APPENDIX V – 161
SMARTER TOGETHER!
GETTING ALL STUDENTS TO PARTICIPATE IN CHALLENGING MATHEMATICS

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COMPLEX INSTRUCTION

- From work of Elizabeth Cohen & Rachel Lotan
- Taken up by Railside High School Mathematics teachers
- Modified for elementary classrooms
What participation problems are you worried about?
PARTICIPATION PROBLEMS

I know how to do this problem!

He is SO SMART!!

Really? Again? Will anyone ever listen to my ideas?

Pick me!! I know the answer! I have the best answer!!
PARTICIPATION PROBLEMS

- **Underparticipator**
  - Students who are quiet, don’t contribute

- **Overparticipator**
  - Students who consistently respond, take over
WHY THESE DIFFERENCES?

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

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

- Physical appearance – clothes, accessories, and body
- Speech (accent, fluency)
- Gender performance
- Social skills
- Emotional control
STATUS AND PARTICIPATION

- Higher status → Over-participation
- Lower status → Under-participation
WHAT DOES THIS LOOK LIKE?

Overparticipation

Underparticipation
WHAT DOES THIS LOOK LIKE?

**Overparticipation**
- Hand raised
- All resources
- Quick to respond
- Direct work of others
- Take over work of others
- Demand timeline

**Underparticipation – at least 3 kinds**

**Content**
- Quiet
- No eye contact
- Distracted/off-task
- Leaning back

**Suppress**
- Interrupted or silenced
- Frustrated
- Eye Contact
- Doing individual work

**Solitary Smart**
- Thoughtful
- Hard working
- Quiet
WHAT DOES THIS LOOK LIKE?

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Need
1) redirection of participation
2) opportunities to stretch
3) opportunities to see other's strengths

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Need strengths identified AND opportunities to use strengths

Need spaces participate AND opportunities to show strengths
COMPLEX INSTRUCTION 3-STEP PROGRAM

1. Diversify mathematics (content, practices, activities)
2. Structure participation
3. Address status issues
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2. Structure participation
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SHIFTING PERCEPTIONS & PARTICIPATION

- What does it mean to be **smart at math** in your classroom?
- What **content, practices, & activities**?
PERCEPTIONS OF MATHEMATICAL COMPETENCE

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PERCEPTIONS OF MATHEMATICAL COMPETENCE

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- What content, practices, & activities?

Talking
Calling out answers
Writing on the board

Computation
Algorithms
Numerical strategies
If we want our underparticipators to do more, we have to broaden the mathematics and participation in our tasks so everyone can see the mathematical competencies of the underparticipators!
TRY A TASK

What does it mean to be smart at math in this task?

Content, Practices, Activities
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?

- **Content, Practices, Activities**
DIVERSIFY CONTENT & PRACTICES

- Content (How many different standards are included?)
- 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)
DIVERSIFY ACTIVITIES

- Talk
- Draw
- Write
- Listen
- Move manipulatives
- Think
- Gesture
- Cut
- Fold
- Build
- Arrange
- Act out
- Estimate
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 underparticipators**
  - provide **stretches for overparticipators**
COMPLEX INSTRUCTION 3-STEP PROGRAM

1. Diversify mathematics (content, practices, activities)
2. **Structure participation**
3. Address status issues
PARTICIPATION STRUCTURES

- How did the ordering numbers task
  - support the participation of underparticipators?
  - redirect the participation of overparticipators?
ANOTHER TASK

- Focus on participation structures
TASK LOGISTICS

- Groups of 3-4
- Supplies table
  - Blocks
  - Grid paper
  - Envelopes
PARTICIPATION STRUCTURES

- How did the Build It! task
  - support the participation of underparticipators?
  - redirect the participation of overparticipators?
MORE PARTICIPATION STRUCTURES

- Roles
- Group questions
- Middle space
- Partitioning
  - Information (clue cards)
  - Objects (names on cards, resources)
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.
COMPLEX INSTRUCTION 3-STEP PROGRAM

1. Diversify mathematics (content, practices, activities)
2. Structure participation
3. **Address status issues**
ADDRESS STATUS

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

- Point out **strengths** of underparticipators
- Point out the **assumptions** of overparticipators
MULTIPLE ABILITIES ORIENTATION

This task requires:
- Visual reasoning
- Creative thinking
- Logical reasoning
- Sharing information
- Moving between 3D and 2D
- 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.
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
BELIEFS BEHIND OVERPARTICIPATION

- Some students are naturally smarter than others.
- Many students are lazy and will social loaf if possible.
- Smart students…..
  - Get work done early
  - Are organized
  - Know how to lead a group
  - Should teach other students
- Students know how to work in groups.