TRANSCRIPT
Learning Unboxed

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Episode #290
Mike Kenny:

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When the cognitive load of having to spend too much of your cognitive abilities on just the numbers, on just the multiples, when that's relieved because MathFactLab helped them there, they can really dive into the content better.

Annalies Corbin:
Welcome to Learning Unboxed, a conversation about teaching, learning, and the future of work. I'm your host and Chief Goddess of the PAST Foundation, Annalies Corbin. We know the current model for education is obsolete. It was designed to create fleets of assembly line workers, not the thinkers and problem solvers needed today. We've seen the innovations that are possible within education, and it's our goal to leave the box behind and reimagine what education can look like in your own backyard.

Welcome to Learning Unboxed. As always, I'm excited to talk with another great innovator in the transformative education space. And joining us today is Michael Kenny, creator of MathFactLab. So, Michael, welcome to the program.

Mike Kenny:
Thanks, Annalies. Pleasure to be here.

Annalies Corbin:
Excellent, I'm super excited to have you on your very first podcast interview. That's always fun too, so we'll celebrate that as well. But let's set a little bit of context for our listeners as we get started. MathFactLab is a smarter, research-based way to build true math fact fluency. Created by a Vermont fifth-grade math teacher and informed by the world's leading math education researchers, MathFactLab offers online fluency, practice grounded in reasoning, strategies, and number sense, not rote memorization. So, I'm going to start there because I want you, in your own words, to tell us why the heck, Mike, why the heck do this work? It's a big lift.

Mike Kenny:
It was a big lift, but it took a long time to get there. So, the slope wasn't too terribly steep for quite a bit of it. I think when I started teaching fifth grade math here in Vermont, which was in 2008, I pretty quickly realized that my students lacked the fact fluency they needed in order to be successful with the content.

And so, like any good teacher would try to do, I tried to help my students and I sort of fell back on what I remembered from my own childhood instead of going into the research and also doing what my colleagues were doing, which was really like the old-fashioned conventional approach to learning math facts. It's like "Memorize them, and we're going to give you a time test every week, and that's going to help you," or so I thought.

And so, I did that for a few years. I was really interested in math education. And there's a program here in Vermont called the Vermont Mathematics Initiative, which is a master's degree program for Vermont teachers to really deepen their ability to teach mathematics. And when I started taking those courses, pretty soon I came across what best practices are in math fact fluency instruction. And what I found is what I was doing and what the best practices are saying I should be doing were a league apart. So, that's when I realized I had to make a change.

What the research says is that, really, the way students should move to fluency where we can say they know their facts is basically just a lot of guided practice with what they're doing already in the classroom, which is in good math classes, I mean, students are using a lot of manipulatives. They might be using 10 frames or number lines. They might be using rekenreks. If they're learning multiplication and division, they're probably using area models or dice or dominoes.

And then, what often happens is that teachers give that great foundation, and then they say, "All right. Now, memorize your facts," instead of using those same tools to help to the point where students know their facts. Those facts might be embedded in memory, but they didn't get in memory through memorization. They got in memory through application.

Annalies Corbin:
Absolutely. And that's the big thing, that all of our content, but math in particular, benefits greatly from that real hands-on applied approach and understanding because that's when students are really fluent.

Mike Kenny:
Yeah. And Jo Bowler in her article, I think it's called Fluency Without Fear, she tells a story of, I think, it was a British Minister of Education who was on a talk show, and was asked what 7 times 8 was and couldn't remember. And the thing is, the minister couldn't remember and probably was never taught strategies to construct that fact. So, couldn't think, "Okay. Well, I know what five eights are. So, let me just add two eights to that. I can take my 40 and 16 and I can combine those." But if your mathematical foundation is based on memorization instead of reasoning, it's not a very solid foundation. It's liable to collapse quite easily.

Annalies Corbin:
And it's interesting, right, because, you know – and on this program, we actually talk about math a lot because we also, in our own work at the PAST Foundation, which is the host and the sort of foundational component of Learning Unboxed, we recognize that literacies and fluencies are critically important. But most importantly, that if we have to prioritize a set of literacies, we're always going to choose mathematics because mathematics lends itself to a different way of thinking.

And back to your point, the strategies are critically important to all learning. And yet, what's one of the things that I find super interesting over time that we've seen is, often, when you're asking educators to make a shift, which is the piece of your story I'm super interested in, that shift that has to take place, that awareness that you had saying, hey, best practices versus where I am were pretty wide apart at one point in your work but, oftentimes, our mathematics teachers, although the greatest opportunity for application in the work that they're doing and the topic that they're teaching, it's fully applied at its very best, can often be the last to get on board to making that transition.

So, I'm super curious from your perspective, why do you think that that happens and how does that relate to the way we teach these fluencies?

Mike Kenny:
Let me see if I understand your question. So, why do teachers resist the change or make the change? Is that what you're asking?

Annalies Corbin:
It's not even so much a resistance. It's a hesitance, right? Because mathematics, when we think about the way we teach teachers to become math teachers, it's also rote. I guess that's really where I'm trying to get at is the practical application of the way learning happens and the human brain grabs all of this information and really, really targets in on it is contrary to the way we actually are preparing educators to actually deliver that content in the classroom. We see it more stringently. We see it everywhere, not to pick on math teachers. But the reality is, oftentimes, it's a harder push, often, with math educators. And I think as part of the teacher prep program. I guess that's what I'm really trying to get at. 'Cause you led this conversation with, you had this epiphany as it related to your practice.

Mike Kenny:
Yeah, I think I was lucky to be in an environment where everyone was eager to learn new ways. I mean, I will admit I was interested, but at the same time I wanted the master's degree because it would increase my salary.

Annalies Corbin:
Sure.

Mike Kenny:
But when I got in there, what the Vermont Mathematics Initiative did was they didn't really teach us how to teach. They just modeled exceptionally good teaching. They were teaching us higher level mathematics. Like teaching me math in a way that I've never been taught before, where it was doing basically what I attempt to do with my mathematics, with my math facts, is that they take us from what we already know, and then give us questions that are just a little beyond what we can do on our own but are achievable if we put some time into it.

And so, that was how the VMI program would introduce new material. Show us what we already know, give us a question that's just sort of outside of our ability range and see if we can get that leap ourselves, and then figure out how we did that. So, always approaching new content from where we currently are.

And so, in MathFactLab and from what the research has said is we help students construct new fact knowledge from previously mastered facts. If you know what 5 times 7 is, it's not too hard of a leap to get to 6 times 7. Or if you know three 7s, you can double it to get to six 7s. Instead of thinking of six times seven as some isolated fact, why don't we connect it to previously mastered material? And that's exactly what VMI was doing. And so, they were inspiring me to do the same in my own classroom.

Annalies Corbin:
I love the fact that they are tapping into things that students have already mastered, right? That knowledge that's owned, it's fully instilled, right? That's really, really powerful. It also plays into another topic we talk about on this program a lot, which is around agency and just honoring students' agency and their ability to think for themselves. Like you're really sort of putting that in play up front by honing that skill.

Mike Kenny:
Yeah. And outside of math facts, but that was my number one way of teaching, which is often sort of the same as VMI style, is give them a problem that's a bit above their ability, throw them in the deep end, and see if they can swim. And typically, the kids could swim. And typically, they were so pleased and would get super excited to then meet as a group and share how they solved that problem, instead of saying, "The teachers already told you how you're gonna solve the problem. Now, follow the steps the teacher has delivered." Instead, "Here's the problem. Now, share with us how you figured out how to do it." And then, there is that agency like, "Wow! This is my mathematics. It's not me doing what you told me to do. It's me finding a route all on my own. And that definitely creates a sense of pride.

Annalies Corbin:
And fun, right?

Mike Kenny:
Yeah, exactly.

Annalies Corbin:
I mean, because when kids see success, it's fun.

Mike Kenny:
And it's not just kids. I mean, I felt the same way with my colleagues, with my classmates at VMI. I thought, "Wow. Maybe I did this in high school, but back when I did in high school, it's because I followed the teacher's steps and I didn't understand why and I probably didn't care why." But then, I was relearning it in a way that was, yeah, it became my own, which was exciting.

Annalies Corbin:
Absolutely. Okay. Well, so let's dig in just a little. I mean, I have more questions, but let's dig in, I think, to really sort of solidify the context. So, share with us about what exactly is it that MathFactLab does or how do you use this tool, and you're training in it, and you're working with other places clearly or, at least, going to conferences and talking about it. So, help us understand then, so what is the premise of what you've built out?

Mike Kenny:
I'll give a little background information. For my master's project with VMI, I built a strategy-based program for math fact fluency development. And when I say program, not computer program. These were flashcards. This was in 2013. So, the reason, I had mentioned earlier, is that I discovered what the research said I should be doing. And then, I went to find material to support that. And I couldn't, because everything I found was memorization based. And I mean, there's research going back to the 1930s that shows that memorization-based approach really is ... some kids, they're gonna be fine with it but there's winners and losers, and it doesn't enhance one's ability as a mathematician.

So, when I kind of was, like, convinced, "All right, this is the approach I wanna take," and I couldn't find the material to do it, that's when I decided, "Okay, that'll be my action research project. Let me start building something." And so, what I built were these visual flashcards. Akid would have a flashcard. Instead of just saying "four times seven," on the front, it would show a strategy. It would show two groups of 7 and two groups of 7 , and helping students realize, "Oh, if I know my two 7s, if I know 14, I can figure out four 7s."

So, instead of just question answer, it would be question model, answer on the back. And that showed promise, but to give kids multiple approaches to the same problem and to cover everything, it ended up that there was a huge stack of flash cards and trying to get 25 odd fifth graders all using the right cards, actually paying attention and trying their best was a logistical nightmare. So, I saw a promise in it, but I didn't really seem like it was going to be a win.

A few years later, we became one-to-one with Chromebooks. And it occurred to me maybe, I don't know, a few months into that, that I could put those flashcards onto Google Slideshows. and then we would take away a lot of the logistic difficulties. And so, then, I created leveled slideshows like level A, there are your twos, level B is your tens, level C is your fives. And so, I could pre-assess students, assign them within the program, have them practice with these slideshows when they felt like "Mr. Kenny, I think I know these," they'd come up to have an interview with me. If that went well, then I'd say, "All right, you're ready for the next level. Go ahead. And you're moving from double D to level E," and then kind of move through.

And that really became sort of the foundation of what became MathFacLab. A colleague of mine at school has a brother-in-law who's a software developer who likes to take on little side projects, and I told him about what I'm doing. He thought, "Yeah, I could build this for you." COVID, then, came around. What he was doing mainly was shaking up so much that he wasn't able to end up developing it for me. I found another developer, but it did give me the inspiration to say, "I'm going to dive into this." So, I took a leave of absence and I turned this basic idea into something bigger. And now, it's all for operations, not just multiplication.

Annalies Corbin:
So, it's now a living, breathing thing that has the opportunity to be in numerous places.

Mike Kenny:
Yeah. And I mean, it is being used around the world now. So, I mean, primarily in the United States, but we have customers in Cambodia, New Zealand, Australia, Singapore, Brazil. It's worldwide.

Annalies Corbin:
That's fabulous. I love that. Let's talk a little bit about, sort of, the impact. So, when we help our students – and this is something obviously all educators know intuitively, and yet we still struggle with it. We see this still all over the place. It's in popular media. It's in conversations at educator conferences. We still know we have a battle when it comes to mathematics. And this idea that kids really turn off,m "I can't do math," right?

And the other thing that I love about this is that we're talking about this at upper elementary, that fifth grade, that's so pivotal because if we can't correct this problem or this perception that our kids bring into their learning before they get into middle school, it's very, very difficult to turn that tide.

So, let's talk a little bit about, sort of, your experience and the research and what you're seeing with kids utilizing MathFactLab to change that confidence dynamic around math being accessible and math being for all, that we are all mathematicians. Talk with us a little bit about what you're seeing there.

Mike Kenny:
Well, as I had mentioned, like with the memorization approach, there's definitely winners and losers because there's some people who could certainly solve problems, but might not be able to memorize such a vast set of discrete facts. When you provide strategies, it's more like teaching the person to fish as opposed to providing them a fish because they, then, strategies are much easier to carry around than isolated facts.

And so, I think it leads to success, and that success leads to confidence, and that confidence leads to greater success and it creates some more "I can do," whereas, I think, you know, maybe the math world that you and I were raised in really had some very clear winners and losers. People who are just like, "I can't do math." And I did not find in my most recent years teaching that that was the case. I didn't have students who had written themselves off as mathematicians because, sort of, taking a problem-based approach to instruction, especially when you provide differentiated sets of problems, then students are all going to be able to find their level of success where they are and where they can see their own growth and where they can, at the end of a lesson, see that they can do something that they weren't able to do at the beginning of the lesson.

And I think where MathFactLab ties into that is it's allowing students to conceive facts in so many different ways. So, like the program uses such a variety of models, whether it's 10 frames, dice, area models, open arrays, number lines, that they're able to conceive of the same problems in so many different ways that it gives them a lot of flexibility of thought. And like I got an email from a teacher the other day who said, "We've only been using it a week in the class, but in a math conversation, student raised her hand and said, 'Oh, yeah, that ties in with what we were doing with the model that we were using in the MathFactLab the other day.'"

So, models are really powerful tools and the impact they have compared to discrete memorization, they're just incomparable.

Annalies Corbin:
Well, and once again, it's that application. That practice is great, right? But the

application, the ability to apply that knowledge to something, the next thing, right? That's where true learning takes place. That's the leap that we need to have happen. If we're not seeing that, to your point earlier, where memorization, it's a skill set that only has a very short half-life of usefulness for ourselves, right? You know, back to somebody on television there, a world leader, they can't answer the question because they don't remember anymore, right?

Mike Kenny:
And you're talking to a history major who can't remember 95% of the facts.

Annalies Corbin:
Yeah, exactly. And that's part of human nature, right? I mean, our brains don't want to store things that we have no use for. But strategies, because we can apply strategies, to your point, in lots of different scenarios, and those same strategies that you've built into MathFactLab apply to other uses as well, not just math. And I suspect that that would be one of those things that from a longevity standpoint, the students would report.

I'm super curious, Mike, about the data. Only because I know, as folks are listening to this, educators thinking about bringing new programs in or new ways of thinking, teaching, and learning into my classroom or my school setting, show me the data. Or "How do we know," right? And so, you've been at this for a while. And part of it, it's intuitive having been a teacher, but now the program's out there. So, talk with us about what the data is telling you about the use of this type of program.

Mike Kenny:
So, I've kind of got two types of data. I've got anecdotal data and I do have a little bit of actual impartial school data from a school that says, "We're interested in trying MathFactLab, we're going to run some tests to see if it's actually generating the results we want."

And so, I'll just start by just saying what I saw in my own school. So, we introduced – this is now the fifth year it was being used in my school. This is my first year out of that classroom but I was able to use MathFactLab for three years in my own school. And so, when I used it in school, it's only fourth and fifth grade. But what we saw is students were able to handle the content in a way that they hadn't been in the years previously.

So, for example, adding fractions with unlike denominators. There is a lot going on that if you don't have a quick ability to think through multiples of each of those denominators and find where those multiples intersect, it's a struggle and it becomes highly procedural without a lot of conceptual understanding behind it. But when the cognitive load of having to spend too much of your cognitive abilities on just the

numbers, on just the multiples, when that's relieved because MathFactLab helped them there, they can really dive into the content better.

And so, that's what we were seeing. And that wasn't just in my classroom. That was in all 10 classrooms across the school. I don't have a lot of hard data outside of that because it's sometimes difficult to get because, (1), there's privacy; (2), every school's gonna implement the program in a different way. But I did have a school, the summer of 2024, reach out and say, "We'd like to pilot it for a year, and we're gonna compare it to another math fact fluency program out there. And we're gonna use a standardized fact fluency test four times over the year, and we're going to compare the results."

And I'm talking off my head, so I don't have the exact numbers, but this was fourth grade. This was a school district outside of Philadelphia. And at the beginning of fourth grade, they were, they think, if I'm remembering correctly, it was around 30% fluency at their baseline assessment at the beginning of the year, and this is just a multiplication. This is a hundred problem pencil, paper and pencil, time test, you know, not the best way.

Annalies Corbin:
Standard

Mike Kenny:
Yeah.

Annalies Corbin:
Yeah, the gold standard.

Mike Kenny:
I wouldn't call it gold.

Annalies Corbin:
Oh, but it's been the gold standard for a long time, right? That's part of the problem.

Mike Kenny:
Yeah. And we actually are building. We're building an online as a much better tool. But from that, I believe it was around 30% fluency on the first test. By the second test, I think it was around 80% in the average. So, that would have been sometime in the second quarter. By the third quarter, we're hitting over 90% fluency. So, this is sort of verification in an impartial setting that you can certainly have successful results with it.

The guy running the tests, this is a testimonial from him. It says, "Our fourth grade implemented MathFactLab last year. By the end of the first quarter of the school year, I had a math teacher with 20 years' experience come to me and tell me how much more successful his students were with math fact acquisition and automaticity than he

had ever experienced. On top of that, our students regularly shared how much more they liked MathFactLab than other programs that we had used." So, particularly that, what that teacher said that it was having the effects that we want to see. And-

Annalies Corbin:
Fabulous.

Mike Kenny:
And it's also just saying that, "Hey, the research is actually right that if students take this strategy-based approach where they're building new fact knowledge from previous facts and they're using models, they're going to be successful." And it's good to see that that is actually happening. And I think in the future, I hopefully should have a lot more data to support that.

Annalies Corbin:
Yeah. Well, we'll be watching for that white paper, the publication and journal. So, excellent. Looking forward to seeing that. So, as we sort of wrap up the conversation, let's close with, what are you thinking about now? Or what's the next thing? I do like to ask my guests, especially folks that are working on innovative strategies and tools that go with those, what is it that keeps you up at night as that, sort of, next thing that you feel like is really really important as the iteration of the work that you're doing?

Mike Kenny:
What we're looking to do next is to build a progress monitoring tool, so that schools won't have to guess if the program is being successful or not, so that the students will be able to take an online assessment, like that gold standard paper and pencil, but the difference is with that gold standard paper and pencil, you can buy time by answering the simple problems quickly, and then spend 20 seconds on 7 times 8. No educator will be able to tell that. But with an online one, teachers will be able to see or administrators will be able to see student response to each problem and the number of seconds it took.

So, you'll have much richer data. It's not as perfect as one-to-one interview, but it's pretty close that you'll be able to assess as many times as you want over the course of the year. And so, you'll really be able to measure growth. And instead of just multiplication, it could be in all four operations. Also, would have like the standards for first grade, second grade within 10 for first grade, within 20 for second grade. So, that's one thing.

And also I've been working with a middle school consultant to build an integers operations learning path as well. I've been told that there isn't a lot of good conceptual approaches to integer operations out there right now, that it's still a lot of, "Memorize these rules and these tricks," instead of really conceiving of it. So, we've

kind of mapped out the big picture, but now we actually have to, sort of, get down to the nitty gritty and develop it. And so, I had hoped that it would be out this fall but realistically now my hope is to have it in sort of beta by the beginning of the next school year.

Annalies Corbin:
That's super exciting. So, Michael, last thing, if anybody wants to get more information, reach out to you, what's the best way for folks to find you?

Mike Kenny:
The easiest way is just go onto our website, www.mathfactlab.com, hit the pricing tab at the top. And then, from there, they can request an eight-week pilot, they can request a quote, or they can even request a call with me and to learn more one-on-one with me.

Annalies Corbin:
Perfect, perfect. Well, Mike, thank you so much for the work that you're doing, first and foremost. Really, really important. Anything we can do to improve mathematical education, we're all about that. So, we really, really appreciate your work and for taking time out of your day to chat with us about MathFactLab. Thank you.

Mike Kenny:
It's been my great pleasure. Thanks so much for having me.

Annalies Corbin:
Absolutely.

Thank you for joining us for Learning Unboxed, a conversation about teaching, learning, and the future of work. I want to thank my guests and encourage you all to be part of the conversation. Meet me on social media, @AnnaliesCorbin. And join me next time as we stand up, step back, and lean in to reimagine education.