
SMARTER TOGETHER!

GETTING ALL STUDENTS TO PARTICIPATE IN
CHALLENGING MATHEMATICS

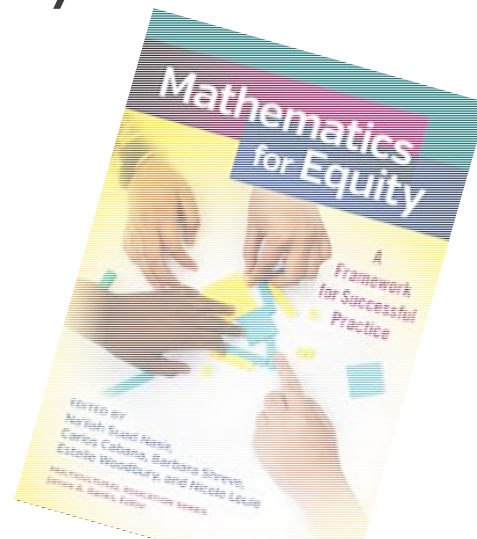
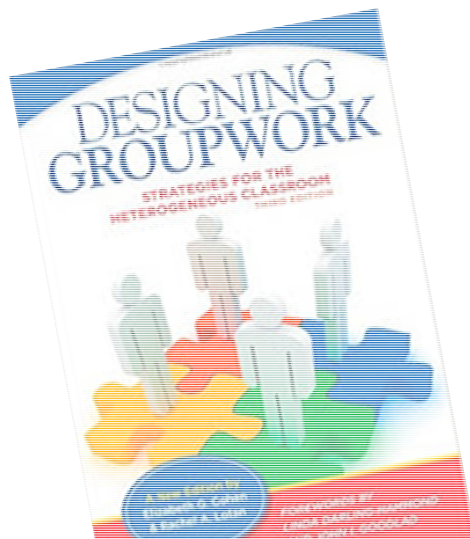
Put your name on
an index card for
book raffle

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NCTM 2017 - 4/7/17 – SAN ANTONIO

COMPLEX INSTRUCTION

- From work of Elizabeth Cohen & Rachel Lotan
- Taken up by Railside High School Mathematics teachers
- Modified for elementary classrooms



PARTICIPATION PROBLEMS

- What **participation problems** are occurring in your classroom?

PARTICIPATION PROBLEMS

- Students who are **quiet, don't contribute**

PARTICIPATION PROBLEMS

- Students who are **quiet, don't contribute**
- Students who **don't leave space** for others to participate

PARTICIPATION PROBLEMS

- **Underparticipation**

- Students who are quiet, don't contribute

- **Overparticipation**

- Students who don't leave space for others to participate
 - Space to talk, to write, to move manipulatives, to think

WHY THESE DIFFERENCES?

- Introversion/extroversion
- Past experiences
- Language
-
- **STATUS!**

STATUS

- **Ranking** relative to others
 - Based on **perceptions of competence**
 - **Dynamic**
 - Pervasive

STATUS AND PARTICIPATION

- Higher status → Over-participation
- Lower status → Under-participation

If we shift **status** – perceptions of mathematical competence – we can shift **participation**.



As we shift **participation**, we shift **status**.

COMPLEX INSTRUCTION 3-STEP PROGRAM

1. Diversify mathematics and participation
2. Provide participation structures
3. Address status issues

COMPLEX INSTRUCTION 3-STEP PROGRAM

1. **Diversify mathematics and participation**
2. Provide participation structures
3. Address status issues

SHIFTING PERCEPTIONS & PARTICIPATION

- What does it mean to be **smart at math** in your classroom?
 - What **mathematical activities**?
 - What **kinds of participation**?

PERCEPTIONS OF MATHEMATICAL COMPETENCE

- What does it mean to be **smart at math** in your class?
 - What **mathematical activities**?
 - What **kinds of participation**?

Computation
Algorithms
Numerical strategies

PERCEPTIONS OF MATHEMATICAL COMPETENCE

- What does it mean to be **smart at math** in your class?
- What **mathematical activities**?
- What **kinds of participation**?

Talking
Calling out answers
Writing on the board

Computation
Algorithms
Numerical strategies

PERCEPTIONS OF MATHEMATICAL COMPETENCE

- What do
- What
- What

If we want our **underparticipants** to do more, we have to broaden the **mathematics** and **participation** in our tasks so everyone can see the **mathematical competencies of the underparticipants!**

ategies

Tall
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TRY A TASK

- What does it mean to be **smart at math** in this task?
 - **Mathematical Activity**
 - **Participation**

TASK LOGISTICS

- Groups of 3-4
- Roles
- Supplies table
 - Task card
 - Set of green cards

TRY A TASK

- What does it mean to be **smart at math** in this task?
 - **Mathematical Activity**
 - **Participation**

DIVERSIFY MATHEMATICAL COMPETENCIES

- Different representations (table, graph, real world, visual, symbolic, words)
- Multiple strategies (direct modeling, counting, number facts, algorithm)
- Varying resources (counters, base ten blocks, paper, calculator, ruler)
- Mathematical practices (modeling, persistence, quantitative reasoning, making connections, construct and critique arguments, use appropriate tools, precision)
- Conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, productive disposition

DIVERSIFY PARTICIPATION

“Take part in”

- Talk
- Draw
- Write
- Listen
- Move manipulatives
- Think
- Gesture
- Cut
- Fold
- Build
- Arrange

BENEFITS OF DIVERSIFYING A TASK

- As you diversify a task, you
 - increase the **mathematical complexity** and **challenge**
 - make the task more **mathematically interesting**
 - highlight **strengths of underparticipants**
 - provide **stretches for overparticipants**

SUPPORTING UNDERPARTICIPATORS (AND OVERPARTICIPATORS!)

1. Diversify mathematics and participation
2. **Provide participation structures**
3. Address status issues

PARTICIPATION STRUCTURES

- How did the ordering numbers task
 - support the participation of underparticipants?
 - bound the participations of overparticipants?

MORE PARTICIPATION STRUCTURES

- Roles
- Group questions
- Middle space
- Partitioning
 - Information (clue cards)
 - Objects (names on cards)

MORE PARTICIPATION STRUCTURES

- Norms
 - No one is done until everyone understands.
 - Everyone is a resource. Use all of your resources wisely.
 - You have the duty to assist anyone who asks for help.
 - You have the right to ask anyone in your group for help.
 - No one of us is as smart as all of us together!

SUPPORTING UNDERPARTICIPATORS (AND OVERPARTICIPATORS!)

1. Diversify mathematics and participation
2. Provide participation structures
3. **Address status issues**

ADDRESS STATUS

Task structure gives underparticipants opportunities to shine.
Next step: **Intervene in status issues** to change perceptions of competence

Point out **strengths** of underparticipants

Point out the **assumptions** of overparticipants

ANOTHER TASK

See how many pieces of the 3 steps you can find in this task

1. Diversify mathematics and participation
2. Provide participation structures
3. Address status issues

- 
- Supplies table
 - Apologize for paper size

MULTIPLE ABILITIES ORIENTATION

This task requires:

- Visual reasoning
- Computation skills (addition, subtraction, division AND multiplication)
- Creative thinking
- Logical reasoning
- Finding connections
- Noticing similarities across different representations

- Communicating ideas
- Listening

None of us has all of these strengths, but each of us has some of these strengths. Together your group has the abilities to solve this task.

COMPLEX INSTRUCTION 3 STEP PROGRAM

- In this task, what did you notice about the three steps:
 - Diversify
 - Support participation
 - Address status

ADDRESS STATUS

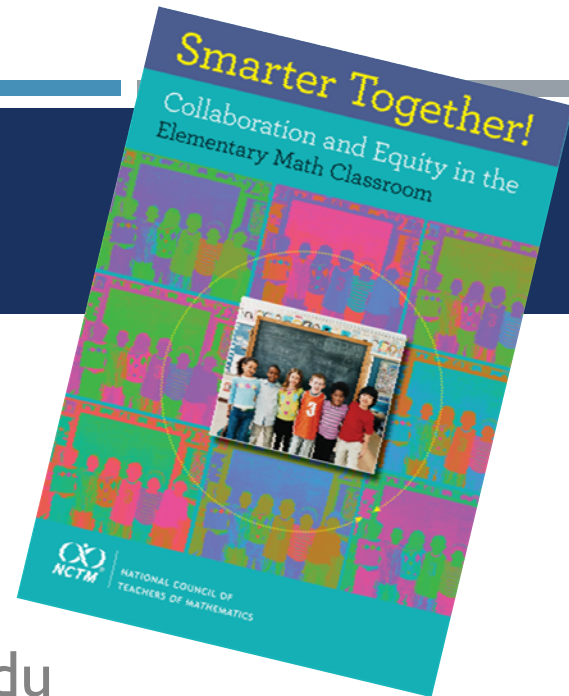
- Assigning competence
 - Public
 - Specific
 - Important
 - Academic
- ... yet
- Assists



**No one of us is as smart
as all of us together!**

RESOURCES

- CImath.org
 - Go to Links to More Information
- Marcy Wood mbwood@email.arizona.edu
- Smarter Together! Helen Featherstone, Sandra Crespo, Lisa Jilk, Joy Oslund, Amy Parks, & Marcy Wood. *Smarter Together! Collaboration and Equity in the Elementary Classroom*. Reston, Va: NCTM, 2011.



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- Raffle!!
 - Reflection Cove - 9:30-10:30 #4



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