

**The Policy Context and the  
Implementation of Reform:**

**Connecting Professional Education  
to Professional Practice**

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# Connecting Two Big Problems

- How to get more “hands-on” “inquiry-based” science instruction in classrooms
- How to help teachers learn to teach in these ways

# Overview

- Problems of teacher education

## **An alternative perspective:**

- What is teaching and what does it take to get better at it?
- What might be involved in learning *in and from practice*?

# 1. What are central problems of teacher education?

# Central problems of teacher education

- Teachers' lack of content knowledge
- Disconnection from practice
- Weak impact compared with years of experience as student and in schools
- Lack of time
- Lack of professional “curriculum”

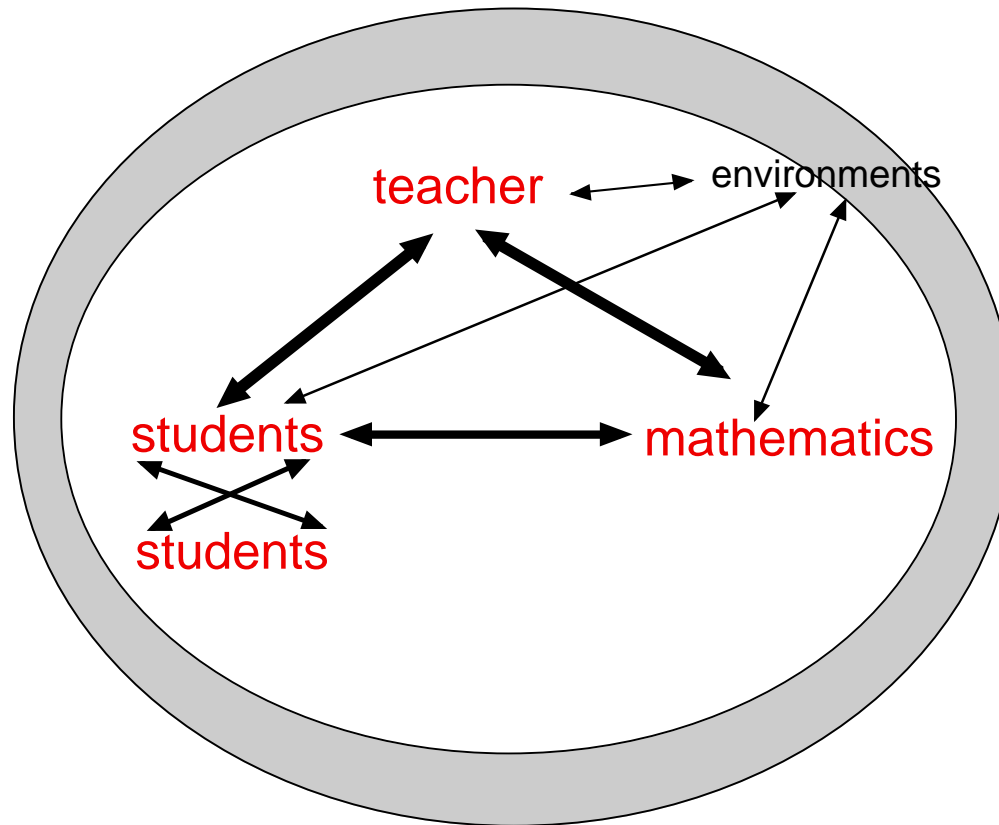
**Taking an alternative perspective on the problems . . .**

## **2. What is teaching and what does it take to get better at it?**

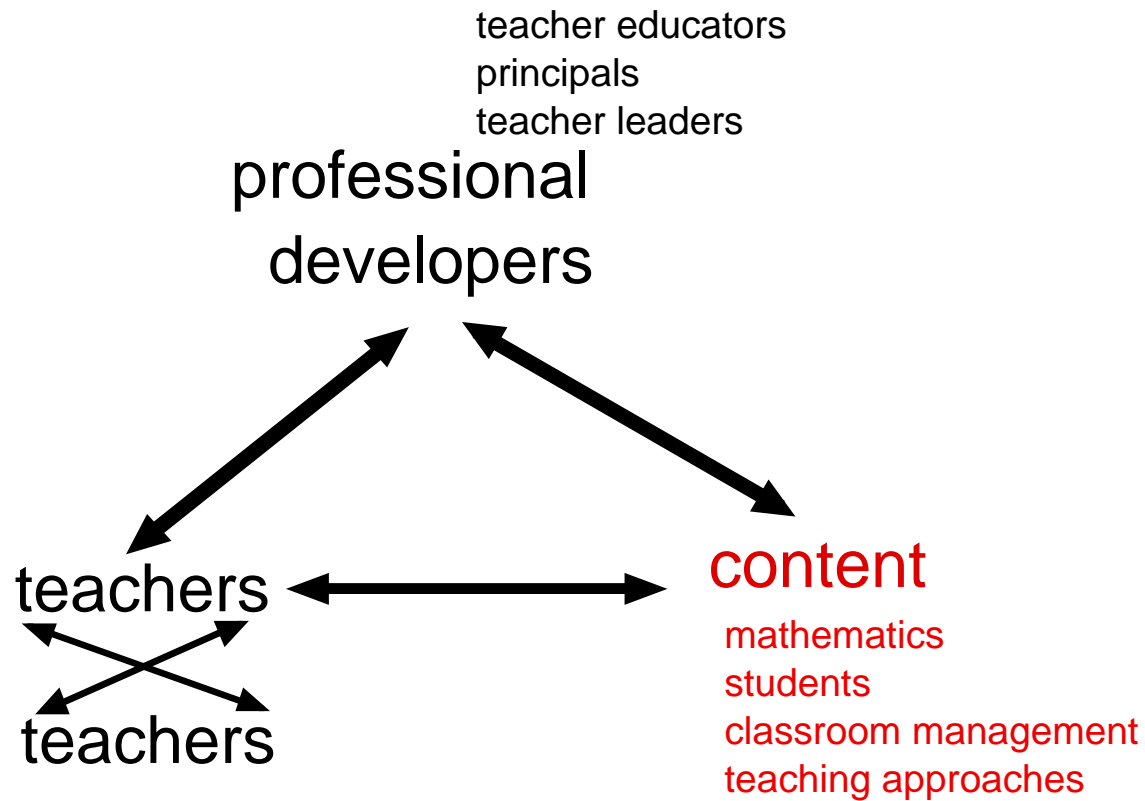
# A set of premises about teaching and about learning the practice of teaching

- Learning teaching occurs mostly from experience.
- Experience is often a poor teacher.
- Teaching is a practice, not merely a domain of knowledge.
  
- Needed are forms of “harnessing” practice to make learning from experience more possible, both individually and collectively.

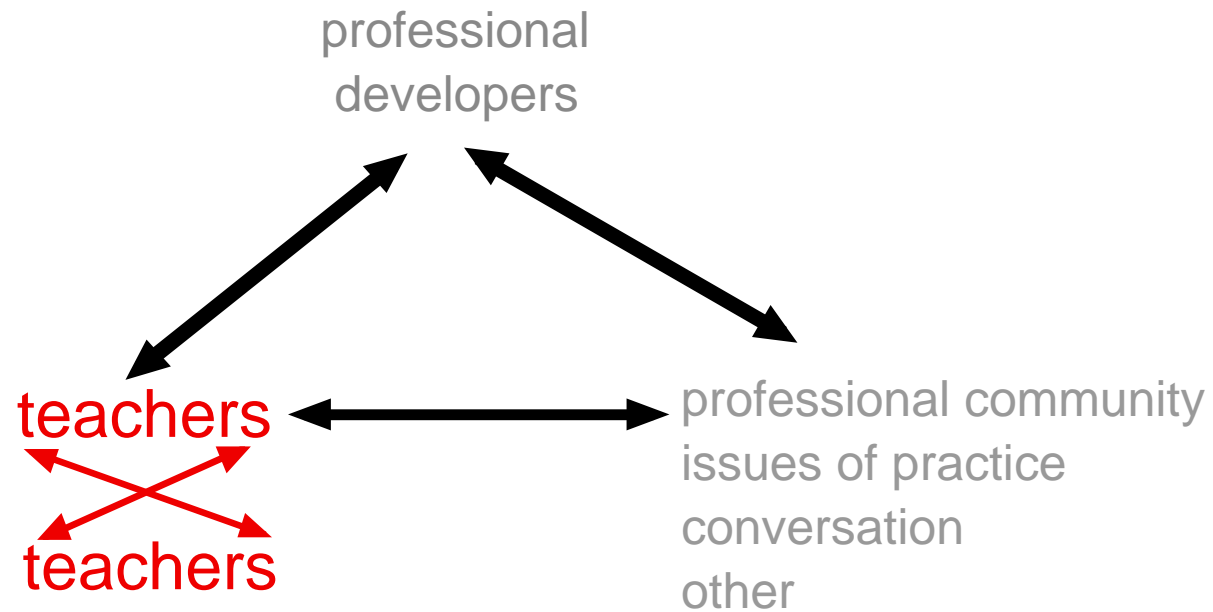
# Teaching is a complex practice, not just a domain of knowledge.



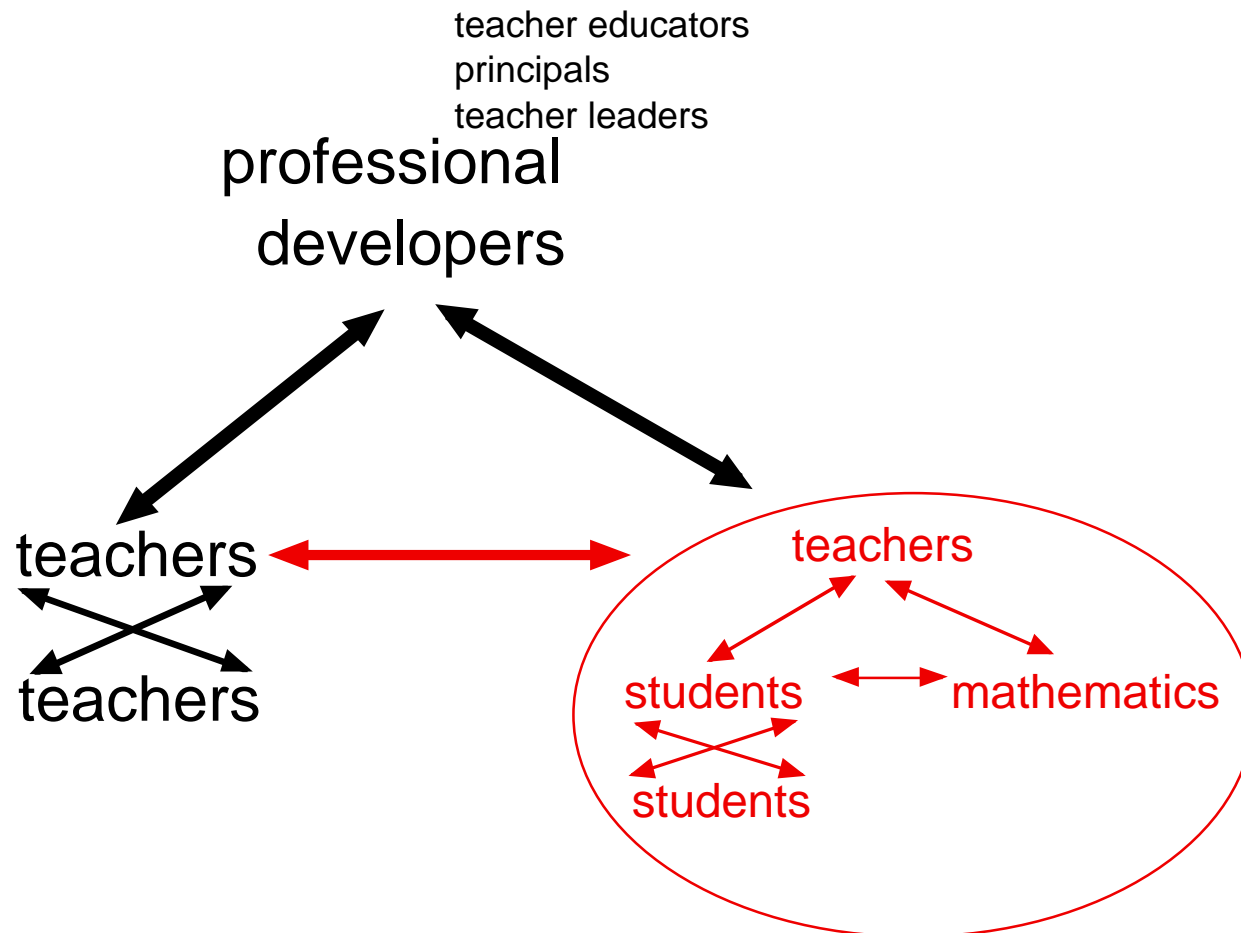
# Three perspectives on teachers' professional learning



# Learning by acquiring new knowledge



# Learning through collegial interaction



## Learning in and from practice

# **3. What might be involved in learning and from practice?**

# What are examples of “harnessing” practice?

- Case studies
- Records of practice (video, student work, teacher notes, lesson plans, assessments)
- Lesson study
- Problems of practice

# Professional learning: Working on **problems of practice**

- Listening to and interpreting students' ideas
- Deciding which ideas to take up and in what ways and on what role to play in a discussion
- Sizing up where you are in the larger mathematical territory
- Considering particular children
- Unpacking the mathematics
- Considering the mathematical implications and connections
- Deciding what to do next

# Example #1:

## MAKING DECISIONS ABOUT WHAT TO DO WITH STUDENTS' MATHEMATICAL IDEAS IN A DISCUSSION

### Subtraction

**Write number sentences for 10.**

$$8 + 2 = 10$$

$$99 - 89 = 10$$

**What mathematics is involved in this problem?**



# Studying a segment of practice

Write number sentences for 10.

- **Listening to and interpreting students' ideas**
- **Deciding which(and whose) ideas to take up and in what ways**
- **Deciding how much to insert yourself into a discussion**
- **Sizing up where you are in the larger mathematical territory**
- **Deciding what to do next**
- **Shea's claim: "There are 1 1 solutions."**
- **Rania: "I want to prove that his answer is right."**
- **Bernadette disagrees: "The answers go on forever."**
- **Lin cites her mother: "50 ÷ 5 = 10" but cannot explain**

# Example #2:

## LEARNING MATHEMATICS IN THE CONTEXT OF LEARNING TO SOLVE MATHEMATICAL PROBLEMS OF TEACHING

**Multiplication**  
**Generalization**  
**Decimals, order**

**Which of these students is using a method that could be used to multiply any two whole numbers?**

| Student A   | Student B  | Student C   |
|---|--|---|
| $\begin{array}{r} 35 \\ \times 25 \\ \hline 125 \\ +75 \\ \hline 875 \end{array}$ | $\begin{array}{r} 35 \\ \times 25 \\ \hline 175 \\ +700 \\ \hline 875 \end{array}$ | $\begin{array}{r} 35 \\ \times 25 \\ \hline 25 \\ 150 \\ 100 \\ +600 \\ \hline 875 \end{array}$ |

**Suppose you wanted to find out if your students understand how to put decimal numbers in order.**

**Which of the following lists of numbers would give you the best evidence of students' understanding ? Why?**

**A.     .5                     7                     .01                     11.4**

**B.     .60                    2.53                    3.14                    .45**

**C.     .6                     4.25                    .565                    2.5**

**D. Any of these would work well for this purpose. They all require students to read and interpret decimals.**

# What does the study of practice afford?

- provides common context for teachers' learning
- offers “texts” of practice that can be examined, analyzed
- places professional learning in the context of practice
- ensures that subject matter knowledge generated is useful for and usable in practice
- can provide exposure to practices that teachers have not seen or do not know
- can develop teachers' abilities to learn in and from their own practice (practices of learning teaching)
- select particular problems of mathematics (or science) teaching and learning to work on

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Slides from this presentation available at  
<http://www-personal.umich.edu/~dball>