathematical explanations and use mathematical representations
- Be explicit about mathematical language and practices

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Knowledge of Content and Students
Knowledge of Content and Teaching (PCK)

Combines knowledge of mathematics with knowledge of students or knowledge of teaching

Teachers need to be able to:

- Anticipate student errors and common misconceptions
- Interpret student thinking
- Predict what students are likely to do with specific tasks and what they will find interesting or challenging

Teachers need to be able to:

- Sequence content for instruction
- Recognize instructional pros and cons of different representations
- Size up mathematical issues in responding to students' novel approaches

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Clarifying the problem: What else do teachers need to know, and know how to do?

- How to engage diverse learners
- How to assess student learning
- How to communicate with care-givers & colleagues
- How to interpret and respond to policy

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How will we know if teachers know and can do these things?

- Teacher certification exams tell only a fraction of the story
- Need to design an integrated performance assessment system…
- which means breaking down the knowledge and skill needed for teaching, and rebuilding our TE programs and our assessment systems.

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What would it mean to be "part of the solution"?

- New teacher education curriculum (and it's a whole-university problem)
- New relationships between teacher preparation programs and K-12 schools
- Incentives for faculty, teachers, policy-makers to work on the problem

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Building a new brand of professional education at UM-AA

CURRICULUM

- Practice-based
- Focused on:
  1) Knowledge of academic subjects for teaching
  2) Skills and dispositions to work effectively with wide diversity of students
  3) Interpersonal and relational skills
  4) Preparation to manage and change school and policy environments

STRUCTURE AND CONTEXT

- Multiple entry paths
- Alternative program lengths and structure
- Strong new recruitment, admissions requirements
- Assessment of performance throughout the program
- Laboratory for research on teaching and teacher quality, professional training

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