Modeling Assessment to Enhance Teaching and Learning

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Project Overview

Construct-centered assessments

Construct-centered assessments can inform efforts to support learning across grades K-5. This project aims to create and test a novel assessment system designed to address two coordinated purposes:

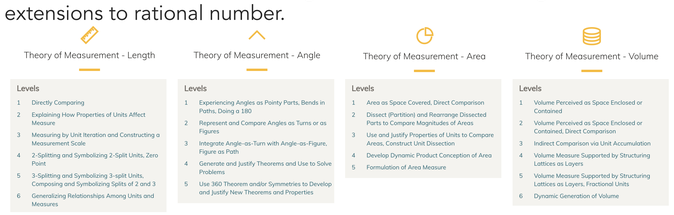
(1) to provide ongoing, instructionally productive evidence to teachers about student learning; and

(2) to link dense information from student work products, classroom conversations, and formative assessments with summative assessments in new models that generate robust estimates of the growth of student learning.

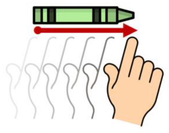
K-5 mathematics based on measuring space

For the past 5 years, we collaborated with K-5 teachers in two elementary schools to develop a learning progression that fosters student thinking about spatial measurement.

This includes the measure of length, area, volume and angle with extensions to rational number.



To support development, our instructional support consistently invoked two embodied metaphors:



continuous motion

discrete motion

Conceptual Tools and Activity Structures

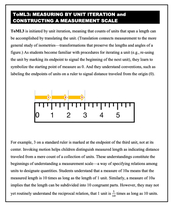
Professional Learning Community

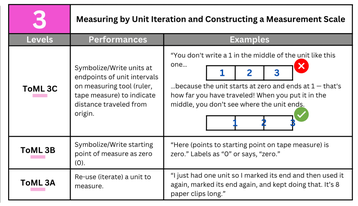
Learning labs:

Plan → **Teach** → **Debrief**

Constructs & Lessons

Curriculum materials include **constructs** that articulate a lexicon of development (in narrative and tabular forms), and **lessons** that reify instructional support.

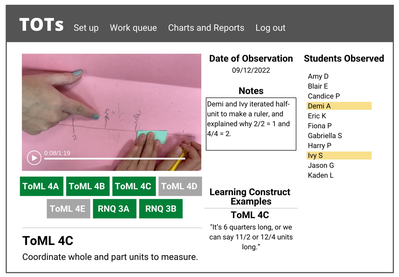




3	Measuring by Unit Iteration and Constructing a Measurement Scale	
Levels	Performances	Examples
ToML 3C	Symbolize/Write units at endpoints of unit intervals on measuring tool (ruler, tape measure) to indicate distance traveled from origin.	"You don't write a 1 in the middle of the unit like this one... ...because the unit starts at zero and ends at 1 — that's how far you have traveled! When you put it in the middle, you don't see where the unit ends."
ToML 3B	Symbolize/Write starting point of measure as zero (0).	"Here (points to starting point on tape measure) is zero." Labels as "0" or says, "zero."
ToML 3A	Re-use (iterate) a unit to measure.	"I just had one unit so I marked its end and then used it again, marked its end again, and kept doing that. It's 8 paper clips long."

Blended assessments

In situ observations: As a lesson unfolds, teachers observe student thinking and create records of thinking trails on handheld tablets. Video, audio, photo, and notes support assignment of one or more students to a particular sublevel of a construct.



Formative assessments: The lessons include FA items and guides for follow-up classroom conversations.

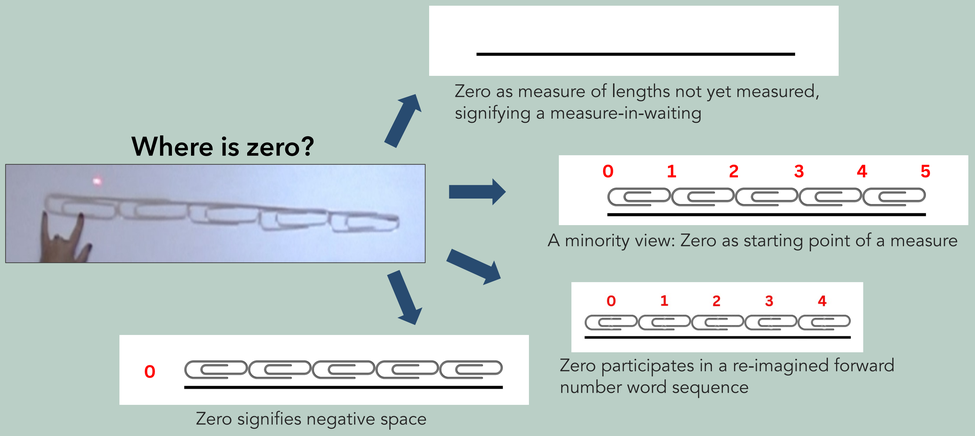
Summative assessments: Items are designed to be consistent with performances described by the measurement constructs.

Constructs Mediate Classroom Dialogue: Penumbra of Possibilities

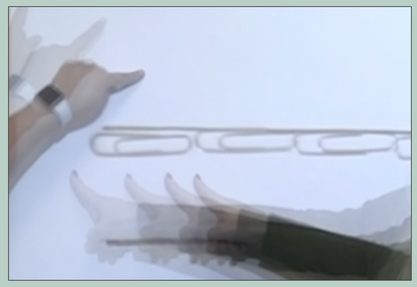
Where is zero on this line?

The teacher had measured a line segment drawn on a paper with 5 paper clips. The class was considering how to label the measure on the line.

As the classroom conversation continued, other observing teachers "paused" the conversation to clarify where zero should be.



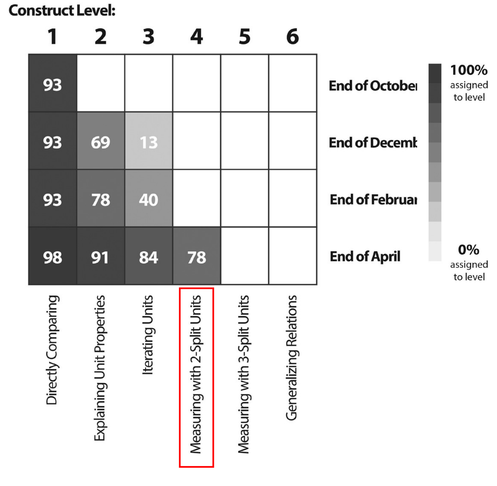
As the classroom conversation continued, other observing teachers "paused" the conversation to clarify where whole-units label should be placed, by invoking the continuous motion metaphor. One teacher asked students to yell out stop when she had traveled one whole unit. She asked another teacher to place her finger to mark where students said stop.



Linking Across Multiple Forms of Construct-centered Assessments

Change: A classroom view

This heat map shows observations aggregated across all students in several first-grade classrooms. The visualization was directed to a teacher question about whether 2-split unit iteration could be made accessible to most of their children.

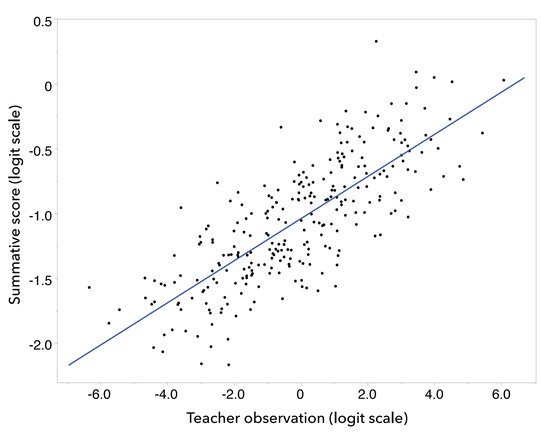


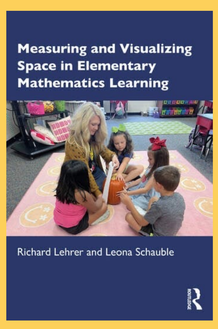
Teachers' changing view:

I just remember I used to think, "There is no way my first-graders are going to be able to do that." I mean, I knew they could probably do one half, but thinking about them, understanding the idea of seven halves, I just really thought that was probably way beyond them. And then now, it's not. It's really realistic. I feel like, in the past several years, two splits have been just part of the regular measurement. The two splits have become a big idea.

Change: A blended view

The graph below shows the correlation between classroom-generated and summative evidence of learning. The correlation between the two is 0.79.





Learn More:

Free online resources include instructional guides, examples of student thinking, and other teacher-focused materials, helping clarify how to bring concepts of measure and rational number to life in classrooms.

https://bit.ly/MeasuringBook

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