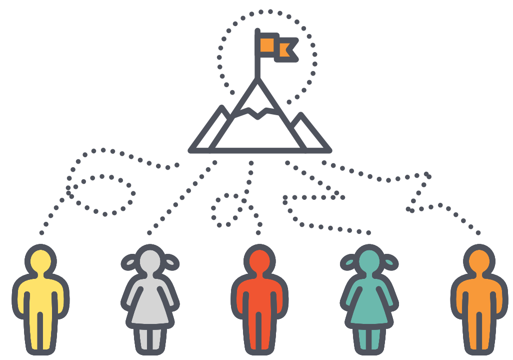


A Level Playing Field

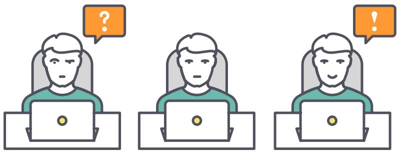
How visual-first math instruction helps students with disabilities engage, persist, and achieve

MIND EDUCATION®

Contents

PART 1

The Pattern We Have Learned to Accept



In many math classrooms, the same students show up with very different levels of effort depending on how math is presented.

They disengage quickly during explanation. They stall when steps are introduced. They appear hesitant, uncertain, or dependent on support.

And yet, in other moments - when problems are presented visually, when students can act, test, and adjust - those same learners persist. They try again. They stay with the challenge. They work far longer than expected.

This pattern is so common that we rarely stop to question it. We explain it instead.

We attribute it to readiness. To confidence. To disability. To motivation.

Over time, those explanations harden into expectations, and expectations quietly shape the level of mathematics we offer.

> "During a kindergarten puzzle talk, a student receiving special ed services was struggling to show their thinking through drawing and needed a different way to engage. Using a game mat and manipulatives, they were **immediately able to model the correct solution quickly and correctly.**"
>
> *—Janna Mcintyre, Professional Learning Specialist, MIND Education*

PART 2

When Support Becomes Reduction

Most educators do not set out to lower expectations for students with disabilities. The impulse is the opposite: **to help, to protect, to remove obstacles.**

But in math, "support" often takes a specific form:

- Tasks are shortened.
- Steps are simplified.
- Reasoning is postponed or removed altogether.

Not because students are not capable, but because the instructional environment makes engagement fragile. When effort drops, the response is to reduce demand.

This cycle is understandable—and consequential.

Because when access to thinking depends on language-heavy explanation and sustained working memory before understanding exists, the students who face the steepest barriers are the least likely to show what they can do.

PART 3

How Learning Actually Begins

Human learning does not begin with symbols or formal language. It begins with perception, action, and feedback.

Long before we can explain an idea, we can see relationships, notice change, anticipate outcomes, and adjust based on what happens next.

Cognitive science describes this as **spatial-temporal reasoning:** the brain's ability to make sense of space, movement, and change over time.

Most people recognize it intuitively. It is how children learn to move through the world. It is how we solve unfamiliar problems. And it exists in every brain.

What matters here is not the term itself, but what it explains: **understanding can form without placing heavy demands on language and working memory.** The brain has something to work with before abstraction arrives.

When instruction aligns with this natural learning process, effort is invited rather than required.

PART 4

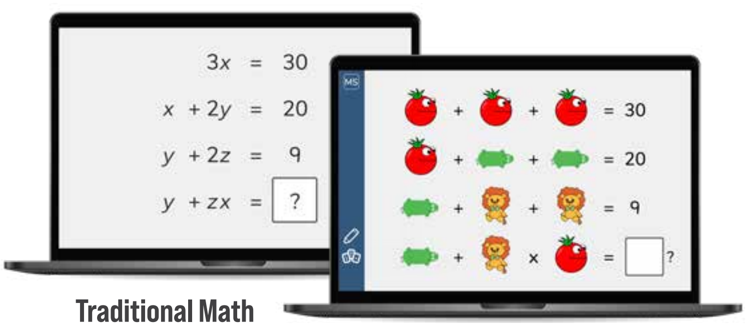
When Instruction Works Against Learning

Much of math instruction asks students to operate in the opposite direction.

- Symbols are introduced first.
- Procedures are explained before meaning exists.
- Multiple steps must be held in mind while the learner is still trying to understand the problem.

For students with working-memory constraints, processing differences, or language-related disabilities, this is not just challenging - it is exclusionary. **Not intentionally, but structurally.**

The result looks like disengagement. The explanation becomes ability. And the response becomes reduction.



Traditional Math

VS Math Using Spatial-Temporal Visual Learning

PART 5

The Question Worth Asking

What if the problem we have been trying to solve is not effort, **but access?**

What if the reason some students persist and others withdraw has less to do with motivation or disability, and more to do with whether instruction gives them a way into the thinking in the first place?

These are the questions that demand closer examination - and where the data begins to frame a different story about access, effort, and learning.

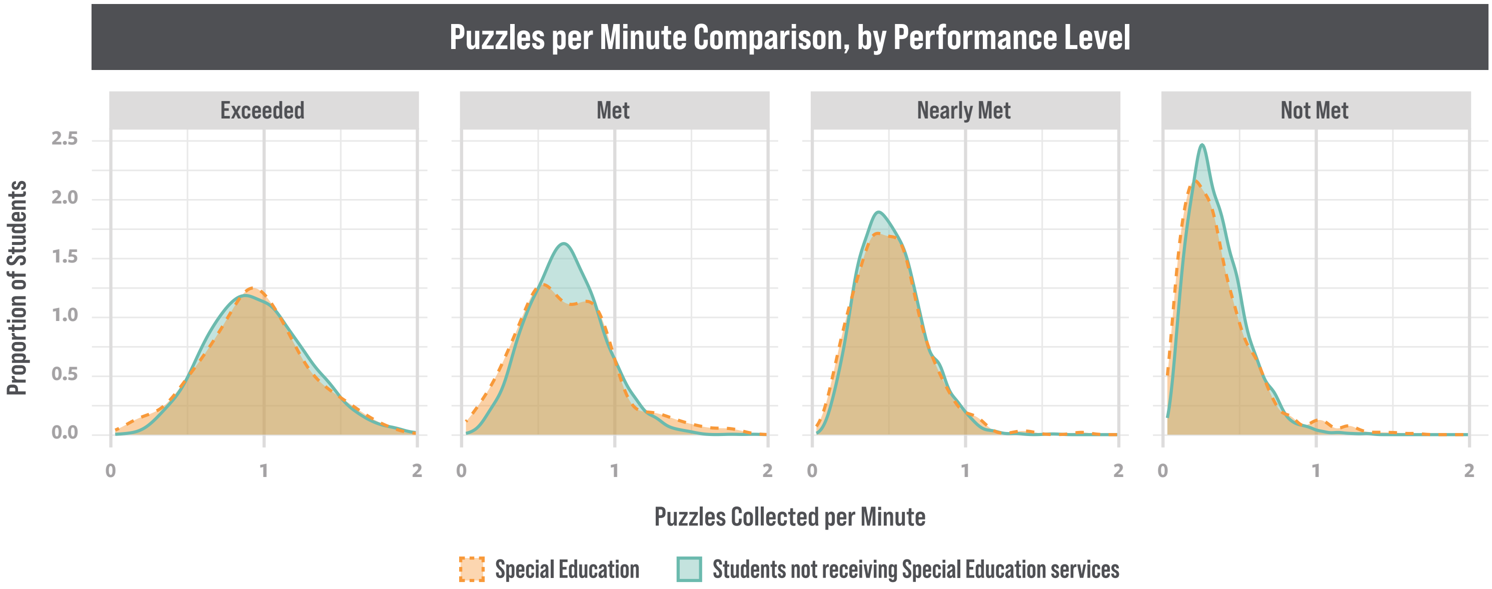
PART 6

Where the Data Leads

If differences in engagement and persistence are driven by instructional access rather than student ability, we should see consistent patterns when access changes - across students, settings, and contexts.

That is exactly what the data shows.

Across large-scale analyses, when students with disabilities receive sufficient opportunity in visual-first learning environments, their **engagement and learning-response patterns overlap with those of peers in ways that are rarely seen in math.**



PART 7

What the Data Measures

To avoid vague claims, these analyses look at observable learning behaviors and outcomes, including:

- Engagement intensity (for example, attempts per hour).
- Persistence through challenge (how students respond to feedback and try again).
- Progress through increasingly complex content (movement through difficulty levels).
- Achievement movement on state assessments when usage is sufficient.

PART 8

What Engagement Actually Looks Like

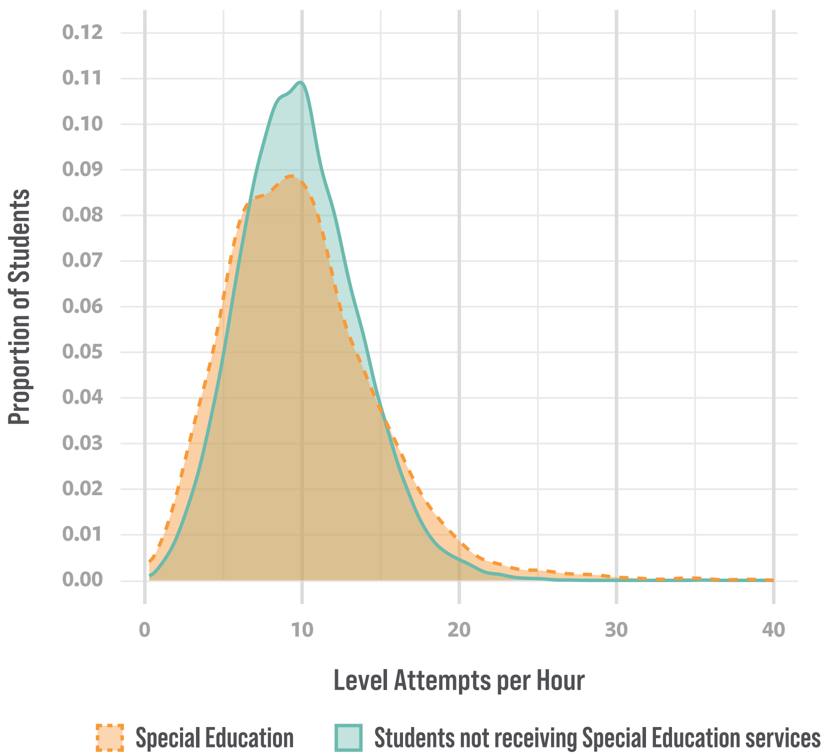
One of the most telling indicators is how students spend their time.

In recent Texas analyses, the distribution of attempts-per-hour for students receiving special education services overlaps closely with general education peers when matched for opportunity and usage.

There is no evidence of a disengaged special education subpopulation waiting to be explained away - no sharp drop-off that suggests an inherent ceiling.

In these environments, engagement is not fragile. It is responsive.

Student Engagement Distribution Comparison



> **"We don't have to set anything up. The program meets students where they are. It takes the lift off of teachers, it takes the stress off the student, and it puts us in a position to analyze whether the student understands conceptually or not. It's a key part of understanding how the student learns."**
>
> *—Dr. Megan McNamara, Superintendent, Redesign Schools Louisiana*

PART 9

Progress is Driven by Opportunity, Not Label

When learning outcomes are examined alongside engagement, the same principle holds.

In Texas Spring 2025 analyses, students with disabilities who received sufficient ST Math usage showed meaningful achievement movement compared to matched comparison groups.

When students had real access, they moved up.

+15.21 points

Net Performance-level Movement

Students with disabilities who received sufficient ST Math usage were significantly more likely to move up one or more performance levels compared to matched peers.

Students furthest behind made the biggest gains.

0.86

Very Large Effect Size

Among middle school students who began in Did Not Meet, movement out of the lowest performance category showed a very large, statistically meaningful advantage compared to matched peers—strong by education research standards.

The most important finding isn't simply that students improved—it's that once access was in place, **disability status no longer predicted effort or progress. Opportunity did.**

PART 10

Why This Evidence is Hard to Ignore

Data related to students with disabilities should be interpreted carefully. Context matters. Supports vary. Comparisons can mislead.

What distinguishes these findings is not only the outcomes, but the learning design. The gains are not driven by pull-out instruction, alternate content, reduced expectations, or one-to-one adult mediation.

They occur in shared learning environments, where students engage with core ideas through **a design that preserves access to thinking.**

When engagement and progress converge across students, the most reasonable conclusion is not that ability has changed, but that the conditions for learning have.

> **"Our use of ST Math is removing barriers for students across our district."**
>
> *—Amy Burke, Math Coordinator, San Mateo, California*

PART 11

What This Explains About Students with Disabilities

Educators have observed for years that some learners are capable of deep thinking, yet are shut out by the way math is typically delivered.

These findings suggest a more precise explanation: **students with disabilities are not uniquely disengaged. They are uniquely impacted by instructional barriers.**

When instruction leans heavily on language-first explanation, multi-step verbal directions, early symbolic abstraction, and sustained working-memory load, barriers rise.

When those demands are reduced - not by lowering rigor, but by changing how ideas are presented - students can engage the same core cognitive capacities every learner uses to make sense of the world.

That capacity exists in every brain.

PART 12

Designing for Access at Scale

This is where MIND is uniquely positioned.

MIND Research Institute, the research arm of MIND Education, has spent decades studying how humans learn mathematics and translating those findings into instructional design. Our patented learning architecture is built around a simple principle: students learn by seeing, trying, and receiving feedback in a way that keeps thinking possible.

One example of this approach in practice is ST Math - a visual, game-based math learning environment designed to give students access to mathematical thinking before formal explanation.

In ST Math:

- Concepts are introduced visually through puzzles that require sense-making.
- Students act on ideas and receive immediate, informative feedback.
- Productive struggle is supported through iteration, not penalty.
- Language and symbols are layered after understanding begins, not before.

This is not accommodation layered onto traditional instruction. **It is instruction designed for access from the start.**

PART 13

What This Changes for Schools and Districts

When instructional access is designed into math learning, the implications are practical as well as pedagogical.

For students with disabilities, it means a genuine opportunity to engage with grade-level mathematics - a chance to persist, reason, and progress alongside peers in an environment where effort leads somewhere visible.

For educators, it means less dependence on constant explanation and fewer fragile workarounds. Instructional clarity lives inside the learning experience, so teachers can spend more time observing, thinking, and responding to students.

For districts, it means a scalable approach that supports inclusive practice without separating students to support them - and evidence that engagement and progress can coexist.

> **"ST Math gives my child a way to build math understanding through visual puzzles, without the heavy language load. As he progresses, his confidence grows — and he's now meeting kindergarten standards and moving ahead."**
>
> *—Katherine Hamilton, Parent of Kindergarten Student with Autism*

PART 14

Reframing the Question

For years, the central question in special education math has been some version of:
What can these students handle?

The evidence suggests a more productive question:

What happens when instruction finally gives them a way in?

When access exists, effort follows. When effort is sustained, learning becomes visible. And when learning is visible, long-held assumptions begin to fall away.

PART 15

Closing

Lowering cognitive demand is often treated as compassion. But lowering demand is not the same as increasing access.

Access is created by changing how students are invited into the thinking - so every learner can engage grade-level ideas and show what they are capable of.

No separate track. No lowered expectations. **Just meaningful access to math designed for how every brain learns.**

> **"One student is autistic and nonverbal. ST Math is their safe place. They're behind in grade level, but we see steady progress. With ST Math, we can clearly see that growth."**
>
> *—Brandi Beal, Data Coordinator, Redesign Schools Louisiana*

ST Math®
Created by MIND Education®