THE POWER OF TEACHING IN GROWING THE NEXT GENERATION OF CHILEANS

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SCHOOL OF EDUCATION
UNIVERSITY OF MICHIGAN

TeachingWorks
UNIVERSITY of MICHIGAN
PREMISE:

Students must learn to understand, reason, analyze, and critique. They are capable of complex academic work.

Skillful teaching is necessary to disrupt inequity and for students to learn to do complex academic work.

This kind of teaching and learning are possible despite the pressures on schools and teachers.

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Teaching must be learned. It is not “natural.”
1. THE IMPERATIVE FOR STUDENTS’ LEARNING

- To be successful as adults, students must learn to understand, reason, analyze, and critique.
- All students are capable of complex academic work.
Grade 5 learners, U.S.
30 pupils
22 African American, 4 Latin@, 4 White
Low-income community
Most children have been unsuccessful in school mathematics
A MATHEMATICAL TASK

What does this task require of the children?

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

![Number Line](image)
LAKEYA

What number does the orange arrow point to?

Explain how you know: because there are equal parts and you are pointing at the second one so that is 2.

JAMARI

What number does the orange arrow point to?

Explain how you know: first I thought it was 5 because the zero messed me up.

MARIANA

What number does the orange arrow point to?

Explain how you know: How I know it is that there is an interval from 0 to 1, there was 2 line between 0 and 1.

LARRY

What number does the orange arrow point to?

Explain how you know: I count it by 1 and keep going 

Write a complete sentence with one goal for yourself for our math class today. Give an example of what it looks like to do this really well.

Learn more about the number line.
ANIYAH

What number does the orange arrow point to?  \[ \frac{1}{3} \]

Explain how you know: Because it is 3 parts.

TONI

What number does the orange arrow point to?  \[ \frac{1}{5} \]

Explain how you know: Because it is \( \frac{1}{5} \) of 2.
What do Aniyah and Toni know and what can each do?
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 does **Aniyah** know and what can she do?

What does **Toni** know and what is she able to do?
WHAT DO MANY PEOPLE THINK ABOUT 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
2. Skilled teaching is necessary for students to learn to do complex academic work

Let’s investigate.
HOW MIGHT THE TEACHER RESPOND TO EACH GIRL?

**ANIYAH**

1. “Remember that when we work with number lines, the whole is the interval from 0 to 1.”

2. Ask the class whether they disagree or agree with Aniyah.

3. Ask the class to ask questions of Aniyah and not agree/disagree.

**TONI**

1. “Toni, when you’re ready to participate appropriately by not playing with your hair and laughing, and have a question to ask, I will come back to you.”

2. “You need to be a better listener, Toni. Aniyah already explained why she picked one-seventh. Who else has a real question for Aniyah?”

3. Acknowledge publicly the importance of Toni’s question: ”That is a very good question.”
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ENCOURAGING EACH GIRL, AND ALSO ADVANCING THE CLASS’ MATHEMATICAL WORK

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ACKNOWLEDGE PUBLICLY THE IMPORTANCE OF TONI’S QUESTION: ”THAT IS A VERY GOOD QUESTION.”

THESE MOVES CAN DISRUPT PATTERNS OF INEQUITY.
ANIYAH
- Identified the “whole” as 0 to 1 on the number line

TONI
- Modeled at the board a complete explanation of how to understand and identify a fraction on the line

THE OTHER CHILDREN
- Developed a depth of understanding of fractions as numbers on the line and how to explain them
- Saw Black girls’ brilliance
3. TEACHING MUST BE LEARNED; IT IS NOT “NATURAL”

High-leverage practices of teaching
Knowing content for teaching
Seeing and actively disrupting inequity
Support for learning to improve teaching practice
TEACHING: INVISIBLE AND VISIBLE

INVISIBLE WORK
- Reading students’ work while circulating
- Selecting a specific student to present and to position as competent
- Trusting the children to think, be engaged, try to learn
- Caring for students
- Making choices about how to interpret students’ behavior and answers

VISIBLE WORK
- Supporting Aniyah to present
- Encouraging Toni to ask her question
- Focusing on concepts and reasoning
- Expecting students to listen to one another
- Naming asking “good questions” as an important mathematical practice
- Highlighting particular children displaying specific forms of competence
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- Highlighting particular children displaying specific forms of competence
- Eliciting and interpreting students’ thinking
- Modeling and explaining content
- Leading group discussions
- Establishing norms and routines for classroom discourse and work
- Building respectful relationships with and among students

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HIGH-LEVERAGE PRACTICES

- Explaining and modeling content
- Leading a discussion
- Eliciting and interpreting students’ thinking
- Establishing norms and routines
- Building caring and respectful relationships with students
- Selecting tasks and materials
- Assessing students' understanding
- Providing oral and written feedback
- Working collaboratively with families

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How many different three-digit numbers can you make using the digits 4, 5, and 6, and using each digit exactly once?

Show all the three-digit numbers you found.

How do you know you found them all?
How many different three-digit numbers can you make using the digits 4, 5, and 6, and using each digit exactly once?
Show all the three-digit numbers you found.
How do you know you found them all?

The exact wording of the problem
The staging of what students are asked to do
Broad access, high “ceiling”
Using the task interactively in class
VIEWING FOCUS

1. What are the students learning? What is complex about this? Why is it important?
2. What is the work of teaching to help the students learn this?
VIDEO: FINDING THREE-DIGIT NUMBERS

Teacher: But what digits were you using?
VIEWING FOCUS

STUDENTS’ LEARNING

- To analyze what a problem is asking
- To interpret a mathematics problem by identifying the “conditions”
- To listen to and use others’ ideas

WORK OF TEACHING

- Choosing a problem for a particular goal
- Using a repertoire of moves to lead the discussion
  - ”What is a wrong answer?”
  - Supporting students to explain
- Engaging all the students
- Strategically positioning students as competent
THE POWER OF TEACHING IN DEVELOPING YOUNG PEOPLE

- Teaching is complex work that requires a special blend of knowledge and skill.
- Teaching involves knowing, reasoning, and skill.
- It is a risky strategy for a country to rely on individual creativity, experience on the job, or “born” talent.
4. THIS KIND OF TEACHING AND LEARNING ARE POSSIBLE DESPITE THE PRESSURES ON SCHOOLS AND TEACHERS

- Learning to understand, reason, analyze, and critique include basic skills, but are more than that.

Examples:

- Fractions: learned to identify fractions correctly, but also to make mathematical arguments, analyze, and understand concepts
- Permutations: learned to find the permutation, but also to identify conditions, prove all cases, and reason
PREMISE:
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This kind of teaching and learning are possible despite the pressures on schools and teachers.

Skillful teaching is necessary to disrupt inequity and for students to learn to do complex academic work.

Teaching must be learned. It is not “natural.”
THE POWER OF TEACHING IN GROWING THE NEXT GENERATION OF CHILEANS
Teaching is powerful.
Teaching can change lives.
Teaching can change the world.
THANK YOU!

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Slides will be available on my website (deborahloewenbergball.com)
Google Deborah Ball
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