Welcome fellow Recovering Traditionalists to Episode 216: Why Math Practice Fails (And the Simple Fix)

Welcome to Build Math Minds the podcast, where fidelity to your students is greater than fidelity to your textbook. I'm your host, Christina Tondevold, the recovering traditionalist and BuildMathMinds.com Founder, where my mission is to change the way we teach elementary math to our kiddos. Are you ready to start building math minds and not just creating calculators? Let's get started.

Hey there, fellow Recovering Traditionalists! I'm Christina Tondevold, and today I'm sharing something a little different with you.

You know how sometimes your students can *do* the math practice, but they're not really *thinking*? They're just going through the motions, following steps, and then forgetting everything by next week? This episode is what you need to help them out.

As I said, this episode is a little different. You are going to meet Michaela Epstein. She's a math educator from Australia who has worked with thousands of teachers globally, and she's going to show you a game-changing approach to math practice that turns mindless repetition into powerful learning.

Michaela was one of the educators we were considering for our upcoming Virtual Math Summit—and honestly, her work is so good, but we had too many presenters to choose from and so instead of having her at the summit I asked if she would share here on the podcast and YouTube channel.

I hope you enjoy this information from Michaela and start using Sorting & Matching Activities with students. The thing I love about this activity is that you don't have to recreate anything, she shows you how to take your current worksheets you are using for practice and just reorganize it. Alright, here is Michaela:

Hello. I want to take you back to an early teaching experience I had as a fresh new teacher. I was teaching a year 8 mixed ability class with what had a huge range of skill sets. And if you've ever taught in the middle years before, you'll probably know what I'm talking about. And moving into the independent phase of a lesson with this year 8 class. Look, I admit there was not much of independent or work that went on.

And I'll also be honest that this didn't only happen in my first year of teaching. Time and time again, I've noticed that there are students who struggle when it comes to doing math practice on their own. And maybe you've experienced this yourself. Maybe you've had students who give up at the first challenge, who look to you to check every single step as if you are the answer key, the person who can give them

affirmation that they're on the right track. Or maybe you've had those students who doubt themselves before they even start.

Now, if you've had any of these students, well, good news. This is what we're going to be honing in on today, strategies that we can use to help these students to change their experience in maths class. So, instead of fearing it or not wanting to go, they enjoy learning maths because they know they can do it and they're proud of themselves.

All of this comes back to two important lessons that I've learned. This comes from over 15 years of working with new and experienced teachers globally. And these two lessons are this. Firstly, students want to look smart, not dumb. They're very good at adopting behaviors when they feel like they can't do something, especially when it happens time and time again. So we want to shift that. We want to change students perception of themselves as learners in maths so that they can see it is a subject for them.

And the second important lesson that I've learned is that the type of independent practice that I had been giving my students, it had only one entry point. And if that entry point didn't make sense, then frankly bad luck. And what I've learned since then is that there's this whole class of tasks. They're called sorting and matching tasks. And they give a wide range of students different possible entry points so that they can all access the maths and have a meaningful learning experience. And that's what we're going to be looking at today.

My name is Michaela Epstein. I'm the founder and director of Maths Teacher Circles. I'm based in Melbourne, Australia, and I work with teachers like you all around the world who want to make maths, that's real maths, a subject that students can do and that they enjoy doing. I'm going to be sharing today small and repeatable strategies that you can incorporate into what you're already doing to make practice far more effective for your students in the maths classroom.

Along the way, I'm going to be sharing a whole bunch of strategies and tips and things that I hope you can use and quickly integrate instead of needing to do any large scale change. I believe that the best change happens when we can start at it straight away. I'll also share a link that you can go to to get access to all of the tools and resources that I mentioned today.

Now, these special tasks, sorting and matching tasks, I like to think that they're at the heart of powerful practice for three reasons in particular. And very soon I'll share these three reasons or these three principles of sorting and matching tasks. And maybe you're already using some of these tasks in your practice. And hopefully by thinking about them in terms of these three principles, you can be even more strategic and purposeful in the work that you're doing.

But first, I want to take you back to that early experience with my year 8 class. I was recently looking through some old resources and came across a textbook that I've been using and it was your very stock standard run-of-the-mill textbook that had questions like this one. Question three, simplify the following fractions followed by a set of 25 proper fractions ranging in difficulty from fairly entry level to a little bit challenging. And students could go through these 25 questions and be successful by following the worked

examples that I'd given them knowing by simply identifying what was the correct number to divide the numerator and the denominator by so that could simplify the fraction.

But it turns out that there was a problem and that's that this sort of practice that I was giving my students it went in one direction only from the question to the answer from the question to the answer and so on. And sure there were some students who understood the logic behind what they were doing. They knew why they had to divide the numerator and the denominator by the same number. They knew what an equivalent fraction meant. They knew what it meant to simplify.

But then there were a whole lot of other students who could go through the motions, but they didn't understand those things. And perhaps they didn't even notice them. You see, these were students who were mimicking the steps, but they weren't really thinking.

And so this is the problem that I had and what we often do and what the resources we have set us up to do which is for students to practice a skill and then to go through the answers and mark them or maybe we go through them together and then we stop. But I want to suggest a second step today. And this is a really simple tweak that you can make for your students practice so that it powerfully changes their experience and what they take away from that practice. And that is to help them to make sense of that practice by asking some follow-up questions.

Questions that draw out metacognitive thinking. The OECD has found that metacognitive thinking can not only be taught, but it also supports lasting improvement across different areas of maths, including arithmetic, algebra, and geometry.

And so to help students make sense of the practice that they've done, you might ask them things about, well, take a look at these examples. How are they the same? How are they different? Or you might ask them to find things that are examples of and not examples of something or to put the problems in some sort of order to make sense of the those features or to categorize the questions that they've looked at. What we're doing here is building up habits of thinking and helping students to make that shift from mindless to mindful practice.

And the magic of this second step is that it's simple to implement. You take what you're already doing and ask a question or two as a follow-up. And let's look at an example with that simplifying fraction set from before. So you might ask as a follow on, well take two of the fractions that you solve differently. What was the same? What was different? You might ask them to take the whole set and put them in order of hardest to easiest to solve and then to consider what they notice.

It might be that there are certain fractions that involve dividing by a particular number that students are not as comfortable and fluent with. It might be that the larger numbers were harder. This will give you great insights into where your students are at and what follow-up support they might need. Or you might ask them say which were examples of fractions where you could divide by two which were not. Maybe they're very comfortable with dividing by two constantly and instead you want them to look for more efficient

strategies to find that highest common factor. So there are lots of questions you could ask depending on what you want your students to walk away from that practice set with.

Now, this second step of metacognitive thinking, the beauty of it is that it doesn't just apply to your run-of-the-mill textbook or worksheet examples. It can also be used with open problems.

And again, it's a simple tweak on top of what you might already be doing. And I want to show you an example. This is a problem called finding areas. And I want you to picture a rectangle that has a perimeter of 20 units. And the challenge for students is to work out what are some possible areas.

Now, this is where we usually stop. Students will go away. They'll work on the problem and then we'll come back together and share the different solutions that they found. But to help them to get even more out of this problem, there are some different questions that we could additionally ask after they've had time to work on it. We might say, well, now that you've got some different solutions, put your areas in size order. Are there any others that you can now find? Or we might ask, what's the largest area and what do you know? What we're doing here is helping students to have a scaffold that structures their thinking as they work through this open problem. And we're also helping them to pull out some key mathematical ideas to notice some features that we know are important in this problem and we want all students to see.

So when it comes to sorting and matching tasks, our first principle is that these are tasks that spotlight important features. They don't hide them. So these subtle features of a problem. They're not incidental to completing a task. They're not things that only quote unquote the bright students pick up. Instead, these are features that are that matter and that are worth all students noticing. Our take-home message is this. We want to take the mystery out of doing math so that it's not about mindless memorizing, but so that it actually makes sense.

By shifting students thinking, by helping them to notice those smaller features, the practices can move from being mindless to mindful.

Now, mindless practice is one problem that students face with math practice, but it turns out that there's another. From research, we know that practice is a pathway to mastery, how practice is needed for attention, and how it's essential for learning in maths. All of this is true. Yet, too often, practice is none of these. Instead, for too many students, a lot of practice is passive or meaningless or wrote. And it results in practice where fluency and understanding are divorced from one another. And quite frankly, calling that practice fluency practice might even be too generous some of the time. For true fluency practice, we want students to be developing flexible thinking about which strategies they'll use for a given problem.

And so we have this problem that practice is happening maybe without fluency and certainly without understanding. And this is where the beauty of sorting and matching tasks come in. They hit that sweet spot of fluency and understanding together. So they're not just about getting to answers, but about making new conceptual connections.

So our second principle underlying this class of tasks is that sorting and matching tasks helps students to be flexible not rigid thinkers.

I was recently working at a school talking to students in grades 1 to nine and across all the conversations that I had there was one thing that kept coming up time and time again that students were telling me they wanted from their experience in maths. Now this surprised me. It wasn't about getting good grades even though students acknowledged that this mattered. Instead, students deeply cared about getting it in maths. They told me how they want to understand what they're doing. They don't just want to be able to follow the steps because when they understand it, the maths clicks and they're confident in themselves about coming to maths and knowing that it's something that makes sense to them.

So for these sorts of students, I want to share one great strategy that you can use to adapt your existing questions. And if we go back to that fractions example again, it's a nice one to keep coming back to. I want to show you how you can use exactly that same bunch of questions but presented differently. So instead of 25 questions where we're going question answer question answer so forth, we turn them into a card sort and what we would have is a set of the original questions. We would have a set of the answers and we would have a set of visual representations, rectangular grids that show those fractions with the challenge to students being well, how can might you match up these cards.

A few more curve balls to throw in in each set of either the questions, the answers, or the rectangular grids. Put in a blank. It levels up students thinking and again builds that flexibility where they can't just keep following the same familiar pathways but it stretches them and encourages them to start looking at the mathematics in a new way.

Now, you might notice compared to an the original set of practice questions from the textbook, the card sort, it's still about simplifying fractions and it's still that same underlying skills, but instead we're opening it up so that there are so many more entry points and there's also a bit more information provided through those visuals. So allowing students to come in and tackle it in a way that they're comfortable but still providing challenge so that they can have that meaningful learning that we want.

I want to emphasize that when the practice is going in one direction only from that question answer time and time again. This isn't going to be effective practice most of the time and for most students. Certainly some of the time it can be, but not always.

Instead, that effective practice will come when students have the opportunity to go back and forth in different directions. Students are going to build flexibility and they're going to build new conceptual connections. And that's what the card sort task does so beautifully. It brings those first two principles of sorting and matching tasks together of spotlighting features and building flexible thinking.

Now, so far we've looked at two problems. Practice that's mindless and practice without understanding. And it turns out that these are both tied up with one way of looking at maths. And that's what I call the ladder view. Well, you if you imagine a ladder and it's got diff on each rung a new skill of mathematics. This is a fragile view of maths. It's easy to fall off that ladder and have trouble getting back on or climbing up when you're stuck somewhere. And I want to contrast that to a web view which is far more more robust because it has lots of interconnections. It has flexibility. The web view involves practice that's reflective and that builds connections.

Now I want to share one more principle of sorting and matching tasks with you and it's one that comes as a consequence of exactly that and that's that these tasks promote remembering rather than forgetting and really this principle is a gamechanger for those kids in your class who give up easily and are full of self-doubt.

Let's look at an example. So when we're thinking about practice in terms of that latter, it's easy to forget if something times like 9 times 6 is 54 or if it's 56. Maybe you remember it's in the 50s and you know it's even, but you don't have any more idea than that. But when we're looking at it in terms of that web view, you've got strong bits of information you can fall back to, such as, you know, the digits will add to nine or that six times ten is 60 and six less than that is 54. So the web view is building up a stronger deeper understanding.

The result is that students can meaningfully build their skills and build confidence in themselves.

Now, I've shared today a couple of different types of sorting and matching tasks, but it turns out that there are seven that I've collected, and I've put them all together inside a planning tool called my powerful practice planning tool. And what I love about all of these seven is that they're easy to plan, easy to set up. Like, you literally take your existing questions that you've got and you give them a tweak and they're adaptable to use with a wide range of students and topics.

What teachers keep telling me is that when they use even just one of these seven tasks, they see a dramatic difference in these students. And by tweaking what maths practice looks like and how it's done time and time again, teachers are seeing powerful learning happening.

Now, if you want this for yourself, if you want to get your hands on this powerful practice planning tool and a few other resources that I've put together, head on over to mathsteachercircles.org/bmm26.

Thanks so much for joining me and I wish you the very best in helping your students to have powerful practice experience in maths class time and time again.

Wasn't that amazing? I told you Michaela was awesome. Thank you so much Michaela. I'm such a fan of Purposeful Practice. I know practice can get a bad rap but it is so needed and can be so powerful. So I enjoy learning about new, fun ways to do purposeful practice and this Sorting & Matching idea is a great one. Let's recap why math practice fails and why Sorting & Matching is a simple fix.

Math practice fails when it's one-directional—question, answer, question, answer, over and over. Students might get the right answers, but they're not really *thinking*. They're not making connections. And that's why they forget everything by next week.

The simple fix? Add in the reflection & connection. This is why Sorting & Matching tasks are so powerful, we are able to get them to reflect about the problems and help them make connections. The more connections we have around something, the easier it is to remember it later on. We need to ask students: 'How are these problems the same? How are they different? Can you put them in order?'

That's what Michaela showed us—when you make practice go back and forth instead of just one direction, students build flexibility. They build understanding. They actually *remember* what they learned.

And the best part? You don't have to create all new materials. Just take what you're already using and add that metacognitive second step of reflection. Don't forget to go grab the resources from Michaela. If you didn't see the link I'll put it in the show notes which is BuildMathMinds.com/216

Now, if you loved learning from Michaela, I have great news. Our **Virtual Math Summit** is coming up on **February 28th and March 1st, 2026**, and we'll have 34 more presentations from math educators just like Michaela to share their best strategies for building math minds.

It's 100% free, and you can register right now at **VirtualMathSummit.com**. I'll put the link in the description.

Whether you teach kindergarten, or fifth grade, or you are a math coach there will be sessions designed specifically for you—all focused on helping your students become true mathematical thinkers, not just answer-getters. In fact this year is our 10th Virtual Math Summit so we are doing things a bit differently.

First off, all sessions are going to be live.

Second, the sessions are grouped so that you have specific ones for your area. We do have the 4 keynote sessions, but everything else is split up and we have 10 PreK-2 sessions, 10 3rd-5th grade sessions, and 10 sessions specifically for math coaches.

Build Math Minds is celebrating 10 years of ideas and 10 years of impact with 10 sessions specifically designed for you.

So go register at **VirtualMathSummit.com**.

This is the last episode before we take a break here for the holidays. I hope this video has helped you build your math mind so you can go build the math minds of your students. I will be back after the 1st of the year!

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