Art Baroody (00:00):

You can get efficiency through rote memorization, but what you don't get is efficiency plus appropriate use and, more importantly, adaptive use.

Dan Meyer (00:17):

Welcome to Math Teacher Lounge. I'm your host, Dan Meyer.

Bethany Lockhart Johnson (00:21):

And I'm Bethany Lockhart Johnson.

Dan Meyer (00:23):

And on today's episode, we are gonna continue going deeper into the same topic we've been on this whole season, the topic of math fluency. So far we've tried to establish what it is with one guest. And then think about how to measure it and develop it with other guests. And we're so excited about our next guest here today. Bethany, how has this topic been working on you? Has it been feeding you and your ideas about education at all?

Bethany Lockhart Johnson (00:48):

I mean, Dan, we've already established that I've been the fluency fan from go.

Dan Meyer (00:53):

Minute one.

Bethany Lockhart Johnson (00:53):

So the better question is, how is it working on you? I definitely love our deep dives. I love the fact that we get to take this topic and talk about it over multiple episodes, and hear from the audience, and incorporate their questions. So, I'm thrilled to be here. So what about you? You're here. You're ready?

Dan Meyer (01:12):

Yeah. For those who are just popping in for this episode, Bethany and I have a dynamic that pulls in different directions sometimes. And that's always been really helpful for us. In our banter. Our repartee. In this season, the tension is that Bethany is a huge fan of fluency and fluency development. And I have had experiences, as a secondary teacher, where kids are coming to me after eight, nine years of having, in some cases, some pretty negative experiences with fluency development. Where they'll come and they've had these different moments where they think like, "Oh, so math is about doing the same boring thing over and over again, and getting some feedback that I'm smart or dumb. And I generally feel dumb with that." So that's led me to kind of drift away from enthusiasm towards fluency. Drift away from fluency. But what's been working on me a little bit is a really strong strand through our conversation so far, Bethany, around equity. And how if I deprive a student of experiences of generating fluency, even if that's in favor of experiences where they see the beauty of math, let's say, or the creativity in math, I'm making it harder for them to experience, through that fluency, new ideas as accessible and approachable. So that's been, I think, the idea that's been working on me so far this season.

Art Baroody (02:33):

I would love to interject here, if you wouldn't mind.

Dan Meyer (02:35):

Folks, guest Dr. Art Baroody, can't wait for his intro. <Laughter> He wants in on this! Let's go, Dr. Baroody! Let's go! Let's talk about it.

Art Baroody (02:47):

I really appreciate your comment about how fluency ruins kids. Because if it's fostered in the wrong way, it's exactly what's gonna happen. Kids are gonna think that math is all about just memorizing stuff, and regurgitating it quickly. And it does so much damage to approach fluency in the wrong way, through rote memorization. But —and this is the whole central theme of our talk today — if you teach fluency appropriately, if you foster meaningful memorization, then you get the kinds of things that you wanna see too, which is an intellectual curiosity. A looking for patterns and relations. And an excitement about math, and an ability to appreciate math. And really wanna do something about math.

Dan Meyer (03:49):

I'm feeling this so much. And I really want us to get into this distinction of meaningful memorization, meaningful fluency, shortly. But, let's tease 'em a little bit here, Dr. Baroody. Let's not give away the whole farm right away <laugh>. Bethany, do you wanna share who we're working with here today <laugh>?

Bethany Lockhart Johnson (04:07):

Well, you've already given us quite an intro, Dr. Baroody. But listeners, this is the fabulous Dr. Art Baroody, Professor Emeritus at the University of Illinois, Urbana-Champaign. He's someone who's been studying math fluency for decades. And, you're gonna help make the case for not only why fluency is so important, but how do we do it in a way that's meaningful. So, thank you for being here. And I love that you just dove right in. You're like, "Oh, Dan <laugh>. Oh, I'm here. I'm ready <laugh>." So thank you again for being here. And we're so excited to have you on the show.

Art Baroody (04:56):

I just couldn't resist. I've seen so many teachers frustrated by the way math is taught. And how kids come to them in their class and they're basically not interested in math. Or they're even anxious about math. ... We've gotta do a better job.

Dan Meyer (05:17):

Fried to a crisp, yup.

Bethany Lockhart Johnson (05:18):

Hey, when you're in the Lounge, let me tell you, you don't have to hold back <laugh>. This is a conversation. We welcome it. That's why you're here. We wanna hear from you. I do wanna ask you, in broadening the way that we think about fluency, one of the things that we're asking all of our guests is, what's something that you are developing fluency in right now? Beyond all the amazing work you've done in mathematics, what's something that, right now, you either have recently or are actively trying to develop fluency in?

Art Baroody (05:53):

Well, at this point in my life, I'm trying to be a better husband, father, and grandfather <laugh>. It's always a work in progress. But, it's especially important to keep my wife happy <laugh>.

Bethany Lockhart Johnson (06:11):

You know what? Wiser words have never <laugh>... Always a learner. Right? We can always improve. Let me tell you what my husband did yesterday—no, I'm just kidding. <laugh>. No, that's fantastic.

Dan Meyer (06:26):

We might jump back in on that too at some point. Because I love thinking about like, "Is every situation we have with our significant relationships, the folks we want to keep happy, are they all unique, like snowflakes? Requiring a deep conceptual work on the part of the "learner" — here, you — to figure out a solution for? Or are there ways in which your study of fluency can actually be applied in a meaningful way to this real-world question of fluency in relationship?" Please don't answer. This is going way deeper than we prepped you for. <Laugh> But it's just a curiosity that I have right now. Are there moments where our work in one area can actually jump into the other? I'm gonna let that hang for a second, Dr. Baroody, and instead ask you about your work in grad school. What fascinates me about you is that, when I went through grad school, I was motivated to prove a thing. I got these ideas! They're never gonna change! They're correct! I'm gonna find the research and do the studies to back 'em up! And I feel like you have a bio that I love. Which is you came into grad school with ideas about fluency, it sounds like. And then those started to change a bit, through your encounter with reality. With your empirical work. And I would love for you to describe a bit about your transition, or what you learned through your graduate work on fluency. What'd you find, as far as the conventional wisdom? And how it was correct or incorrect?

Art Baroody (07:53):

Sure. As an undergrad, I was trained as a teacher, and I became interested in psychology, especially the psychology of learning. So when I went off to grad school, a natural major was educational psychology. And I had the good fortune of studying with Herb Ginsburg, who was a great mentor. He was a leading researcher in mathematical learning. And, in particular, he was interested in this new area of children's informal mathematical development, and how it provided a basis for formal mathematical learning, including providing an informal basis for fluency. And so that's where I got my initial interest in fluency. Herb Ginsburg was an interesting mentor. What he would do with his grad students is say, "OK. Here's one side of the issue. Here's the other side of the issue. Here's the research. You decide which is right." Now, that's highly unusual <laugh>. But it helped me a great deal, because what I started to do was dive into the research on mathematical learning. And one of the issues that we were encouraged to explore was, how do kids learn the basic number combinations? When I started grad school, I believed what everyone believes: that if kids don't know the basic facts, then what you have to do is make sure they have massive amounts of drill and practice to memorize those facts. That was certainly true of my undergraduate training. In fact, I was at a parent-teacher meeting and one of the fathers stood up and said, "Everyone knows what two plus two is. And you know how we know that?" And here it is, someone who's had no training whatsoever, but of course they know everything about how to teach mathematics. "OK," he said, "Well, remember back in first and second grade, what did we do? Your teachers gave you all sorts of practice and drill on two plus two equals four. And that's why you know two plus two equals four." It turns out that a lot of kids know two plus two equals four before they even get to school. So, it's not an adequate explanation. We'll talk more about that later. One of the things that comes out of a traditional or a conventional view of fluency is that informal methods, such as counting, especially finger counting:"Oh! That's bad! Counting and finger counting, those are just crutches for avoiding the real work of memorizing those facts!" Well, that's certainly what I believed at the time. And I, basically, was looking at the issue through adult eyes. What Ginsburg taught me was that, in order to understand learning, to understand the issues around learning, you also have to look at the issues through a child's eyes. And one of the first things I learned was that kids have their own informal methods of solving math problems. So, if you ask a child, "How much is five plus three?" Kids, typically, at least initially, what they'll do is they'll count out five fingers, or they'll put up five fingers, count out three more fingers, or put up three fingers, and then count all the fingers and come up with the answer. Why is this important? Because kids aren't stupid. What they do is they continuously invent increasingly efficient counting procedures to figure out sums and differences. And, what this enables kids to do then is to look for patterns and relationships among the number facts. And this can then be used to devise reasoning strategies. For example, I was observing a kindergarten class while I was in grad school one time. And, we were playing a simple race game, where the children would throw two dice and figure out what the sum was, and that's how many spaces they could move on a racetrack. And one little girl rolled a six and a one, and she didn't have six fingers on one hand, so she wasn't quite sure what to do. And she was really kind of puzzled by the question. And the little girl next to her leaned over and whispered in her ear, "That's an easy one, Marcy. It's just the number after." Now, what this kindergartner had discovered was a connection between her counting knowledge, specifically her number-after knowledge, and adding one. When you add one, the sum is just the number after the other number in the count sequence. So, for six plus one, the answer is, what number comes after six when we count? Seven, it's easy.

Bethany Lockhart Johnson (14:00):

I have to say, what I'm hearing is you seeing the brilliance of children.

Art Baroody (14:07):

Yes.

Bethany Lockhart Johnson (14:08):

And you're seeing the wisdom, and what they bring in, and their innate brilliance, right? And, so much of the conversation, I feel like, when we're talking to educators, is really wanting to celebrate the way children think. And I often feel that that's separated from the task of fluency, right? But what you're saying here is exactly what I think excites me about it, is that there are patterns. There are ways to look at it. There's sensemaking happening. Even in something that might seem simple to an adult. Two plus three — kiddos are bringing so much to that. And, when we listen, we can respond in ways that respect and value what they're bringing to the table. And, it sounds like the way that you thought about fluency and listening and working with kids really evolved.

Art Baroody (15:03):

Yeah, that's interesting. I was once told by another adult that being a psychologist must really ruin kids for me. Must take all the fun out of it. No <laugh>! You see more. You appreciate more of what they can do! It's amazing. And <laugh>, it's exhilarating! It's quite the opposite.

Dan Meyer (15:32):

What I'd love to say about the plus-one example here is that moment happened in a span of like five seconds, right? That exchange between students. And what folks like you, and us, and our listeners who have taught for a while and thought deeply about teaching — you can see that moment up in the sports booth playing out in real time. And say, "Whoa, slow that down. Back it up. Let's do a replay." And you could do a whole dissertation —maybe you did — about that one moment. And, I just think it's so interesting how that came from a peer; it's like a moment that might get missed by a layperson, this person who spoke to you in a meeting about how kids develop fluency without expertise. And I also think it's so interesting how a lot of people might suggest that what the student needed was to be told this idea about one-after, before. But it's amazing to me how much time students need. Like, I see my own six-year-old counting up to five. And I'm just like, "Buddy!" I just wanna tell him. And sometimes I even do. But it doesn't matter. So much of these ideas — the informal learning — is so durable and needs to ... not run its own course, but have enough experiences tossed at it. So those moments you described then become natural. And I wonder if you'd explain a little bit about what you're learning about fluency development gone wrong. What are some common ways ... I feel like I've mentioned like rushing it—

Art Baroody (17:03):

Can I expand on your other comment, for just a moment?

Dan Meyer (17:06):

Spin it, yeah. Spin it, please.

Art Baroody (17:08):

What I think is interesting about informal mathematical learning is that kids can learn a great deal from their peers. And, often, their peers are closer to the situation and understand the situation better than adults. We, as adults, have forgotten how we learn the basic combinations. And so we — most adults — aren't even aware that there's a number-after rule that can be used to quickly, efficiently generate the sum of ANY number plus one, for which you know the count sequence! Most people just are not aware of that. But this little girl probably had just made the discovery, or done so in the recent past. And so, for her, it was still a fresh issue. It was still something in her mind. And so, she was able to share that with her peer. And, with any luck, her peer benefited from that.

Dan Meyer (18:11):

I think it speaks to all these different learning paths that we've all been on in developing our own fluency. And how easy it's to forget the path in favor of the destination, and then try to create this paved route for kids that bypasses what, for so many of us, was necessary kind of stumbling around a bit. I don't wanna revel in the stumbling ... but I guess the informal-formal dichotomy there is so important to me. We're not just, like, discovering or wandering in the dark. But we are taking stock of our surroundings, and thinking about what resources we have. And, sometimes, I think, it seems like teachers want to move to the side of that. And say, "Well, actually, there's a highway over here. It's moving so fast and can get you there faster." Which I think leaves students disoriented to these connections from informal to formal knowledge. How close is that to what you studied with Ginsburg, about how formal and informal knowledge is related?

Art Baroody (19:10):

Basically, one of the key points that Ginsburg made was that most mathematical learning problems in school are due to a fact that there's a gap between the formal instruction and the child's informal knowledge. So, if a kid is struggling with math — and I have found this with my own case studies — the problem typically is not the child. The problem typically is that the formal instruction is not connecting with what the child knows already. And, if your teachers get nothing else out of this talk today, the Principle of Assimilation, Piaget's Principle of Assimilation, is that we understand things in terms of what we already understand. So, we understand new stuff in terms of the stuff that we already understand. And that principle is violated way too often. And when it is, kids don't have any recourse, other than rote memorization. Or quitting. Not learning it. And those aren't good options.

Dan Meyer (20:36):

Yeah, I love it. Since all new knowledge builds on old knowledge, it leads to this beautiful rule for learning, which is that everybody knows something about everything. Pick any topic that I might one day learn about that's way beyond me. Aeronautical engineering, let's say. That knowledge has gotta build on stuff that I at one point knew, down to knowledge that I was forming as a small child, crawling around. It can be useful. Puts me on a path towards this knowledge. I love the spirit that Bethany brings throughout our work, and what we've talked about here, that kids are brilliant. They have resources that can help all of us learn. Feels like to me an important takeaway of our conversation here. Bethany, what's your thoughts about that?

Bethany Lockhart Johnson (21:20):

Well, absolutely! I feel like, as a teacher, we're facilitators to help build those connections. Or to help highlight those connections, and celebrate those connections, between the new material and the things that kiddos already know. Right? And I feel like when we're thinking about fluency, when we see timed tests or speed drills, and we see — as you said — the damage that's caused by that, not helping kiddos to build connections. I feel like ... I don't know, in listening to this conversation, I feel really moved. Because I get so excited thinking about different moments when I've seen kiddos build those connections. And how can we, as educators, help each other to make sure that, even in something that has so been drilled down to these speed tests and rote memorization, how can we make those connections present there, too? How can we treat that with that same level of respect, and the kids with the same level of respect. And I feel like you've spoken about something called meaningful memorization. And I feel like maybe you can talk a bit more about that. Because there's a lot more awareness of kids and making it matter and respecting them than rote drill-and-kill, right <laugh>?

Art Baroody (22:46):

Meaningful memorization basically involves a number of things. Meaningful memorization builds on a child's conceptual understanding of an operation, for example. So a child needs to understand what addition is, what subtraction is, what multiplication is, in order to achieve fluency with those facts. Let me give you an example. If a child understands that one meaning of multiplication is a groups-of meaning. So, five times eight means I've got five groups of eight items each. OK? If a child understands that conceptually, then five times zero makes sense. Because what do you have? I've got five groups of no items. So how many items do I have all together? <laugh>, I have no items. So, contrary to most multiplication facts, the answer here is not getting bigger <laugh>. And kids can understand it if they have this conceptual understanding of multiplication as a groups-of meaning. So, it can help kids then memorize the zero rule for multiplication in a meaningful way. The other aspect of meaningful memorization is discovering patterns in relations. Like our little girl here, who discovered the connection between adding one and her number-after knowledge, her existing number-after knowledge. So meaningful memorization involves building on both conceptual understanding and trying to find new patterns and relations to enrich that conceptual understanding.

Bethany Lockhart Johnson (24:52):

For me, when I hear that, it sounds so spot-on. And it makes a lot of sense to me. But what would be a response to folks that feel like, "Yes, let's make it meaningful, let's build these concepts, but we still need the timed test, we still need the speed drills"? Is there a space for that?

Art Baroody (25:18):

Speed tests, timed tests, are a tool. An educational tool. And like any tool, they need to be used carefully and thoughtfully, and where appropriate. The problem with timed tests as they're often used is that they're overused. Timed tests make sense after a child understands an operation, after they've had a chance to explore the operation using counting. So that they've had a chance to find patterns and relations among the facts and devised reasoning strategies like the number-after rule. Once a child has devised a reasoning strategy, then it would make sense to have them practice it — even under a timed condition — to make sure that it becomes more efficient, that it becomes fluent. But there's no sense trying to impose fluency before a child has constructed the reasoning strategy. That makes no sense whatsoever. It makes no sense whatsoever to have timed tests before a child has constructed an understanding of the operation. So, mathematics educators, for a long time now, have argued that you need to be careful about premature practice. That you shouldn't have kids doing drills before they have devised means for figuring out the sum or difference or product or quotient or whatever. So I'm not completely opposed to timed tests. But boy, you have to use them really, really carefully. When we were developing software for helping kids learn the basic addition-subtraction combinations, initially there was no timing involved. But once the child had developed a strategy, then we wanted to start introducing the child to some time limit — a generous time limit — so that there was some incentive to use the strategy as quickly as possible. Now the thing is, practice doesn't have to be boring. It doesn't have to be flashcards. It doesn't have to be boring drills. It can involve games. Dice games are especially important to preschool kids and kids in the early primary grades. Why? Because they can see again and again that two plus one is three, that two and two is four. So they can begin to learn some of the add-one combinations or facts, and they can begin to learn some of the doubles, such as two plus two is four; three plus three is six. And this then provides a basis for learning other facts, such as two plus three. Because if you know the number-after rule for adding one, and you know the double two plus two is four, you can look at two plus three and say, "Ah, that's just two and two and one more." So, basically, you're building on your previous knowledge to figure out new facts.

Dan Meyer (29:07):

So I got a voiceover here for a second. I feel like you've just helped me have an epiphany here, Dr. Baroody, which is, well, first of all, timed tests are this topic that just kinda lurks in the background, like a ghost, of every conversation we've had about fluency. And your perspective is, I think, a somewhat unique one. Not a hard-line perspective here. I like the idea that they're just overused. They're a blunt-force instrument to try to pressure kids into fluency when there's so many other interesting games, where a student's natural inclination to optimize or even win can carry the fluency impetus. I dig that. Number one. And, number two I think is this: I feel like we're just mired in these dichotomies in math education discourse around, for instance, conceptual and procedural. Which one comes first? Which one comes second? And I think you've helped make sense of a finding from Bethany Rittle-Johnson. This article was like: They develop together. And it's given me a new question, which is it's not—and it's a question I ask myself—it's not like, is this conceptual or procedural, what's going on here? But rather, what resources do students have? And what experiences would help them develop those? 'Cause what you've helped me see is that the fluency is not just the formalization of this burgeoning resource. It actually creates a new resource. Where when the student is like, "OK, I get it five times one, five times two, five times three, five times four." That is not just a formalization of the kids counting and grouping.

It gives the kid a resource to then do five times zero. That is then a new resource in the bag of resources to help the kid create new concepts. The concepts create the fluency, create the concepts. And so, I dig this question of "What are the resources a kid has? And what do they need to develop new ones?" Versus, like, "Are we doing concepts today? Are we doing fluency today?" No, it's both! It can be both! I dunno, how close is that?

Art Baroody (31:02):

Back in 1986, Herb Ginsburg and I wrote a chapter together to address the issue of procedural and conceptual knowledge in mathematics. At the time, there were two very popular views. There was the skills-first view, where you taught kids the skills. You didn't bother to take the time to help them conceptually learn. You just taught them the skills by rote. And then kids would apply those skills and eventually understand the math too. The concept-first approach was you teach for understanding first and then the skill learning will be easier. If you understand the conceptual basis for a procedure, you're much more likely to learn the procedure. Well, Ginsburg and I took the position that the two couldn't be separated. That basically it was an iterative process. That is, you might learn a skill and then discover a relationship, and then use that relationship to understand something more, and then devise an even better skill, and so forth and so on. So I think they go hand-in-hand.

Dan Meyer (32:29):

They're buddies. They're buddies.

Art Baroody (32:31):

Another view would be the simultaneous view. That both skills and concepts can develop together. And that's another interesting possibility, I think, of how they might go together hand-in-hand. So, I don't see this dichotomy between procedural knowledge and conceptual knowledge. It's not the best paradigm for trying to figure out how to teach. I think it's really important that children understand both the concepts underlying procedures and the procedures. And when you do that together, you're much more likely to have procedural fluency, because fluency is often defined only as using a skill or procedure accurately and quickly, that is efficiently. The National Research Council published a book called Adding It Up; and they argue from the research that it makes a whole lot more sense to think of fluency not only as efficiency, that is accurate and fast use of procedure, but the appropriate use of a procedure, and, perhaps even more importantly, the application of a procedure to a new situation. Now, you can get efficiency through rote memorization, but what you don't get is efficiency plus appropriate use and, more importantly, adaptive use. So that's why I think both procedures and concepts need to be taught in an intertwined way.

Bethany Lockhart Johnson (34:23):

Early childhood ed is my joy, is my land. And I remember, actually, when I was a student teacher in a TK classroom. So, these kiddos are four, right? This is years and years ago. And we were talking about numbers. And this little boy said, "Two plus three is five." And he said it in such a way that it was clear that he's regularly celebrated for knowing that, right? And I'll never forget that my mentor teacher said, "Whoa! Can you show me with these blocks?" We had little blocks on the table. And the little boy burst into tears. And there was this palpable panic, right? And, I'm not exaggerating when I say that was a transformative moment for me. Because what I saw, and I found out later, this kid had been in — I will not name it, but a program that purportedly supports the gaining of math skills. And you can pay them money to have them work with your kiddo. So the little boy clearly knew this script, right? But when he was asked to show it or make meaning of it, he couldn't. And there was a fear; and there was a panic. There was a panic. And I know that the parents and caregivers of this child would never do something ... they thought they were doing good and right and helping them give a leg up. They weren't trying to harm their kiddo. They're taking the time to drive this kid to a class, probably Saturday morning. And when I think about that, and I think about the way that the fear that that little boy had was already holding, and the anxiety that little boy was already holding, and I've seen how fluency can be developed so differently, I just ... I feel like this conversation — and I hope that for educators listening, I feel like you are reminding us and giving us permission to slow down. To slow down. To attend to children's thinking. To notice these little moments when children are showing their brilliance. And I just really appreciate that. And I really appreciate your perspective, your learned perspective, after decades and decades of—not to like, "Whoa, over decades and decades <laugh>!"—and I celebrate that. So, thank you so, so much for being in the Lounge with us. Thank you for helping us make more sense of this. Really, really, really.

Art Baroody (37:02):

You're absolutely welcome. One of the reasons I was so passionate about this is from my own experience. I was a first grader at the time. I was sitting there at my desk doing a worksheet, a math worksheet, and I had my fingers under the desk, because I was figuring out sums. And my first grade teacher said, "Arthur, what are you doing with fingers under the desk?" I should have told her anything but the truth. 'Cause I told her I was counting to figure out my addition. Well, my normally patient and kind and soft-spoken teacher erupted and said, "Don't do that! Don't do that!"

Bethany Lockhart Johnson (37:56):

That makes my heart hurt for baby Art! I've had parents tell me that they've held their kids' fingers down. "I've been holding his fingers down to try to keep him from using 'em, but he just keeps using his fingers." I'm like, "What? What are you doing? There's a tool you carry, a tool around!" Oh, wow. Wow.

Dan Meyer (38:18):

It's a resource.

Art Baroody (38:19):

What was my first grade teacher telling me? What are the parents who hold their child's fingers down telling the child? Your way of doing things is wrong. It's inferior. It's stupid. And that's how a child's confidence in their own knowledge can be undermined, instead of building on it. Instead of honoring it. We too often say, "Oh, well, that's not right. That's not the right way of doing it. Here's the right way of doing it. The formal way." What it does is just undermine children's disposition to learn mathematics. It undermines their confidence to solve problems. And they stop doing it. They just stop.

Dan Meyer (39:10):

They're learners. And they eventually learn what not to do.

Art Baroody (39:12):

And then they become dependent on the teacher and they say, "All right, I don't know how to do this. You tell me how to do this."

Bethany Lockhart Johnson (39:20):

Yeah. Not to mention all the shame and the fear <laugh>.

Art Baroody (39:23):

Yeah. And, you actually hear kids, "Don't explain to me why! I don't wanna know why. Just tell me how to do it." It's just absolute craziness. And that's what the focus on rote memorization does to kids.

Dan Meyer (39:39):

Yeah, that's the outcome.

Art Baroody (39:40):

It really destroys any disposition to think mathematically, to enjoy mathematics. It can be really harmful.

Dan Meyer (39:49):

Well, I always appreciate, Dr. Baroody, a conversation that is far-reaching and takes very seriously teaching mathematics and the gifts that students bring to us in our classrooms, if only we recognize them as such. Bethany and I really appreciate your time here in the Lounge. So, thank you. And I hope we meet again some time.

Bethany Lockhart Johnson (40:08):

Thank you so much, Dr. Baroody.

Art Baroody (40:10):

Any time. I'd be happy to come aboard any time.

Dan Meyer (40:13):

Thanks so much for listening to our conversation with Dr. Art Baroody, Professor Emeritus at the University of Illinois, Urbana-Champaign. Let us know what you thought of this episode. I thought it went a lot of very interesting places. Hit us up in our Facebook discussion group, Math Teacher Lounge: The Community, or on X, formerly known as Twitter, at MTLShow. What questions do you have about math fluency? What would you like to know? Please let us know and we'll do our best to investigate that for you over the course of this season. Make sure you don't miss an episode in this new series by subscribing to Math Teacher Lounge: The Podcast wherever you find fine podcasts products. You can find more info on all of Amplify shows at our podcast hub. Go to amplify.com/hub. Thanks again for listening, folks.