

NEWSLETTER

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Measurement: The Unit Gives the Number Its Meaning

DMT Insight 18 · Why Measurement Matters: How the Unit Gives a Number Its Meaning

In today's edition, we explore:

- Why two correct measurements of the same object can be different
- How the unit gives the number meaning
- Three instructional moves to build understanding before procedure

Educators!

A student measures a book with paper clips and gets 9. A classmate measures the same book with craft sticks and gets 3. When asked whose measurement is correct, the first student says hers because 9 is more. Both counts are correct. The important question is what each number counts and how the unit size changes the count.

In measurement, a number counts units of something. To measure, a student identifies the attribute, chooses a unit, iterates it with no gaps or overlaps, and counts how many units compose the quantity. The same structure returns in the number line, fractions, and place value. Young children who can state that larger units give smaller counts often do not use that relationship when they compare two measurements (Carpenter & Lewis, 1976).

Classroom Tips

1. **Compare before you count.** Have students compare two lengths directly, then with a string, before any number appears. Ask, "Which is longer, and how do you know?" The attribute comes first.
2. **Change the unit on purpose.** Measure the same object with two units of different sizes and put both counts side by side. Ask, "Why did the larger unit give a smaller number?"
3. **Count the intervals on the ruler.** Place an object so that it starts at 2 rather than at 0. Ask students to count the units between the two ends, and connect each interval to one unit on the number line.

Why This Matters

The unit-and-count structure students build in measurement is the same structure they use on the number line, with fractions, and in place value.

What Does the Research Say?

Students often read a ruler as a row of numerals rather than as equal units counted from 0. Kindergarten and second-grade children measured accurately when an object started at 0 and performed at chance when it was shifted, even though they succeeded when they could count separate units (Solomon et al., 2015).

Children reason about length more successfully with a ruler than with a piece of string (Nunes, Light, & Mason, 1993). The important instructional work is helping students understand what the ruler represents. Second- and third-graders who practiced locating fractions on a number line, a measurement model, improved on fraction comparisons they had not practiced (Hamdan & Gunderson, 2017).

Keep developing mathematical thinkers!

More Information

For the full research overview and the accompanying video, visit the DMT Insights page at mathsuccess.io/dmtinsights, where the Insight, the Companion for teachers and coaches, and this Newsletter are together in one place.

Have a classroom story, tip, or question to share? Email us at contact@dmtinstitute.com to contribute a teaching tip or a story for a future issue.

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