NEWSLETTER

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WHEN NAMING THE PLACE ISN'T KNOWING THE NUMBER

In today's edition, we explore:

- **The Classroom Reality:** Why a student can label the tens place and still not know that the 7 in 472 stands for 70 — and why naming places is not the same as reasoning about quantities
- **The Structure:** Why units and magnitude, not place names, are what predict later achievement — and what the research on number-line reasoning actually shows
- **The Instructional Shift:** How to assess and teach for reasoning about units and magnitude, and the three habits that quietly keep place value procedural

Educators

A student points to the 7 in 472 and says, correctly, that it is in the tens place. Asked how many tens are in 470, she pauses, then counts up by ones. She can name the place. She does not know it means 47 tens.

Another student is asked which is greater, 509 or 590. He says 590, "because the 9 is bigger." Asked to place 472 on a line from 0 to 1,000, he spaces his points evenly, with no sense of where the number actually falls. He is reading digits, not magnitude.

A third student multiplies by ten by "adding a zero," and it works — until decimals arrive, 0.5 becomes 0.50, and the rule quietly fails. Asked to show 304 a second way, she can only give the standard one. The procedure is intact; the understanding underneath it is not.

These three students share something important: each can produce the right surface behavior — the place name, the bigger digit, the "add a zero" rule — but none is reasoning about the two ideas that make place value work: how the number is built from units, and how big it is. **Naming a place is not the same as understanding it.**

Our latest **DMT Insight — Place Value: The Understandings That Predict Later Math Success** — explains why place value is one of the earliest and strongest predictors of later mathematics achievement, which understandings matter most, and how to assess them before the gap widens.

The Classroom Reality: When Place Value Stays at the Surface

In many classrooms, place value is taught as vocabulary — the names of the columns — rather than as a way of reasoning about quantity:

- Students learn to label the ones, tens, and hundreds place, so they can answer "what place is the 7 in?" without ever saying what the 7 is worth
- Worksheets ask for the digit in a place, not how many tens or hundreds are in the whole number, so unitizing never has to happen
- Comparison is taught as "line them up and look at the first digit," so students compare symbols instead of reasoning about magnitude
- Multiplying and dividing by ten becomes "add a zero" or "move the decimal," a rule that survives whole numbers and collapses at decimals

So students develop the logic their instruction has taught them:

- "If I can name the place, I understand the number."
- "The longer number, or the one with the bigger first digit, is the bigger number."
- "To multiply by ten, add a zero."

The answers look right — even when the reasoning underneath them is missing.

The Structure: Why Units and Magnitude Predict

Research from cognitive psychology and mathematics education points to a consistent finding: the understandings that predict later achievement are not the place names, but units and magnitude.

Units are the foundation everything else is built on. Place value rests on unitizing — treating ten ones as one ten, and 340 as 34 tens — while still knowing what is inside each unit (Fuson, 1990). Multi-digit operations, fractions, and decimals all depend on it. A student who sees 340 as 34 tens can divide it by ten at a glance; one who only names the tens place cannot.

Magnitude is one of the most durable predictors. Where students place numbers on a line uniquely predicts later mathematics achievement, even after controlling for intelligence and working memory (Geary, 2011). Across a meta-analysis of more than 10,000 students, number-line estimation tracks broader mathematical competence and grows stronger as students move into fractions (Schneider et al., 2018).

The places are multiplicative. Each place is worth ten times the one to its right and a tenth of the one to its left. That relationship, not the rule "add a zero," is what carries place value into decimals and the proportional reasoning that follows.

Connected understanding transfers; isolated rules do not. When students understand place value relationally — seeing how units, magnitude, and the multiplicative structure connect — they can reason about unfamiliar numbers and notice when an answer is unreasonable (Hiebert & Carpenter, 1992; Skemp, 1976). Students who memorized each rule separately start over every time the numbers change.

The pattern is consistent: when place value is built on units and magnitude rather than labels, students do not just name the columns. They reason about quantity, and that reasoning holds — from whole numbers to decimals to early algebra.

The Instructional Shift: Teach and Assess for Reasoning

The DMT Insight proposes a simple shift: assess and teach for reasoning, not recall. The same question becomes diagnostic the moment you ask the student to explain how they know. A few deliberate moves:

- **Ask "how many tens," not "what is in the tens place."** "How many tens are in 340?" forces unitizing; "what is in the tens place?" only asks for a label.
- **Build magnitude on a number line.** Have students locate numbers, not just label the endpoints. Mark the benchmarks first, then ask which one the number is closest to and why.
- **Never say "add a zero."** Ask "how many times greater?" and "how much smaller?", and use a place-value chart with ×10 and ÷10 arrows that extend past the ones place into tenths and hundredths.
- **Read the equals sign as "is the same as."** Use bar models to show one quantity renamed two ways — 304 as 3 hundreds and 4 ones, or as 30 tens and 4 ones — so equivalence and regrouping make sense.

When teachers ask, at every grade level, "Does this student understand what the digits are worth and how big the number is, or only what the places are called?" the difference between a label and an understanding comes into focus.

Small questions create large shifts:

- "How many tens are in 340? How do you know?"
- "Which is greater, 509 or 590, and how do you know?"
- "Show me 304 a second way."

These questions move students from naming the places to reasoning about the quantities they represent.

Your Turn to Share

We would love to hear from you. **What is one moment when a student's reasoning about units or magnitude revealed an understanding — or a gap — that a correct answer alone would have hidden?**

Share your thoughts at **contact@dmtinstitute.com**. We will compile and elevate your insights to help advocate for

stronger teacher support across districts.

Keep inspiring mathematical minds!

MORE INFORMATION

This newsletter is just a preview—there is much more to explore. For the complete **research overview**, visit the **DMT Insights** page at **dmtinstitute.com/research**.

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