



Complex Instruction
Equity in Mathematics
& Common Core
Math Practice Standards

Amy McDonald

International School of Tucson

mcdonald@internationalschooloftucson.org,

amylynnm@email.arizona.edu

Original Plan- 90 minute proposal

- **Educate** (CI plug based on mine and others' research/ experiences)
- **Equip** (Valuable resources)
- **Engage** you in a CI task
- **Exhibit** authentic and imperfect CI interactions via video from my current site (with permission)
- *practice standards*

Current Plan- 60 minutes / conference program

- **Educate** (CI plug based on mine and others' research/ experiences) Perhaps a little less than I originally intended...
- **Equip** (Valuable resources)
- ~~○ **Engage** you in a CI task~~
- **Exhibit** authentic and imperfect CI interactions via video from my current site (with permission)
- **Engage** you in an interactive discussion about whatever CI-related content you all want to talk about...

Full disclosure...

- **INSPIRE YOU** to try it... NOT AS A ONE-SIZE FITS ALL FIX-ALL SET OF INSTRUCTIONAL STRATEGIES...
- **BE COMPLETELY HONEST AND VULNERABLE** about what that will look like, beg/encourage you to try it anyway... and offer myself as a networking resource who will ALWAYS be more than willing to collaborate in the best interest of any group of students you find yourself trying to teach

**Who am I and
what made me
ask that
question?**

**Who are *YOU*
and why did you
choose this
session?**

I started this year with a
research question...

**Can
Complex Instruction
in the Elementary
Mathematics
Classroom
Effectively Support
Each of the
Common Core Math
Practice Standards?**

Researcher Bias

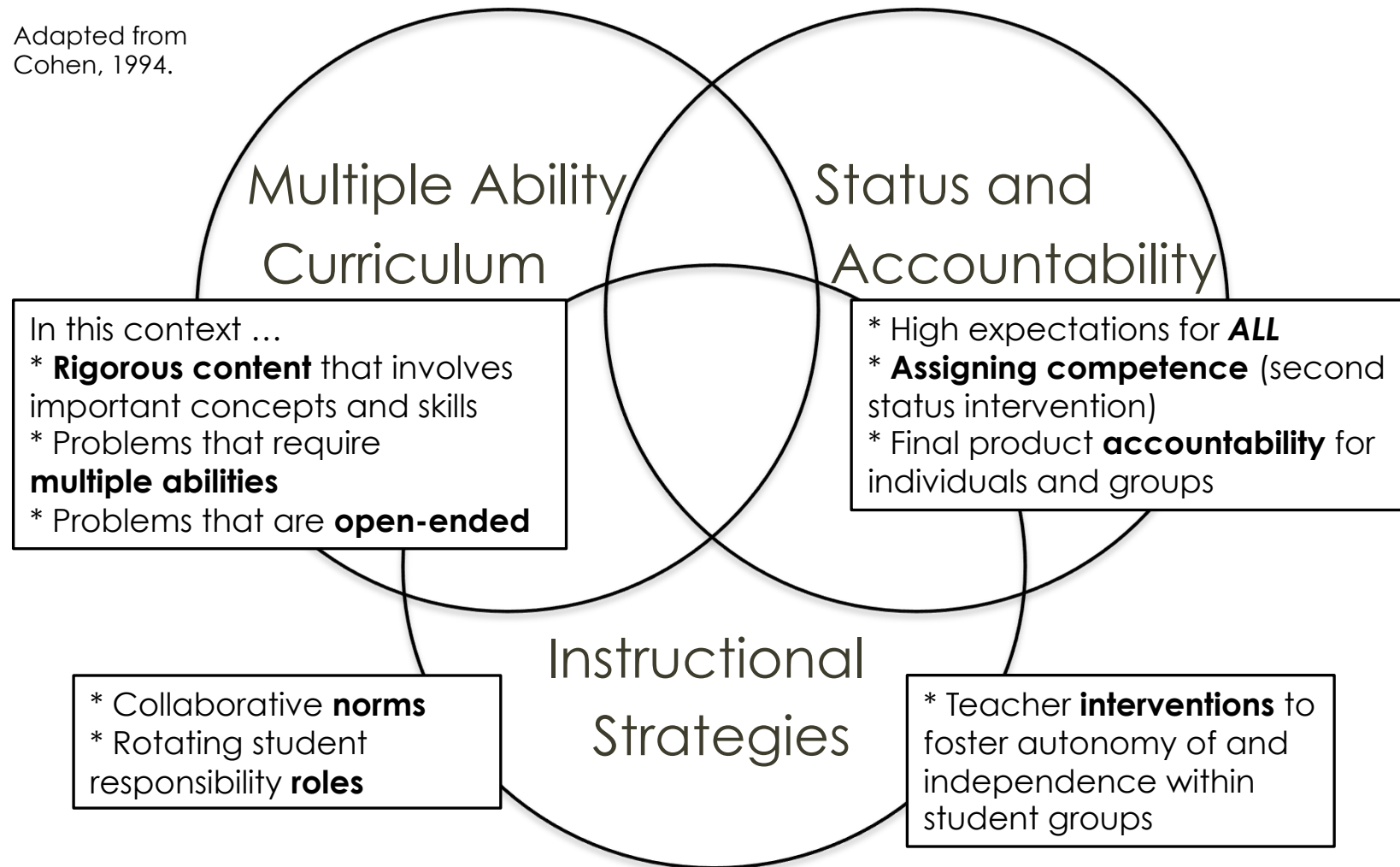
- I have this unrelenting conviction that **ALL** students have been created with a variety of talents and smartnesses and therefore that all students not only have something valuable to bring to any worthwhile academic endeavor but also that they all have the capacity to learn anything I could ever want to teach them...

What are the Common Core Practice Standards?

1	Make sense of problems and persevere in solving them
2	Reason abstractly and quantitatively
3	Construct viable arguments and critique the reasoning of others
4	Model with mathematics
5	Use appropriate tools strategically
6	Attend to precision
7	Look for and make use of structure
8	Look for and express regularity in repeated reasoning

What is Complex Instruction?

Adapted from
Cohen, 1994.



Theoretical Perspective

It's basically an attempt to prevent THIS...



Why students don't do the mathematics...

- Lack of background knowledge
- Language barrier
- Personality
- Incapacity of students
- ...
- *STATUS*

Theory and CI Underpinnings

Albert **Einstein** —
“Everybody is a genius. But if you judge a **fish** by its ability to climb a tree, it will live its whole life believing that it is stupid.”

The BIG problem- 2:51-5:25...

Link not enabled- YouTube- Lotan on equal status classrooms...



What do status issues LOOK LIKE in the classroom and what do I do about them?

VIDEO WAS HERE... SORRY, CAN'T DISTRIBUTE
=(

Acknowledgement of trust issue- background info. of students...

REAL Practical Experience

Acknowledge time critique and focus on equitable participation- background information of students...

The truth about when it's going well...
not always what you expected...

VIDEO WAS HERE... SORRY, CAN'T DISTRIBUTE
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When it all falls apart...

When it's not so great,
just keep swimming...

VIDEO WAS HERE... SORRY, CAN'T DISTRIBUTE
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So... let's talk...

- Questions, etc.
- The rest of these slides will give you more information about my research project this year...
- Resource list at the end...
- QUICK SCROLL THROUGH SLIDES

Back to that Project- Data Collection

- Video clips (16, varied lengths)
- Student work
- Teacher observations
 - 6 instruments and a website-
[http://www.insidemathematics.org/
index.php/mathematical-practice-
standards](http://www.insidemathematics.org/index.php/mathematical-practice-standards)

Two groups of tallies

- General observation tallies by teachers (not specific to student groups)
- Tallies specific to each small student group (either observed in video, evidenced in work, or cited by teacher)

Difficulties with the tallies

- When trying to enlist the other teacher's help (mainly for non-video data sources), getting everyone familiar with the practices and grade-appropriate representations was HARD!
- The issue of multiple tallies for the same work (intimately related practices)

Data Analysis






A teacher-observation example:

There's an essential story that goes with this slide- email me if you want it...

- **1-** Make sense of problems and persevere in solving them
- **2-** Reason abstractly and quantitatively
- **3-** Construct viable arguments and critique the reasoning of others

What Can I Buy?
Pretend you have 12 pennies.
Pick a toy to buy.
How many pennies will you have left? Show your work.

NOTE: Students find combinations of 12 in real-life situations.
38-42

FOR SALE	
	3 pennies
	6 pennies
	4 pennies
	3 pennies
	2 pennies

Start with the pennies you have left. Buy more toys. Which toys can you buy? Show your work.

Handwritten work:
 $12 - 3 = 9$
 $9 - 6 = 3$
 $3 - 3 = 0$

- **4-** Model with mathematics
- **5-** Use appropriate tools strategically
- **6-** Attend to precision

Data Analysis

1- Make sense of problems and persevere in solving them

4- Model with mathematics

A short video clip example:

6- Attend to precision

5- Use appropriate tools strategically

VIDEO WAS HERE... SORRY, CAN'T DISTRIBUTE
=(

3- Construct viable arguments and critique the reasoning of others

- 2- Reason abstractly and quantitatively

8- Look for and express regularity in repeated reasoning

Looking for *intrapersonal* reliability in the absence of help...

- I checked 3 video analyses 2 weeks later:
 - 100% consistent... *BUT* it's not exactly hard to agree with yourself with such little data...

Still collecting data!

Current implications

- **A few key remarks:**
 - Interrelated nature of the practices and the resulting impact on tallies
 - Question of whether what I observed had more to do with the math problems themselves than CI and whether that matters depending on how the research focus is defined
 - Need for more clarity/consensus surrounding Math practices and the existence of new information and supporting materials
- **A hypothesis:** CI discourse and problem requirements being the key
- **A potential implication:** Pressure to look more closely at the student-student interactions CI affords and also to keep abreast of CCSS resources

Some resources to show anyone who says ELLs can't do this...

ELL specific:

- *Theory Into Practice*, 45(1) [Various- on Detracking and Heterogeneous Grouping]
- Bunch, G. C., Abram, P. L., Lotan, R. A., & Valdés, G. (2001). Beyond sheltered instruction: Rethinking conditions for academic language development. *TESOL Journal*, 10(2-3), 28-33.
- Zahner, W. C. (2012). ELLs and Group Work: It Can Be Done Well. *Mathematics Teaching in the Middle School*, 18(3), 156-164.

Some good TASKS...

- Erickson, Tim. *United we solve: Math problems for groups, grades 5-10*. Oakland, CA: eeps media, 1996.
- Goodman, Jan M. *Group Solutions: Cooperative Logic Activities for Grades K-4*. Berkeley, CA: Lawrence Hall of Science, 1992.
- YOUR SITE'S CURRICULUM- IMPROVISE, ADAPT, AND OVERCOME!!!
 - Investigations Curriculum, Connected Math, Email Steve Leinwand...
 - Network!!!

A working reference list...

Too long to paste here... Imperfect
Literature Review and Reference list
available if you want it... just email me...