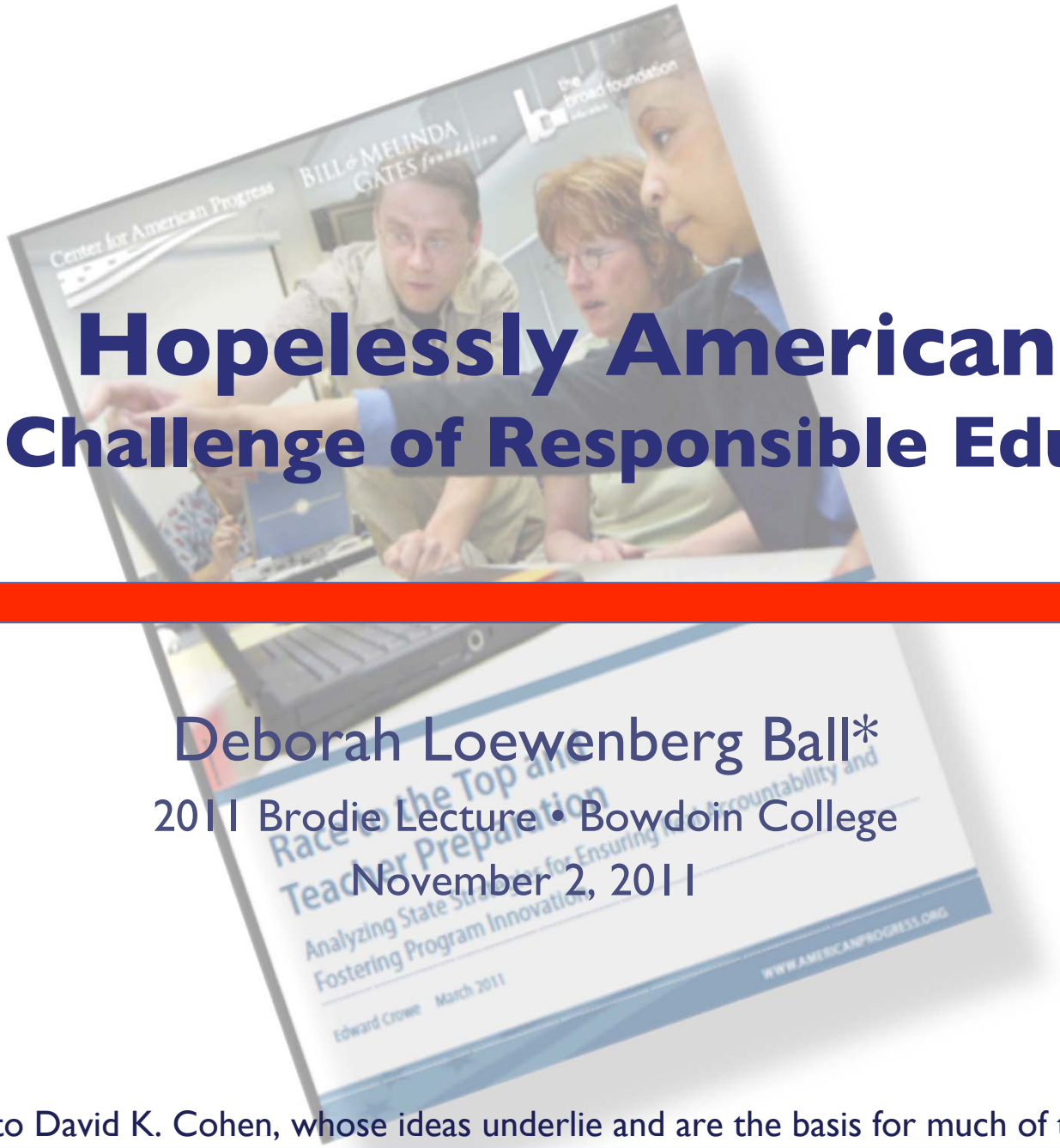


Hopelessly American:
The Challenge of Responsible Education

Deborah Loewenberg Ball*

2011 Brodie Lecture • Bowdoin College

November 2, 2011

*With thanks to David K. Cohen, whose ideas underlie and are the basis for much of this argument.

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

Which are myths? Which are true?

Mark M (myth) or T (true).

1. U.S. education used to work better than it does now.
2. Societal problems — e.g., inequality, poverty, the declining family — are so overwhelming that schools cannot do their job.
3. Education could be improved dramatically if local innovations were allowed to flourish without intervention and interference.
4. We need to remove barriers to entry to teaching so that our best and brightest can teach more easily.
5. The highest performing countries' education systems are more successful because they have a national curriculum.
6. Charter schools are more likely to be successful than other schools because they are free of external controls on their 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

Overview

1. Defining responsible education, and the problem
2. Why does education need improvement?
3. What does it mean to "reform" education?
4. What is "hopelessly American" about our efforts to improve education?
5. Improving the training of teachers: An "un-American" proposal
6. Is there hope of reforming education in this country?

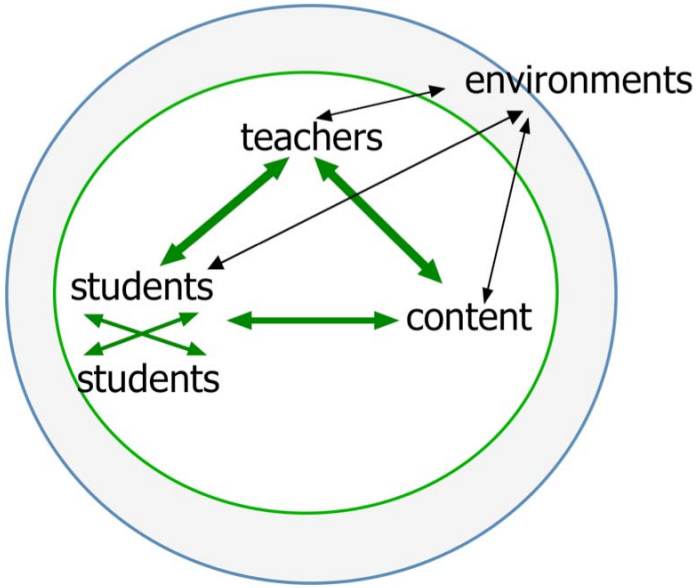
This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109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

What is "education"?

It is not:

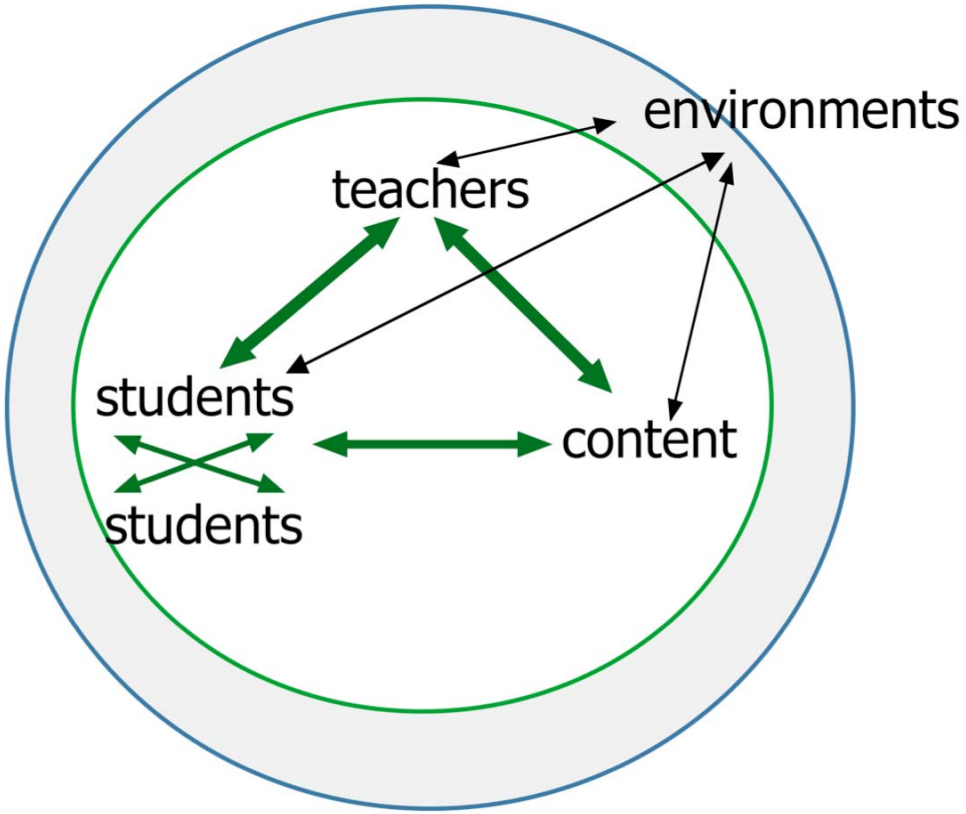
- What teachers do
- The cause of students' learning
- "Natural"
- Primarily intuitive and improvisational

Education is what is *co-produced* by students and teachers in contexts, around specific content and curriculum, all in the broader societal environments.



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 "responsible" education?

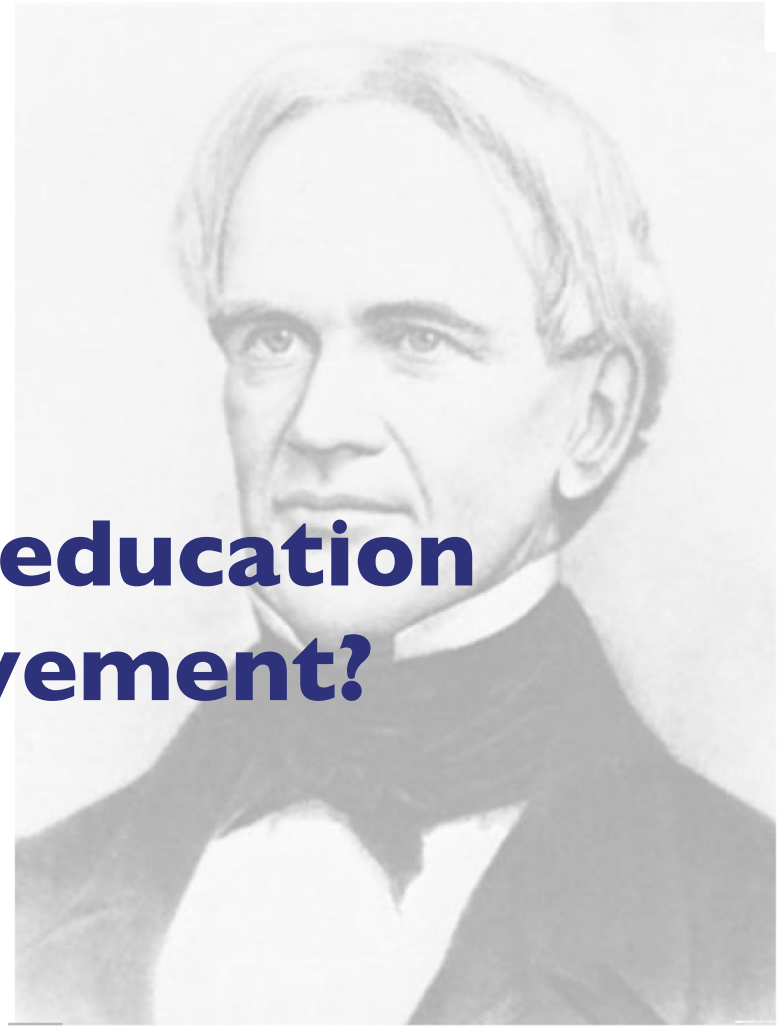


Takes responsibility for:

1. deliberately maximizing the quality of the interactions . . .
2. . . . in ways that maximize the probability that students learn
3. . . . worthwhile content and skills

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

② Why does U.S. education need improvement?



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

The immediate challenges

1. Enormous gaps in learning opportunities and disparities in achievement (within U.S. and in international comparisons)
2. Rapidly changing school population
3. Weak teaching quality
4. "Summer loss" and school effects

5. Higher, more complex academic goals
6. High expectations for all students



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 broader context

- Major increases in economic inequality over the last 40 years
- Increasing racial and class segregation over the last 50 years
- Gap between schooling and skills needed in the workplace (since 1970s)

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

③ What does it mean to "reform" education?

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 "reform" landscape

- Federal policies: No Child Left Behind, Race to the Top
- New players: Growing role of philanthropy in education, charter schools, alternative route teacher pathways and programs
- Reports

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

Democratic school governance

- State regulation: teacher licensure, program accreditation, assessment; no constitutional authority for districts, but LEAs dominate
- Elected community school boards: hire superintendent; teacher hiring, evaluation, pay; curriculum; school taxes
- Intra-district local school councils and parent groups
- Weak Federal role

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

School funding

- We spend more per pupil than any other OECD country, but highly unequal
- State funding:
  - Average per pupil spending varies significantly by state. In the 2008-2009 school year, New York spent $18,126 per pupil in comparison to Utah's $6,356.
- Local funding: Wide variation among districts within states (although has narrowed in some cases); variation within districts
- Federal funding:
  - 9¢ of every dollar;
  - political basis for widely and thinly spread categorical funding;
  - Federal highways and their effect on schools

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

Weak educational infrastructure

- No common curriculum or assessments
- No system for training teachers or for building collective professional knowledge and skill
- No common system for inspecting and improving schools and teaching

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

Instead it is all very, very local

- Teaching high in personal and individual discretion
- Curriculum highly variable
- Many different tests and standards for students' 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

And we like it that way

- Enormous belief in differentiation, context, "specific" and "relevant" pedagogy
- Strong views about community and parents' role in determining their children's education
- Teaching understood as contextually-based work that depends on discretion
- Varied fears about "centralization"

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

But this presents a dilemma

Our version of democratic control of schools has led to:

- Major inequities in educational resources
- Hugely unequal educational opportunity and outcomes
- The lack of a teaching profession
- Weak educational infrastructure

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

④ What is "hopelessly American" about our efforts to reform education?

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

Love "new," "innovative," "reform"

Examples:

- Mrs. Oublier and her colleagues in the California mathematics reforms of the 1990s (Cohen et al.)
- Labeling: e.g., instructional change that is principally labeled "reform-oriented" — ???
- Frequent changes in curriculum (cycles of renewal)
- Excitement about new tools and technology

How "new" is all of this?

("plus ça change . . ." David Cohen)

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

Attention to international comparisons

- How other countries value education more
- Teachers are more respected
- Teacher education more selective
- Curriculum is better

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

But do we SEE what they do?



- All democracies, too
- Education is a societal national commitment
- Common K-12 curricula and criterion-referenced exams
- Prospective teachers study the common curriculum in detail and practice how to teach it
- Inspection system evaluates teachers' instructional capability in reference to the common curriculum

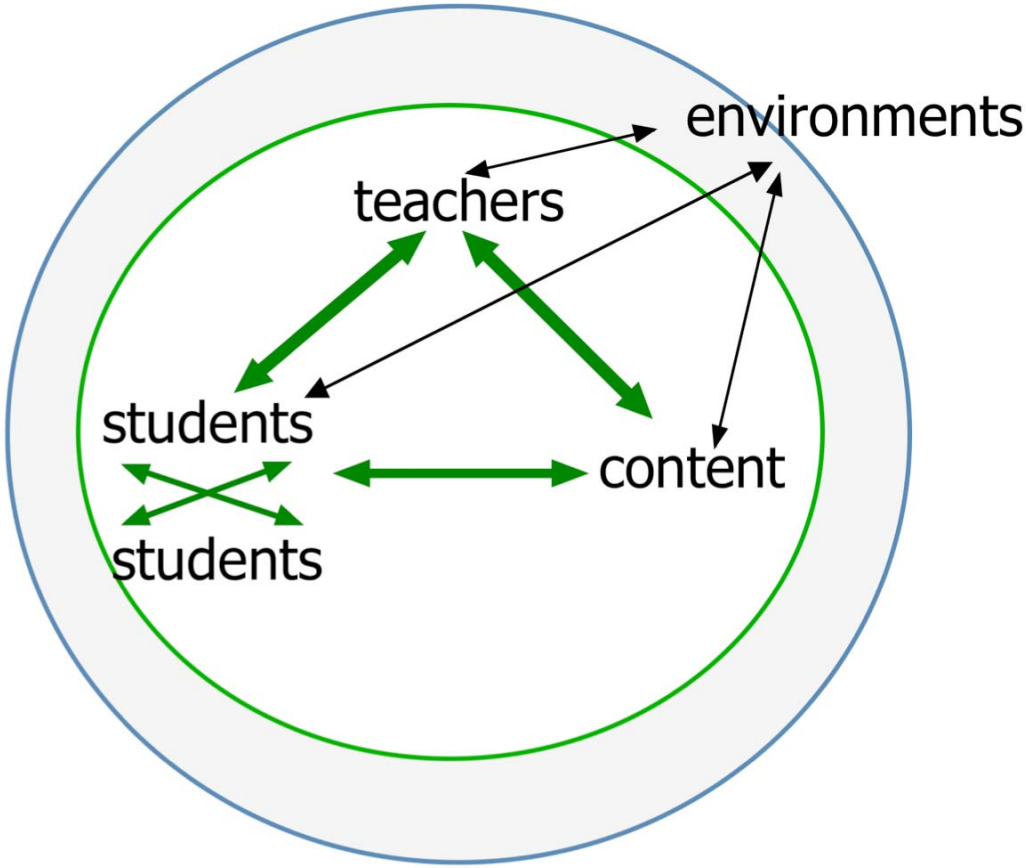
This work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works Version 3.0 United States License: http://creativecommons.org/licenses/by-nc-nd/3.0/us/
© 2011 Mathematics Teaching and Learning to Teach • School of Education • University of Michigan • Ann Arbor, MI 48109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

We reinvent ourselves over and over again

- Individual projects—single schools, single programs, resources for local development → no common infrastructure; competition and/or isolation
- Federal programs leave core issues to local discretion
- Confounding of "common" with "government" (Federal)—again not professional
- Few reforms build educational infrastructure (exceptions: charter management organizations or networks)

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

. . . and often fail to get to the core



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

⑤ Improving the training of teachers: An "un-American" proposal

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 children's mathematical 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.
- 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

No professionally-grounded system for teachers' training

1. No common curriculum for the professional training of teachers—specific, professionally-agreed upon learning objectives for new or practicing teachers
2. Over 2,000 independent providers of initial teacher training, and an uncountable number of providers of professional development
3. No common standard of performance for entry to independent practice with (on) young people
   - Primacy of personal experience
   - 62% of beginning teachers say they feel unprepared for practice;
   - 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

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."

"I can't explain what I do –- teaching is really an art and you have to follow your intuition a lot."

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

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



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

Training to do the work of plumbing

SPECIFIC CAPABILITIES

- 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



DETAILED TRAINING FOR PRACTICE

- Detailed performance expectations
- 5-year apprenticeship
- 1700-2000 hours on-the-job training
- 246 hours classroom instruction
- 1-year probationary period with on-the-job evaluations
- Extensive training required to be a master plumber

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

Features of strong training for responsible practice

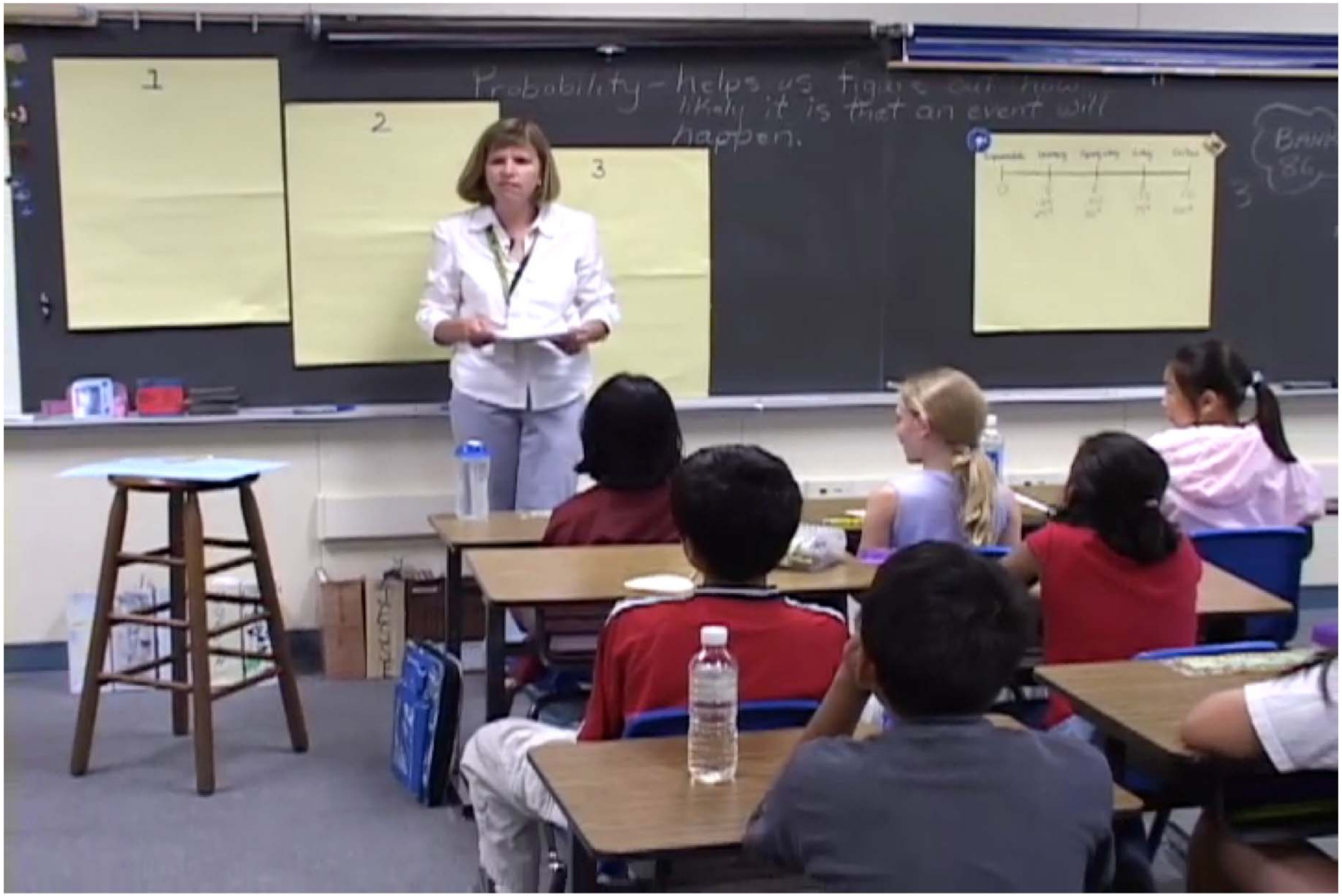
1. Clear specification of skills, capabilities, and qualities of performance necessary for basic independent practice
2. Detailed developmental clinical training, progressing from observing to simulations to supervised apprenticeship to supervised independent practice
3. Performance assessment of individual competence before allowing independent 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 concern for preparing teachers for practice, but . . .

- tendency to describe instructional competence in large global terms
- no consensus about a set of specific instructional practices that are essential for beginners to be able to carry out
- impoverished vocabulary for describing, teaching, and assessing teaching

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

Building a SYSTEM for the professional training of teachers

1. A common core of teaching capabilities that must be demonstrated prior to practicing independently
2. A common system of performance assessments of these capabilities
3. Development of detailed approaches to clinical training and a range of settings for that training

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

Assessments of teaching practice

- Useful for: diagnostically-based improvement; licensure; hiring decisions; licensure renewal and advancement
- Based on specific core practices for teaching specific K-12 content (keyed to the Common Core)
- Scored based on how well candidates use a particular practice to reach particular content-specific instructional goals
- Based on actual performance appropriate to the practice being assessed: e.g., planning versus leading a discussion versus diagnosing common patterns of student thinking
- Conducted in real classrooms, in performance centers, through simulations ("standardized patient" or computerized); some live and some scored through 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

Approaches to teaching practice

- Deliberate guided learning from skilled teachers (clinical rounds)
- Study of videos and other primary records of practice
- Rehearsals
- Rubrics for providing detailed feedback
- Systematic clinical experience with supervision and feedback, staged across time

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 makes this an "un-American" proposal?

- Highly detailed
- Not individually discretionary
- Common across 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

⑥ Is there hope of "reforming" education in this country?

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

Good signs

- More attention to instruction (the technical core) than ever before
- The Common Core State Standards in English language arts and mathematics
- Some signs of systems developing, even if not yet common (e.g., CMOs)

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

Big challenges

- Growing economic inequality and local governance: teacher distribution, other resources for instruction
- Emphasis on teachers (instead of teaching)

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

Which are myths? Which are true?

Mark M (myth) or T (true).

T U.S. education used to work better than it does now.

M Societal problems — e.g., inequality, poverty, the declining family — are so overwhelming that schools cannot do their job.

M Education could be improved dramatically if local innovations were allowed to flourish without intervention and interference.

M We need to remove barriers to entry to teaching so that our best and brightest can teach more easily.

T The highest performing countries' education systems are more successful because they have a national curriculum.

M Charter schools are more likely to be successful than other schools because they are free of external controls on their 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

THANK YOU!

dball@umich.edu

Slides will be available on my 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 slides 1 and 7:
Center for American Progress. (2011). *Race to the top and teacher preparation: Analyzing state strategies for ensuring real accountability and fostering program innovation.* Washington DC: Crowe, E.



Image on slide 7:
Thomas B. Fordham Institute. (2010). *Cracks in the ivory tower? The views of education professors circa 2010.* Washington DC: Farkas, S., & Duffett, A.



Image on slide 7:
National Council for Accreditation of Teacher Education. (2010). *Transforming teacher education through clinical practice: A national strategy to prepare effective teachers.* Washington DC

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

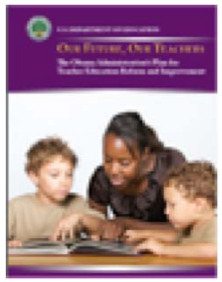


Image on slide 7:
United States Department of Education. (2011). *Our future, our teachers: The Obama Administration's plan for teacher education reform and improvement.* Washington DC



Image on slide 7:
Organisation for Economic Co-operation and Development. (2011). *Building a high-quality teaching profession: Lessons from around the world.* Paris, France



Image on slide 7:
National Council on Teacher Quality. (2011). *Ed school essentials: A review of Illinois teacher preparation.* Washington DC

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 29 – "Haircut" by Flickr user I Should Be Folding Laundry
Licensed under a Creative Commons Attribution 2.0 Generic License
http://creativecommons.org/licenses/by/2.0/deed.en



Image on slide 29 – "20110916_171840" by Flickr user Team Massachusetts
Licensed under a Creative Commons Attribution 2.0 Generic License
http://creativecommons.org/licenses/by/2.0/deed.en



Image on slide 29 – "nursing_student" by Flickr user University of Missouri System
Licensed under a Creative Commons Attribution-NonCommercial-NoDerivs 2.0 Generic License
http://creativecommons.org/licenses/by-nc-nd/2.0/deed.en



Image on slide 29 – "almost forbidden territory...." by Flickr user Esthr
Licensed under a Creative Commons Attribution-NonCommercial 2.0 Generic License
http://creativecommons.org/licenses/by-nc/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

Credits



Image on slide 29 – "Marielle Carving Francinaldo's Ear" by Flickr user ReSurge International
Licensed under a Creative Commons Attribution-NonCommercial-NoDerivs 2.0 Generic License
http://creativecommons.org/licenses/by-nc-nd/2.0/deed.en



Image on slide 30 – "WSC2009_Skill_15_090904_DDG_2121" by Flickr user WordSkills
Licensed under a Creative Commons Attribution-NonCommercial-NoDerivs 2.0 Generic License
http://creativecommons.org/licenses/by-nc-nd/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