

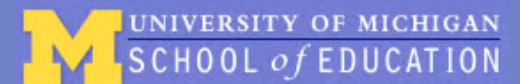
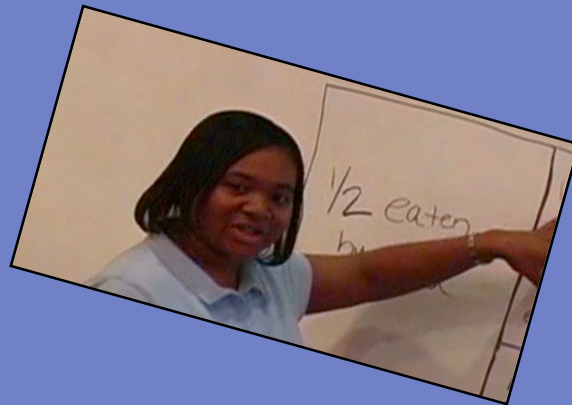


# Stepping up, Breaking it Down: The Problem of Teacher Preparation in the United States



Presentation to the  
Michigan House Education Committee  
Lansing, Michigan

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April 19, 2006



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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



# Overview

1. Teacher preparation and certification:  
What is the scope of the problem?
2. What would it mean to be “part of the solution”?



# 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



# 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



# 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?



# 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?***



# 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



# 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.





# 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



# “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)

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



# 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 I.I and I.II?



# 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

# 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



# 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



# 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.



# 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



# 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