

DMT COMPANION

Insight 13 · 2025 · for teachers, coaches, principals, and families



DMTI AND HATTIE: CONNECTING RESEARCH TO MATHEMATICS INSTRUCTION

How to Use This

This Companion is for anyone working with DMT Insight 13. Start with the three questions that follow. Answer them before you read the Insight or watch the video, then come back and answer them again. Coaches can open a team meeting with the same three questions, and use the worked examples to keep the conversation close to the classroom.

Key Idea • Answer the three questions first, then read. The gap between your two answers is the point of the Companion.

Three Guiding Questions

Answer these before you read the Insight or watch the video, then again afterward.

1. When you post a learning intention, can you name the relationship students are developing?
2. Does your next question evaluate the student's answer or uncover the reasoning?
3. When students share two strategies, can they identify the relationship the strategies share?

Before and After: The Shift This Insight Asks For

The shift is from naming a research finding to making it specific in the mathematics. Feedback is one example. In the before, the teacher corrects where the student placed one-fourth. In the after, the teacher asks what the 4 tells us about the unit, and the student finds that four marks made only three intervals.

BEFORE • the answer is evaluated



The student makes four marks and labels the second one.

“Not quite. One-fourth goes here.”

The answer is corrected. The reasoning is not visible.

AFTER • the question uncovers the reasoning

“What does the 4 tell us about the unit?”

“Four equal intervals. My four marks made only three.”



The unit from 0 to 1 is partitioned into 4 equal intervals.

The question makes the reasoning visible.

Before: feedback that evaluates the answer. After: feedback that makes the reasoning visible.

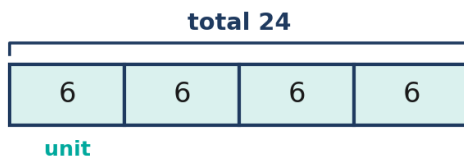
Teacher clarity (effect size 0.75), feedback (0.70), and metacognitive strategies (0.60) appear in John Hattie’s Visible Learning research (Hattie, 2017). DMTI’s framework was developed independently, and the two connect in several places. Naming a factor does not tell a teacher what to do with it. The mathematics and the student’s thinking make it specific.

Key Idea • Feedback should move the mathematics forward, not simply evaluate the answer.

Worked Examples: The Model and the Words to Use

Example 1 • make the mathematics clear

Four sixes: the unit, the iterations, and the total



4 iterations of the unit 6

iterations	1	2	4
total	6	12	24

$$4 \times 6 = 24$$

Four sixes. The unit is 6; it is iterated 4 times, and the iterations compose a total of 24. The same relationship appears in each representation.

The language to use:

“What is the unit? Where do you see it in the bar model?”

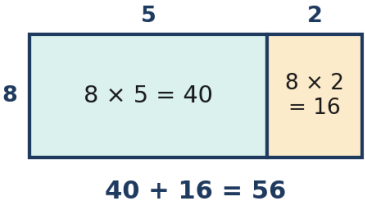
“How many times is the unit iterated? Where is that in the ratio table?”

“What total do the iterations compose? Where is it in the equation?”

Example 2 · ask students to explain and compare.

Eight sevens: two strategies, one relationship

Strategy A · decompose the unit 7 into 5 and 2



Strategy B · double the iterations

iterations	1	2	4	8
total	7	14	28	56

$8 \times 7 = 56$

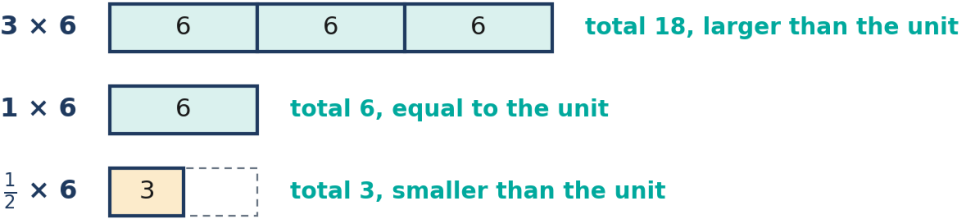
Two strategies for eight sevens. One decomposes the unit 7 into 5 and 2. The other doubles the number of iterations.

The language to use:

- “Explain your strategy. Where is the unit 7 in your model?”
- “Compare the two strategies. What did each one decompose or double?”
- “What relationship do the two strategies share? When would you choose each one?”

Example 3 · use a misconception to reorganize thinking.

The unit 6, iterated 3 times, 1 time, and one-half of a time



“Multiplication makes larger” works when the iterator is greater than 1.

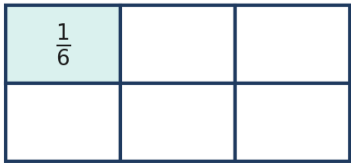
The idea that multiplication makes quantities larger works when the iterator is greater than 1. It no longer fits when the iterator is less than 1.

The language to use:

- “Where does your idea work? Show me an example.”
- “What changed in this problem? Is the iterator more than 1 or less than 1?”
- “How would you say your idea now, so it fits all three problems?”

Example 4 · give students something mathematical to reason about

One cake, partitioned into 6 equal shares



2 rows of 3 equal shares



6 equal shares in 1 row

The shares look different. Each is one-sixth of the cake.

Students partition one cake among 6 people before introducing a procedure for fractions.

The language to use:

“How could you partition the cake so each person gets an equal share?”

“How do you know the shares are equal?”

“What do we call one share? What does the 6 tell us about the cake?”

Key Idea • One model per example, and the words to say alongside it. The procedure records the mathematics; it does not create it.

The Language Shift

Keep this by the board. The right column makes the mathematics specific.

Instead of	Say
Today we are learning multiplication.	What is the unit? How many iterations? What total?
Not quite. Here is the answer.	What does this number represent in your model?
Reflect on your thinking.	Explain your strategy and compare it with another.
Show it another way.	What relationship do the two strategies share?
Multiplication makes numbers larger.	Where does that idea work? What changed in this problem?
This student is below benchmark.	What does this student understand? What comes next?

What to look for in a classroom:

- Learning intentions that name a mathematical relationship, not only a topic.
- Teacher questions that follow a student’s answer, whether it is correct or not.
- Students connecting a strategy to a model and to a second strategy.
- Teachers discussing student thinking and evidence of learning together.

Key Idea • Teachers develop shared ways of looking at mathematics, student thinking, and evidence of learning.

Across the Grades

The five DMTI practices are the same in every grade. The mathematics they are applied to changes.

Grade band	Example	Model	The shift it asks for
Grades K-2	Counting a collection, representing the quantity, and connecting it to a numeral	Counters, drawings, number line	From an answer to a quantity students can represent
Grades 3-5	Four sixes as iterations of a unit, and one-fourth as 1 of 4 equal intervals of the unit	Bar model, ratio table, number line	From a procedure to the unit, the iterations, and the total
Grades 6-8	Multiplying by a number less than 1, and comparing two strategies for a ratio problem	Bar model, ratio table, double number line	From an idea that fits whole numbers to a reorganized idea

Key Idea • Research can tell us where to look. The mathematics and the student's thinking help determine what to do next.

Where to Go Next

Read DMT Insight 13, DMTI and Hattie: Connecting Research to Mathematics Instruction, and watch the short video. Find both at mathsuccess.io/dmtinsights, along with the rest of the DMT Insights series. DMTI's Math Learning Profiles (MLPs) show what a student understands across specific areas of mathematical reasoning.

Try this every day for a week. When a student gives a correct answer, ask one more question: "How do you know?" or "Where do you see that in your model?" The answer tells you whether the student is correct. The explanation tells you more about what the student understands.