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Playing Chess with Learning: Jim Mamer on Math Reform That Lasts

Why sustainable math improvement depends on system commitment — not individual heroics.

By Carlos A. Lopez Gonzalez

Published March, 2026

For Jim Mamer, math reform is not a debate. It is a responsibility.

The day after our interview, he was already on the road again — driving to another school, thinking about unfinished ideas. During our interview, Jim kept returning to one central conviction: among the many variables that shape learning, the one districts can most intentionally control is the work placed in front of students.

The tasks matter.

For Mamer, an executive board member of the Ohio Council of Teachers of Mathematics, nearly four decades in classrooms have led to a simple but demanding conclusion: when teachers share strong, common tasks — and the time to study them together — the conversation shifts. Instruction becomes less about surviving the day and more about refining the craft.

The evidence, he says, is not theoretical. In four different districts, each with a very different demographic makeup, the pattern held without exception: year one of implementation brought immediate growth. "My students went from 70 percent to 85, 90 percent proficient in one year. Same teacher, same building. I just changed my curriculum and got supported with it. I've seen that in four districts now. The excuses — my kids can't, my accelerated kids can't, my struggling kids can't — there are no excuses. It can be done anywhere."

In his words, it is the difference between "playing checkers and chess" with children's learning.

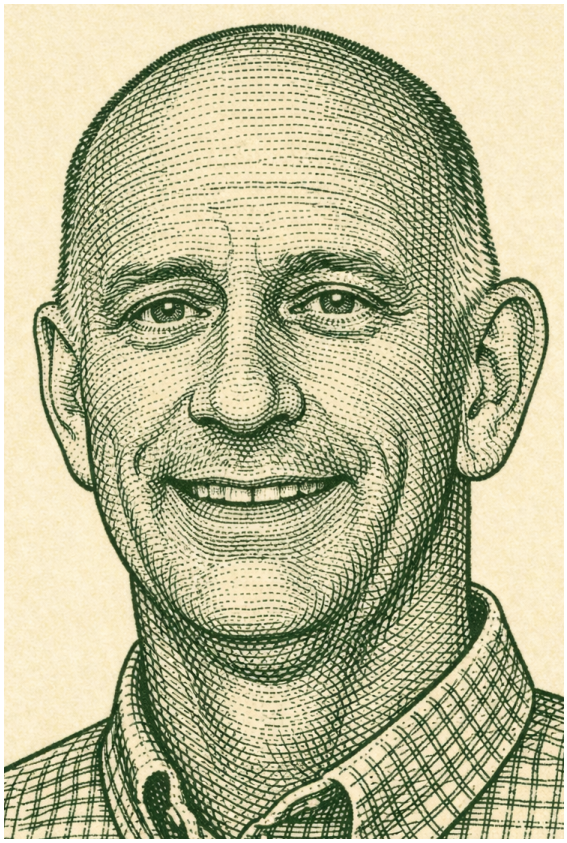

Photo courtesy of Jim Mamer

What did mathematics instruction look like when you began teaching?

"I taught the way I was taught. The district gave me state standards and a textbook. That was it. No training. No coaching. Nothing.

When I taught, it was ...I like to call it naked number sentence learning — just numbers on a page.

The page before gave us some problems with red numbers that were the solutions. Then on the next page, we had three problem sets. Set A was kind of easy. Set B got a little more difficult. It was all number sentences. There was no reading, no real problem solving."

He remembers the pattern clearly.

"Every time we went to a new set, I would have good kids — hardworking kids — and hands would start shooting up all around the room, because the kids didn't know what to do; the algorithm or the gimmick that I was teaching didn't apply anymore. So I would have to bring everybody back together."

> ***"The algorithm or the gimmick that I was teaching didn't apply anymore."***

At the end of that first year, about 70 percent of his students were proficient. Today, he measures success differently.

"I care more about a kid trying to grow every day as much as they can, so at the end of the year they will show incredible growth, no matter what their starting point was."

What happened during that first workshop that changed your trajectory?

"There is no doubt I would not have landed where I am right now."

He describes walking into a three-day workshop in Dayton, Ohio, and being handed square tiles.

"We literally got out square tiles and put them on the floor and had to make designs that would have fencing around irregular shapes. Then we found perimeter and area. We progressed from tiles to grid paper, to cubes for volume and surface area. We cut out a flat pattern and folded it into a cylinder. I was like, what? I've never done this."

The shock was conceptual.

"My entire math life, we were given formulas and told to plug numbers in. I just always thought there was one way to solve everything."

He recalls arguing with other teachers over equivalent expressions that matched physical models.

"That collaboration — that was new. It created curiosity in my mind that there was another way to present math."

At Michigan State, years later, that curiosity deepened in ways he hadn't anticipated. He describes an experiment where teachers spent half an hour cutting out squares the size of a circle's radius, taping them onto circles of different sizes, and counting how many fit. "When we walked around the room, everybody's getting about 3 radius squares to cover a circle. And I'm like, what? It's about 3? Oh — it's π." He pauses. "That was the first time I'd ever seen that. All I ever knew was, well, it's either $\pi \cdot r^2$ or diameter times π. That's it. There was no reason behind it."

Years later, that curiosity produced measurable results. After implementing the sixth-grade units with fidelity, he made a risky decision.

"I used the sixth-grade units with my non-Algebra 1 eighth graders — kids I had taught for three years. Historically, that class would have about 50 percent proficiency. They took the eighth-grade test, and ninety percent passed without the use of calculators."

Part of what made that result possible, he says, was unlearning a habit he'd carried for a decade. "One example was teaching fraction division using the *keep, change, flip* approach. I came up with this convoluted way to explain why it worked. And I was the sixth, seventh, and eighth grade teacher. I watched those kids come back to me year after year and not remember how to divide fractions. I

wondered who their teacher was the prior year. It was me."

Why do districts struggle to sustain reform?

"I don't think teachers are afraid. I think we don't know what we don't know, because what we do know is what we've experienced. And what we've experienced are the things that we will believe in, and then the way we'll deliver things is going to be in the manner that we believe in."

He argues we teach the way they were taught.

"If we only experience one vision for how math can be taught, that's what we'll believe in. And that's how we'll deliver it."

He remembers coming back from that first winter follow-up session — a few months after the summer workshop — and noticing the range in the room. "You had people like me that were just giddy, all in. And you had others who weren't. It's a bell curve — with adults, with kids, it doesn't matter. If you're trying to help people learn something, you're going to have varying levels of buy-in and willingness to stick with it. That's not a reason to stop. We are all caring people and we just need to keep finding ways to provide more valuable tasks and experiences to our teachers."

The deeper issue, he says, is systemic.

"If we have 20 math teachers in a district, and everybody's individually making up their own things, we're not running a system. We're individually running experiments based on what we think is best."

Common curriculum, in his view, is not about control. It is about coherence. "A common curriculum with strong support over time creates incredible experiences, impacts beliefs, and creates momentum."

Clark-Shawnee Local, a district he left a decade ago, recently renewed its commitment to the same curriculum. And Hamilton City Schools, where he spent years as a math coach covering eleven buildings and forty-five teachers — driving over an hour each way — showed growth results after 2018 that he says anyone can verify. "Prior to 2018, they were not growing like they could, year after year. Since then, it's been this incredible thing. And they've even changed the curriculum since I left — but they've kept the commitment to another strong curriculum with support. That's what carried over."

What does meaningful support actually look like?

"Support doesn't have to be any one way. It's just the district has to be committed that they're going to allow teachers opportunities to collaborate during the year."

He emphasizes time, not inspiration, as the lever.

"When teachers have a common ground to come together on real things that they're actually teaching, conversations matter more and involve more relevant depth. It also becomes easier to discuss how things fit vertically — the grades below, the grades above."

The effect, he says, is cultural.

He spoke recently with a teacher from one of those districts, and asked her to name what had actually worked. "She said: it was the strong tasks — curriculum that was genuinely challenging for us as adults, because we hadn't learned this way or taught to this depth. But it was also the time during the school year. Not only before units, but during — a half day, a full day, somebody in the room saying: our kids can do this. Our questions shifted from, 'Can they do this?' to 'How can we get our kids to do this?' "

How does this connect to student curiosity?

"Our subject is bigger than the math questions that we're asking. If we could help kids understand the

mathematical practices, those are bigger than math. Those are lifelong ways to attack life."

He contrasts his early years with his current philosophy. "My first 10 years, I delivered math in a way that was, I have some efficient ways I learned. I need you all to follow my way. Unfortunately, I would then see those deer-in-the-headlight looks."

The shift came from the tasks; "Now I can put kids in a problem-solving setting every day. Around real tasks that often lead to numerous pathways to a solution with multiple possible algorithms. Children make choices based on their brain and what makes sense to them."

He remembers the moment that crystallized it for him — Sixth graders Nick and Zach debated a task to determine how many $\frac{3}{4}$ lb hamburgers could be made from $2\frac{1}{2}$ lbs of ground beef, concluding $3\frac{1}{3}$ burgers. Nick made a model that supported division with the unit rate: $\frac{3}{4}$ pound of hamburger per patty, while Zach's model used a unit rate: each pound could make $1\frac{1}{3}$ patties. Their rich discussion was made possible by the strong tasks being delivered daily along with quality teacher support that has improved over time through quality adult collaboration time. "This conceptual understanding wasn't happening in my classroom in my first 10 years of teaching—I had never experienced these types of tasks. I didn't know kids could engage in them."

Mamer still sounds moved by what those students and so many others have shown they can do, given strong tasks and quality support.

From the student perspective, what has improved over 25–30 years?

"I care more about growth than proficiency. Achievement is directly tied to socioeconomic status. But growth is the great equalizer."

He connects that idea to leadership broadly. "If you listen to many leaders of organizations — in sports, in business — they focus on process. They're trying to get an end product. But, their focus is on the process. The thing we can control."

For Mamer, when we support teachers with strong tasks, common curriculum, and find a way to value and support growth, the chances for learning are increased greatly.

What is ultimately at stake?

"I just can't yell and scream any louder that the state's plan is what matters."

"For nearly four decades," he says, "the field has asked teachers to teach differently. The challenge is about influencing adult visions of what can be done by creating collaborative experiences that model what we've been asked to provide. If we want to impact teacher beliefs about what can be done and how it can be done, we need to provide them with strong tasks, from strong curriculum, with quality and ongoing opportunities for professional development/support around those tasks."

For Mamer, the debate over math reform has lingered long enough. The research has been written. The standards have been revised. The professional arguments have been made. What remains, he suggests, is not persuasion but coherence because we've come to see things we have never seen through our own professional development nestled in our common curriculum.

"Growth is the great equalizer."

In the end, his message is less about a specific curriculum and more about commitment. Reform does not hinge on charismatic teachers or isolated innovation. It hinges on whether adults are willing to align around a common vision, collaborate, and

give it time. The question isn't, can the kids do this? It's how can we get the kids to interact with this? If districts take that question seriously — and build structures that honor it — math classrooms can move from memorized procedures to meaningful thinking. From isolated effort to collective responsibility. From checkers to chess.

About This Interview Series

This conversation is part of a series highlighting diverse voices in Ohio mathematics education. We feature in-depth interviews with stakeholders across the educational landscape; teachers, students, parents, K-12 administrators, policymakers, and education leaders, each offering unique perspectives on the challenges and opportunities in mathematics teaching and learning.

About the Interviewer

Carlos A. Lopez Gonzalez is a data scientist and educator with a background in engineering and mathematics education. He designs innovative tools and learning experiences that personalize instruction. His recent research focuses on integrating AI into mathematics education. These interviews are published in partnership with the *Technology Educator Alliance.*