INTERVENING ON PATTERNS OF INEQUITY AND UNDERACHIEVEMENT (IN MATH) BY LEARNING TO SEE AND BUILD ON STUDENTS’ RESOURCES

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All this talk about not focusing on children’s deficits—why does this matter so much? Isn’t our job to figure out what children don’t know and help them grow?

So—focusing on children’s strengths is crucial for effective and equitable instruction and for advancing social justice.

1. Learning occurs through a process of building on prior knowledge and experience.
2. Strong academic and mathematical identities are a means to developing competence. They are also instructional goals.
3. For children of historically marginalized groups, stereotype threat and other biases interfere with and impede children’s performance.
Okay, I see why this is important. But it isn’t easy. How do I learn to be more skillful at recognizing and using children’s strengths?
MY CHOICE OF VIDEO SEGMENTS FOR THIS SESSION

- Non-professional video ("home video quality")
- My own teaching, but why?
- Diverse classrooms: race, ethnicity, language, SES
- Complex mathematical work, elementary level
- Useful for the specific goals of this session: to learn to see and use students’ resources
STORY #1
CONNECTING WITH VIRSHAWN
THE MINICOMPUTER

- Abstract mathematical context for work on number relationships, mathematical structure, arithmetic properties (e.g., distributive property), even and odd numbers
- Also a setting for developing skills of mathematical argument and analysis, as well as proof
- Novel and complex mathematical environment for children

(Papy Minicomputer)
SEEING VIRSHAWN

Virshawn between 11:19 – 11:25

What do you see of Virshawn?

Paper airplane

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At 11:26, the teacher says, “You know what, Virshawn, I am going to need you to come up here closer where you can see and hear and won’t be distracted.”
Over the next minute, Virshawn is raising his hand to answer questions.
At 11:27, the teacher says, “Virshawn, you get to come up and make a number because you are the closest person to the board.” “You can have two checkers and you can put them wherever you want, and make a number, and then you can call on somebody.”
AT 11:28, VIRSHAWN TAKES THE ROLE OF THE TEACHER
VIRSHAWN, ONE WEEK LATER

THE TWO-CHECKER PROBLEM

What numbers are possible to make on the Minicomputer with exactly two positive checkers?
ADDING A NEGATIVE CHECKER!

The children found that 7, 11, 13, 14, and 15 were impossible with exactly two checkers.

EXTENSION:
Can you make 7, 11, 13, 14, and 15 if you have a negative checker?
You must use both positive checkers and you can use one negative checker if it is useful.
VIDEO: HOW DOES THIS DAY RELATE TO WHAT HAPPENED ONE WEEK EARLIER?

Then the purple is a four, the red is a two, and the white is a one, so you couldn't do it without a- without if- without another negative number.

I think the negative checker is awesome.
WHAT IS THE WORK OF SEEING AND BUILDING ON VIRSHAWN’S STRENGTHS IN THIS EXAMPLE?

- Trusting Virshawn to be mathematically engaged
- Making explicit positive mathematical roles that actively include and support children (e.g., “being the teacher”)
- Creating opportunities to “practice mathematics”
- Making available an opportunity to develop agency through “proving the impossible”
- Focusing on mathematics as a context for positive roles and identity
INTERMEDIA

HOW DO WE SHIFT OUR ORIENTATION TO MATH AND TO YOUNG PEOPLE, IN ORDER TO HELP THEM GROW?
WHAT IS INSTRUCTION?

Instruction is co-constructed

- ... in broad socio-political, historical, economic, cultural, community, family environments
- ... through the interpretations and interactions of teachers, students, and “content”

Cohen, Raudenbush, and Ball (2003)
WHAT IS THE WORK OF TEACHING?

Taking responsibility for deliberately maximizing the quality of these interactions . . .

- . . . in ways that maximize the probability that students learn
- . . . worthwhile content and skills
WHY “WORK” OF TEACHING”?

1. To focus our attention on what teachers DO and to distinguish this from other features of classrooms, such as instructional formats, classroom culture and norms, what students are doing, how the curriculum is designed.

But what about small group work, open-ended problems, “grit,” etc.? Aren’t those what teachers DO?
WHY “WORK” OF TEACHING”?

1. To focus our attention on what teachers DO and to distinguish this from other features of classrooms, such as instructional formats, classroom culture and norms, what students are doing, how the curriculum is designed

2. To honor the effortful and deliberate nature of teaching and not to leave it invisible, implicit, and taken for granted
SEEING STUDENTS’ RESOURCES—AND “ASSIGNING MATHEMATICAL COMPETENCE”

A set of practices that deliberately deploy the power of teaching to:

1. Broaden and label what being competent in mathematics means
2. Intervene to position who (and what) is seen as competent in math class
3. Support individual children to develop their mathematical and academic identities and competence

Sources: E. Cohen and R. Lotan, complex instruction; J. Boaler’s work; Smarter Together: Collaboration and Equity in the Elementary Mathematics Classroom (Featherstone, Crespo, et al., 2011)
WHAT DOES “ASSIGNING COMPETENCE” REQUIRE IN TEACHING?

1. Broaden and label what being competent in mathematics means
2. Intervene to position who (and what) is seen as competent in math class
3. Support individual children to develop their mathematical and academic identities and competence

1. Be able to see what is “mathematical” and what is “competent”
2. Have techniques for making these moves to intervene
3. Strategically using these techniques with particular students in authentic and well-timed ways
STORY #2
SEEING AND BUILDING ON ANIYAH’S AND TONI’S STRENGTHS

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A MATHEMATICAL TASK

What does this task demand of students?

What number does the orange arrow point to? Explain how you figured it out.

0 1 2
VIDEO: ANIYAH AND TONI

Teacher: Listen closely and see what you think about her reasoning and her answer.

This video and additional supporting materials are available online here.
What number does the orange arrow point to?

\[ \frac{1}{3} \]

Explain how you know: Because it's in 3 parts.
LAKEYA

What number does the orange arrow point to?

Explain how you know: because there are four equal parts and you're pointing to the second one so it's $\frac{2}{4}$. 
What number does the orange arrow point to? \( \frac{1}{2} \)

Explain how you know: Because if you look at it and count.
VIDEO: ANIYAH, TONI, LAKEYA, DANTE

Teacher: Listen closely and see what you think about her reasoning and her answer.

This video and additional supporting materials are available online here.
What does Aniyah know and what can she do? What does Toni know and what is she able to do?
WHAT DO MANY “HEAR” IN ANIYAH AND TONI?

ANIYAH

- She has the wrong answer: 1/7

TONI

- She is playing with her hair and trying to get attention
- She is trying to embarrass Aniyah
WHAT DO ANIYAH AND TONI KNOW AND WHAT CAN EACH DO?

ANIYAH

- Uses the definition for a fraction to explain
  - She identifies the “whole”
  - She makes sure the intervals are equal
  - She counts intervals and not tick marks
  - She knows how to write “one-seventh”

- Produces a mathematically well-structured explanation

- Presents her ideas clearly

TONI

- Listens closely to a classmate’s presentation

- Uses the definition for a fraction to ask
  - How Aniyah decided on 7 parts

- Asks a pointed mathematical question
USING TECHNIQUES AND STRATEGIES FOR ASSIGNING COMPETENCE

Identify the competence to be highlighted. Consider how to disrupt hierarchies of status in class by which child is to be “called out” as competent.

- Call out an individual child’s competent move or contribution publicly (“___ just shared a very important idea”)
- Ask a child to explain another child’s contribution that the teacher highlights
- Ask the class to identify things that were part of an important contribution by one of the children
- Write something publicly that a child or children came up with or contributed that is important
- Accord expertise to children through assigning roles explicitly in a group
NEXT STEPS:
SUPPORTING TEACHERS TO LEARN TO SEE AND BUILD ON STUDENTS RESOURCES AND INTERVENE ON INEQUITIES THROUGH THE PRACTICE OF ASSIGNING COMPETENCE
MAKING THE SHIFT FROM A PREOCCUPATION WITH DEFICITS TO A FOCUS ON STRENGTHS

- Seeing past “distractions” or non-mathematical issues
  - Behavior that distracts the teacher, but not the child or the other children (Noel, 2014)
  - How children talk (as they are learning; and when they are speaking academic language, or in English when that is not their first language)

- Pausing on “apparently incorrect” answers
  - Actually not incorrect
  - Answer to a different (and reasonable) question
  - More correct than incorrect
DILEMMAS OF LEARNING TO SEE AND HEAR STUDENTS’ RESOURCES

1. Feeling committed to students as sense-makers who bring many strengths and feeling pressure to make sure students get it “right”

2. Using yourself yet also suspending assumptions based on what you would mean or feel

3. Knowing mathematics well enough to see “mathematics” in children’s talk, representations, etc. while also not letting your own mathematical knowledge overtake your capacity to see and hear what they are saying or showing
WHAT IS INVOLVED FOR THE TEACHER IN SEEING AND BUILDING ON STUDENTS’ STRENGTHS?

- Listening carefully to what they say, reading attentively what they write
- Making deliberate choices about how to see and interpret students
- Both of these involve using what you know, but also suspending what you assume (knowing mathematics for teaching)
OPPORTUNITIES TO LEARN TO BUILD SKILLS IN SEEING, HEARING, AND BUILDING ON STUDENTS’ RESOURCES

- Examining challenging video clips with others
- Looking at students’ written work
- Doing the mathematics that children are doing
- Seeing children outside of school, in community settings: look not just for mathematical content but also practices
OUR NATION, AND OUR FUTURE

- There are 78,000,000 people under the age of 18 in our country.
- Almost 25% of the nation’s population.
- 50,000,000 are in schools.

How can we teach mathematics so that people stop hating and killing one another?

- Adapted from Maisha Winn, inspired by Ihab Hassan
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Graphic on slides 6, 7, 13, 14, and 15

Graphic on slides 18 and 19