Math Success by DMTI

NEWSLETTER

Math Success with DMTI

BUILDING STRONG THINKERS: MOVING FROM ADDING TO SCALING!

DMT Insight 52: Scaling and Comparing

In today's edition, we explore:

- Why adding more is not the same as scaling up
- Key ideas: the factor, the ratio, scaling, and the additive bias
- Classroom strategies that build scaling with visual models
- Insights from research

Educators!

This week we look at scaling and comparing, which are among the strongest signals of where a grade 3 to 6 student stands in mathematics. When students enlarge a shape, double a recipe, or extend a ratio, the question is whether they add the same amount to each quantity or scale both by the same factor. Adding more is not the same as scaling up, and the difference shapes what follows, from fractions and percent to slope and algebra.

When students learn to track the factor that links two quantities, how many times as much one is as another, rather than the difference between them, they can tell whether an answer is reasonable and whether two ratios are equivalent without a rule. Reading a multiplicative situation as an additive one is a common and fragile habit. Naming it, the additive bias, and teaching past it is the central shift these grades ask for.

CLASSROOM TIPS

1. Put the visual model before the symbol: Build scaling on bar models, double number lines, and ratio tables before the equation. Show a recipe that calls for 3 cups of flour per 2 batches on a double number line first, then record the same relationship in a ratio table. Students meet the picture before the notation.

2. Ask how many times as much, not how many more: When students compare two quantities, ask how many times as much one is as another. This shifts attention to the factor rather than the difference, and it is the language that carries over into fractions, percentages, and slope.

3. Show that scaling keeps the shape: Enlarge a 4-by-6 rectangle to 6-by-9, and it keeps its shape; add 2 to each side, and it changes shape. Drawing figures and recipes as they grow and shrink shows students what stays the same and what does not.

A TEACHER'S PERSPECTIVE

"Once my students started asking how many times as much instead of how many more, their reasoning changed. They stopped adding when the problem called for scaling, and they could explain why a recipe or a drawing kept its shape. The double number line gave them something to point to."

– Grade 5 Teacher

By making scaling visible and giving students the language of the factor, you equip them with reasoning that holds across whole numbers, fractions, decimals, and early algebra.

WHAT DOES THE RESEARCH SAY?

Research in cognitive psychology and mathematics education points to a consistent finding: later success depends less on a faster procedure than on the ability to see and operate on the factor that links two quantities. Lobato and Ellis (2010) show that treating the factor rather than the difference separates students who are ready for fractions, percent, and slope from those who meet the same problems again and again. Where students place numbers on a number line is one of the most durable predictors of later achievement, and the relationship strengthens as students move into fractions (Schneider et al., 2018). Used as a scaling model rather than a counting strip, the number line, the ratio table, and the double number line keep the relationship in view, while reading a ratio as two separate numbers loses it (Brendefur, 2015).

Keep developing mathematical thinkers!

MORE INFORMATION

This is a quick overview of this topic. To download and read the full research overview or watch the video, go to Research Overviews at dmtinstitute.com/research.

To access the Math Learning Profile (MLP), Targeted Activities, and more, visit **mathsuccess.io**.

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