Great teachers are not born. They're TAUGHT.

Deborah Loewenberg Ball

September 24, 2011 • Long Beach, CA

Cotsen Foundation for the Art of Teaching

2011 Art of Teaching Conference

SCHOOL OF EDUCATION UNIVERSITY OF MICHIGAN

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/

© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Knowing how to do multi-digit multiplication

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

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Seeing multiplication from the learner's perspective

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

What might students have done to produce these answers?

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

What great teachers often say about teaching

"Teaching has always come naturally to me."

"I have learned what I do from experience; I like to pass on what I know to student teachers."

"Teaching requires a lot of improvisation and can't be specified in advance."

"I have developed my way of doing things that works for me."

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

What's wrong with this?

1. Undermines the idea that teaching is a profession that can be developed through careful unpacking of the practice and a common technical language
2. Perpetuates the belief that teaching is individual
3. Reinforces the predominance of "style" over skill

If teaching is individual and must be figured out by each person on the job, then there is little hope of ensuring that all young people receive skillful instruction.

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Teachers matter—a lot

- Differences in teachers account for 12%-14% of total variability in students' mathematical achievement in each of grades 1, 2, and 3.
- Students 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.
- The cumulative effects of being taught by a highly effective teacher can substantially reduce differences in student achievement that are due to family background.

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Two schools of thought, or bets

1. Focus on teachers

- recruitment, selection
- rewards and sanctions

2. Focus on teaching

- training
- assessment
- curriculum

What are the reasons to bet more on one or the other?

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

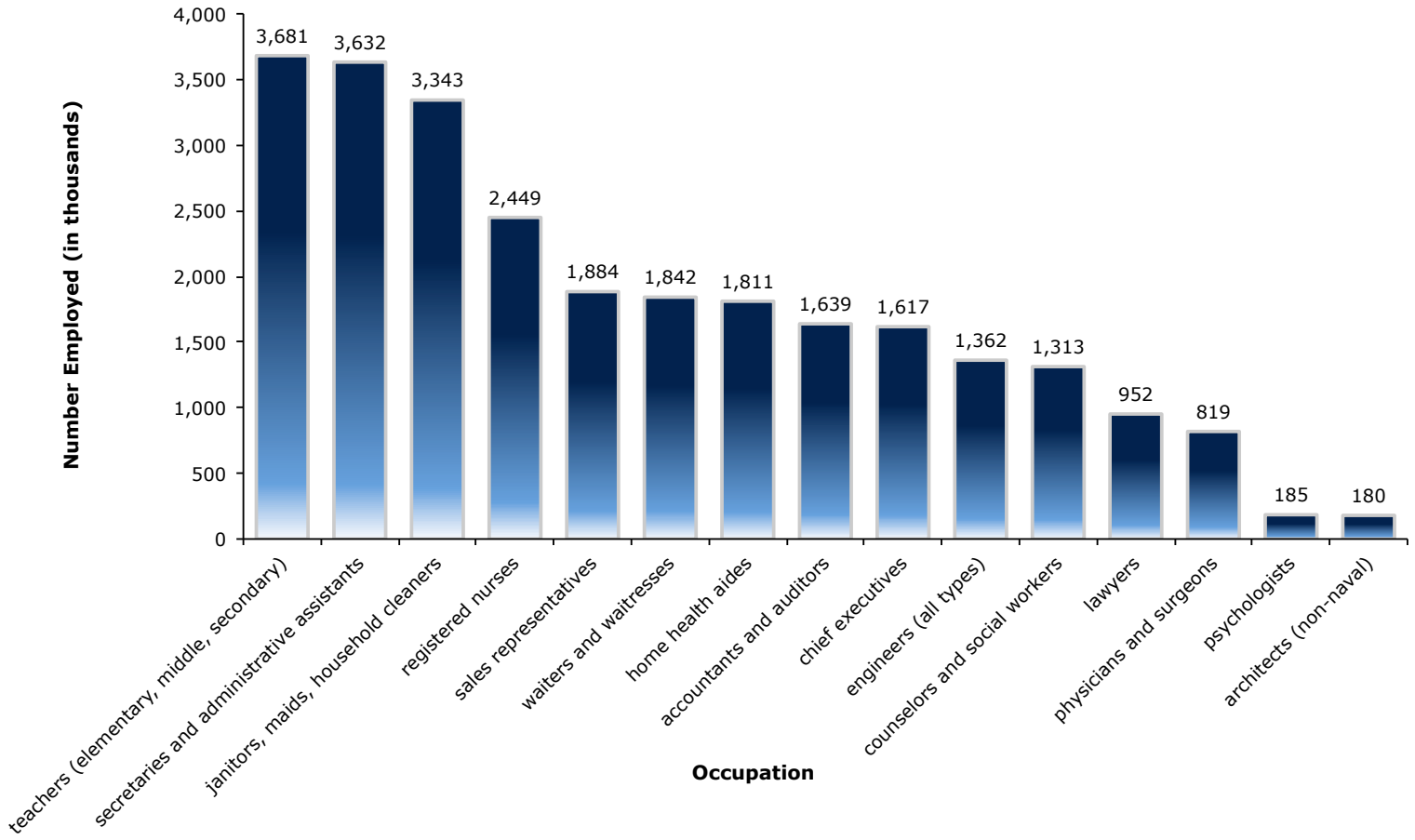
Why the problem is one of professional training

The scale of the need

Teaching is unnatural, intricate, and deliberate work

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

The realities of scale



This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

No reliable *system* for preparing and developing teachers in the U.S.

- No common curriculum for the professional training of teachers—specific, professionally-agreed upon learning objectives for new or practicing teachers
- Over 2,000 independent providers of initial teacher training, and an uncountable number of providers of professional development
- No common standard of performance for entry to independent practice with (on) young people
- Teachers report doing most of their learning on the job

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Standards for flying a plane

- Conducting a preflight inspection
- Normal and cross-wind approach and landing
- Straight turns and climbing turns
- Effective visual scanning
- Runway incursion avoidance
- Crossed control stalls
- S-turns across a road

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Standards for plumbing

- Install copper and copper alloy piping
- Build a plumbing trap
- Vent a sanitary drainage system
- Disassemble and rebuild a centrifugal compressor
- Maintain joints, connections, supports, and hangars
- Install and maintain storm drainage systems

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Plumber training and assessment



- Clear, detailed performance expectations
- 5 year apprenticeship
- 1700-2000 hours on-the-job training
- 246 hours related classroom instruction
- 1-year probationary period with on-the-job evaluations

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Physician training and assessment

[Image Removed]

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

No equivalent in teaching

- Objectives for coursework, student teaching, and other clinical experiences are imprecise and vague and vary significantly from one program to the next
- Performance expectations for teachers are underspecified and weakly assessed
- Most teaching happens privately—with minimal observation and feedback—undermining the notion of a professional learning community

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Vague standards

"The teacher uses a variety of instructional strategies to engage students in a discussion of challenging academic content."

rather than

"The teacher elicits solutions to a geometry task and conducts a discussion comparing the solutions."

or

"The teacher poses a focused task to engage students in considering how to apply the definition of a fraction."

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Identifying high-leverage practices

Teaching practices that:

- Are vital to helping students learn
- Directly address inequities
- Can be "unpacked," and taught and learned by beginners
- Useful (even if in different ways) across content and contexts

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

High-leverage practices

- Leading a whole-class discussion
- Eliciting and interpreting individual students' thinking
- Recognizing particular common patterns of student thinking and development in a subject-matter domain
- Implementing organizational routines, procedures, and strategies to support a learning environment
- Setting up and managing small group work
- Engaging in strategic relationship-building conversations with students
- Selecting and using particular methods to check understanding and monitor student learning during and across lessons
- Providing oral and written feedback to students on their work
- Communicating about a student with a parent or guardian

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu



This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu



This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

What is the EML?

A live laboratory for the design and study of teaching:

- 10-day summer math "turnaround" 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



This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

A site for collective work on practice

- Opportunity to deliberate collectively about instructional decisions, and to develop and discuss experiments
- Diverse participants with varied interests, areas of expertise, and "lenses" for viewing practice lend different perspectives and expand the range of discussion

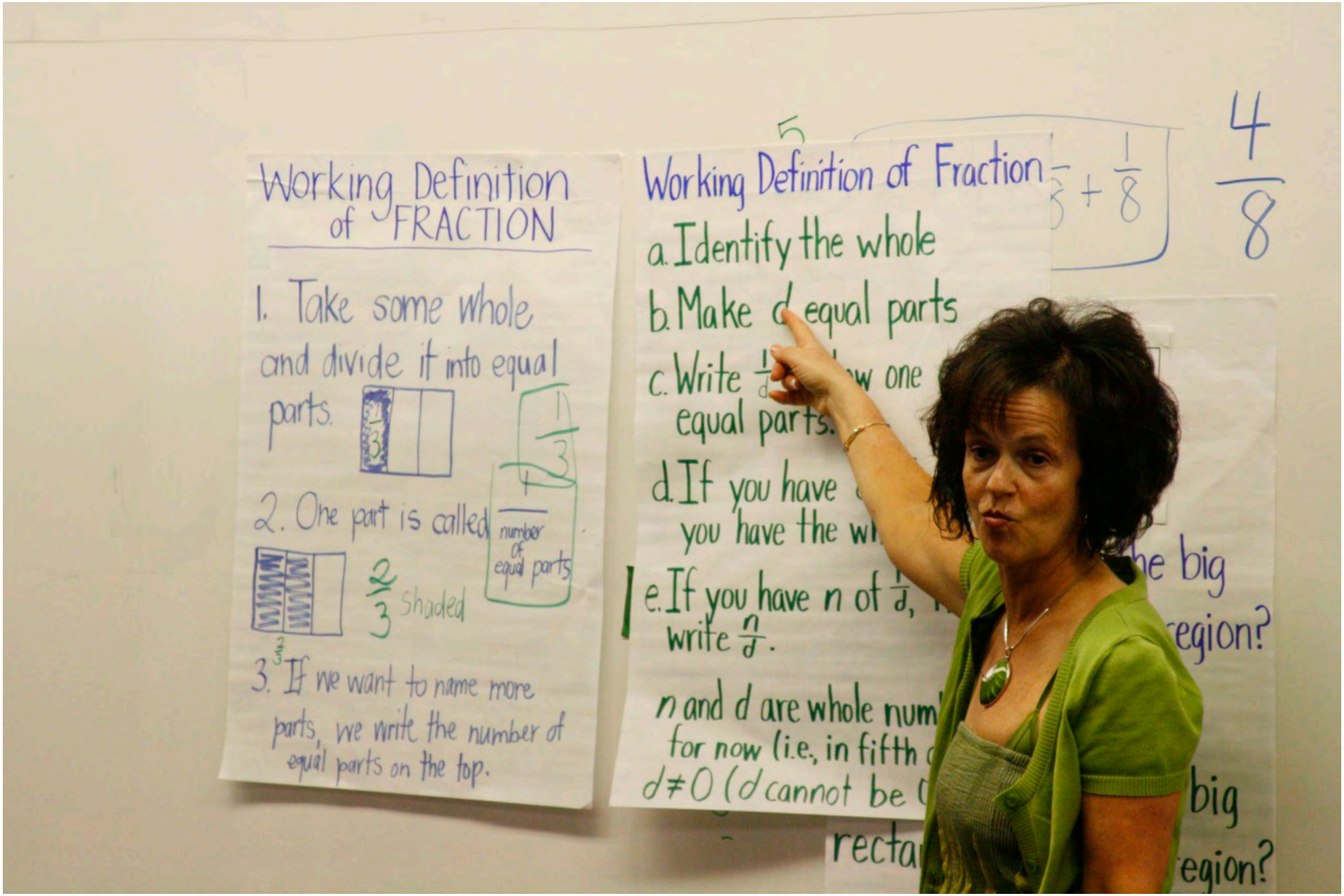




This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu



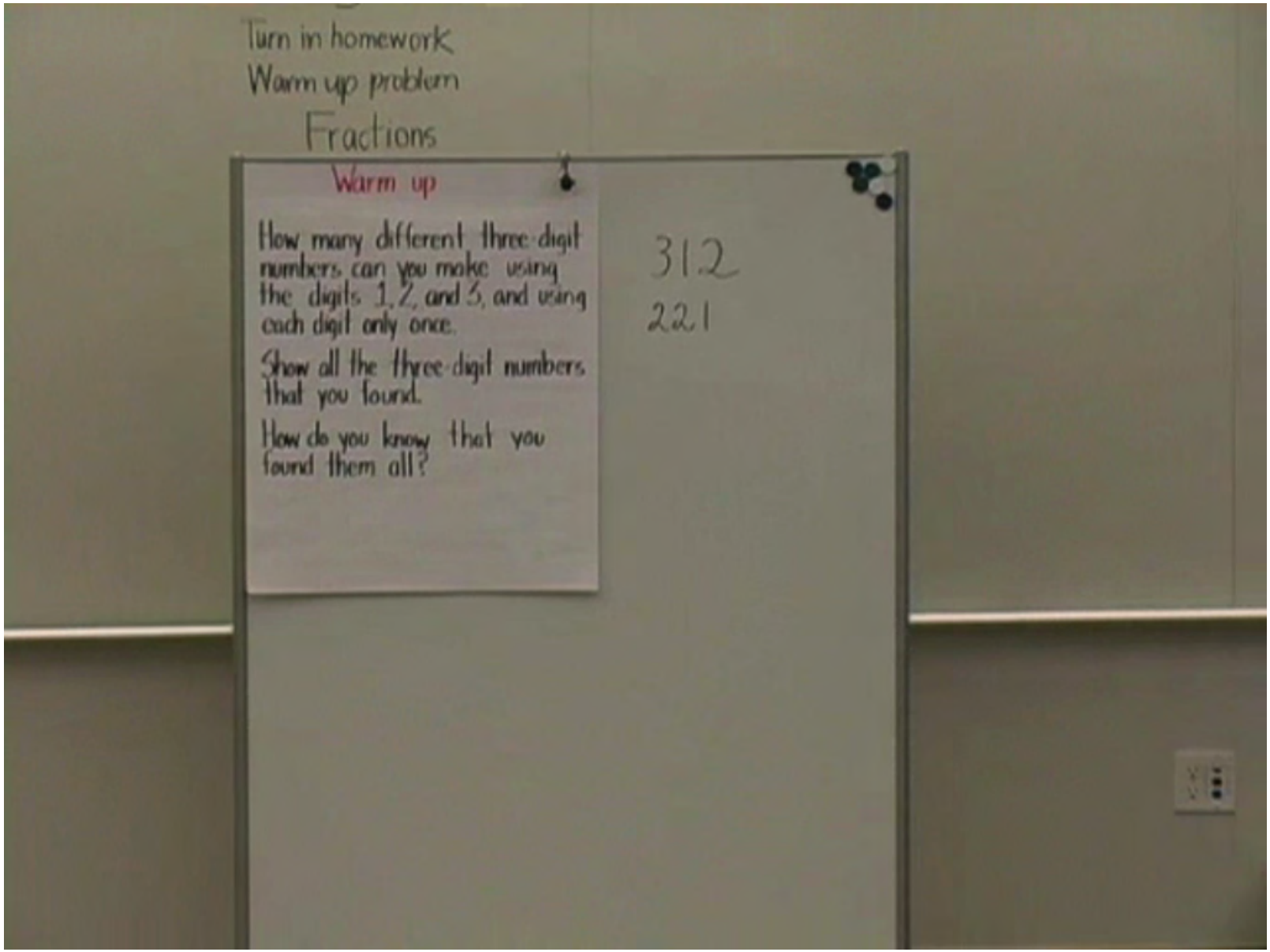
This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu



This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu



This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu



This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Core components of practice-centered professional training of teachers

- **Curriculum**: What is there to learn in order to become a competent beginning teacher? What types of continuing professional training contribute to expert teacher development?
- **Instructional activities and settings**: What specific approaches and settings work best to prepare and support novices and developing teachers as they *do* the complex relational, psychological, social, and intellectual work of teaching?
- **Assessment**: How do we know when beginning teachers are ready to take responsibility for their own classrooms? How do we assess increasing levels of expertise, from entry-level to exemplary to expert?

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

An assessment *system*

- Tapping multiple aspects of practice
- Warranted by logic, connection to student growth, wisdom of practice, research
- Linked to student learning gains
- Geared to specific K-12 curriculum (CCSS)
- Offering useful information for improvement
- Connected to an ongoing R&D agenda to adjust and improve metrics
- Including detailed articulations of effective and less effective practice as well as video exemplars, to support learning

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Does this student understand?

$$\begin{array}{r} {\scriptstyle 1} \\ 15 \\ 29 \\ +12 \\ \hline 54 \end{array}$$

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/

© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Does this student understand?

1	1
15	18
29	29
+12	+17
56	54

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

What it would take

- A common core K-12 curriculum, or a means toward it
- Developing common “standard of care” for practice, with assessments of performance linked to student outcomes
- Developing capacity for the teaching of practice: resources, training, and shared professional knowledge
- Moving from individualistic views of teaching to a more collective sense of the profession

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu



TeachingWorks

UNIVERSITY of MICHIGAN

A national organization focused on building a practice-based and outcomes-oriented system for the professional training of teachers. It has four primary functions:

1. **Materials and resources** for teacher educators and professional developers
2. **Training** for teacher educators and developers
3. **Research** on approaches to professional training; data and information about teaching quality and development
4. **Communications**, policy analysis and leadership for the improvement of teaching quality

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/

© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

How you could help

1. Vetting the high-leverage practices (HLPs) and helping to unpack and label the techniques and moves that comprise them
2. Working to help create and comment on the development of a common technical vocabulary and professional language
3. Contributing to a library of exemplars of the HLPs in use (video and other exemplars)

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

THANK YOU!

dball@umich.edu

Slides will be posted on Deborah Ball's website Google "Deborah Ball"

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu

Credits



Image on slide 13 - “March 16, 2004 -Rough plumbing” by Flickr user CSLP
Licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 2.0 Generic License
http://creativecommons.org/licenses/by-nc-sa/2.0/deed.en

This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109 • mtlt@umich.edu