

Myuriel von Aspen (00:00):

It's really interesting to see the similarities between learning a language and math fluency.

Bethany Lockhart Johnson (00:06):

Hello and welcome to Math Teacher Lounge. I'm your host today, Bethany Lockhart Johnson, and I am flying solo. No Dan Meyer. So Dan, we miss you, but you know, you held it down at NCTM, so I'm going to do my best. Luckily, we have an amazing guest. I can't wait to introduce you to her. But I wanna check in: Listeners, we're now on Episode 9 of our series on math fluency. And just like with our whole series on math anxiety, there's so much to say and there's so many questions we have. I know we didn't go into this series thinking, "Well, at the end of the season, we'll have it all figured out." But I am hoping that you are where we are, which is feeling like we know a little bit more than we started. We might have some of our questions answered. We might have questions we didn't even have at the beginning. And mostly, we're just enjoying these conversations and helping to broaden what we think about math fluency. And today, we are going to talk about math fluency development. But the teacher-educator-mentor that we have on today also taught in a dual-immersion setting. I'm really excited to talk about how that impacted the conversations that she had within her teaching community about the way language and language development played a part in fluency development. And I gotta tell you, I was once at a wedding with this person, so I have spent a little bit of time on the dance floor — shared a dance floor — with our guest today, and I gotta tell you: fabulous. On the dance floor. Fabulous. In the classroom, all-around fabulous person. So let's welcome our guest today, Myuriel von Aspen. She's the coordinator of the Multiple Subject Teacher Credential Program at UC Irvine School of Education. For several years, Myuriel taught first grade and fourth grade in a Spanish-English dual immersion school in California. She also spent years as a coach working with other teachers on math instruction. Myuriel, welcome to the Lounge. Thank you for being here today.

Myuriel von Aspen (02:24):

I'm so happy to be here, Bethany. So good to see you. And I'm trying to remember my dance moves from the wedding. <Laugh>

Bethany Lockhart Johnson (02:34):

I don't know, I just remember ... I also went to UCI. So Myuriel and I know each other. We didn't overlap at UCI, but I remember I got to visit your classroom. We knew the bride. We had the bride in common. And I don't know, I just remember it being a fun time. So hopefully my moves, if you don't remember my moves, that's probably a good thing. Because if you remember them ... like, "Oh, I remember Bethany. I remember." <Laugh>

Myuriel von Aspen (03:03):

Yes, I do remember visiting your classroom, too. And it was a pleasure to be there, seeing children joyfully learning math.

Bethany Lockhart Johnson (03:11):

I have to say, that's the best compliment you can give. If you walked in and you felt like kiddos were joyful in their experience and development with math, then you've made my day. Thank you.<Laugh>

Myuriel von Aspen (03:23):

Oh, you're welcome.

Bethany Lockhart Johnson (03:25):

You know, I have to say, this whole season we've been talking about fluency, but we've been talking with folks who have different relationships with fluency instruction. We talked to Dr. Val Henry, who we both know and have learned so much from. And we've talked to so many people. But there's something special — extra-special! — about talking to a teacher who used these ideas and for whom the journey of math fluency was one that they just got to see the fluency come to life in their classroom. And I'm so excited to hear about your journey. But I wanna say before we dive into that, we've been asking all of those guests the question: Is there an area of your life beyond mathematics where you're currently developing fluency?

Myuriel von Aspen (04:18):

I am.

Bethany Lockhart Johnson (04:19):

Ooh! Ooh!

Myuriel von Aspen (04:19):

I am actually developing fluency in another language.

Bethany Lockhart Johnson (04:25):

Wait, but you're already ... you're gonna be trilingual?

Myuriel von Aspen (04:30):

<Laugh> Maybe two and a half. Or maybe three, between the two other that I have half. But for the past six months, I have been learning Italian. Because our daughter is going to Italy to study abroad for one semester, and my husband and I are going to go visit midpoint, because we cannot live without her for six months. <Laugh> And so I've been using Duolingo and I'm proud to say that I have a 192-day streak.

Bethany Lockhart Johnson (05:03):

Hey!

Myuriel von Aspen (05:04):

Yes, yes, yes!

Bethany Lockhart Johnson (05:05):

That's impressive. And I think I would be extra-motivated to keep practicing and signing on if I knew that I was gonna actively be using this in Italy. So that's really exciting.

Myuriel von Aspen (05:17):

I know. You know what? One of the things that's really interesting to me is to see the similarities between learning a language and math fluency. As I'm going through this process, I'm noticing that what has helped me learn is that I practice it on a regular basis. I also like doing it in little chunks. Whenever I

spend more than 20 minutes on the app, I just start getting antsy and I need to move onto something else. And also, I realized that it helps me to figure out the patterns. And one of the things that I notice sometimes when I'm doing Duolingo is that it's a little bit random. And I actually had to borrow a book from someone so that I could just go to the conjugations and figure out what the patterns are. So the patterns have really helped me learn more than sometimes the way I feel about the randomness in which the sentences are provided on the app. And I think thinking about my students learning their math facts, a lot of that is true as well. One more thing I need to say, because I think it's important too: I use what I know to figure out things that I still don't know. So, for example, I use my Spanish and Italian ... with the Latin roots, there's so many similarities, but I've also noticed that if it's not similar to Spanish, it's similar to French, which I also know some because I took it in high school and in college. And so, knowing the other languages helps me figure out the new language that I'm learning. Which is similar to students learning their facts by using other facts as well.

Bethany Lockhart Johnson (07:01):

OK. That's huge, what you just said. And research tells us: frequent practice. It tells us: small meaningful chunks. Using strategy. And using things you know — using facts you know — to help you to make sense of and learn new facts. That is such a perfect connection. All those pieces together are what is going to help build that fluency. And that's huge. That's so huge. And you've seen that; you've seen that work with your students. Can you set the scene for us? If I was to walk into your classroom, maybe when you first started, versus after you'd been using these strategies and skills with your students, to help build their fluency ... what was the story?

Myuriel von Aspen (07:53):

So, I have to start by thanking Dr. Valerie Henry, whom you had on your program. She was my professor and I took one of her courses, where she did introduce me to her research and also to the methods that she had for students to learn their math-fact fluency. So in her case, she has a program called FactsWise. And so I became aware of that, and I started learning and thinking about how I could use that in my classroom. So in my class, I really did practice. I remember her saying that you need to — again, just like you mentioned — you need to do this regularly. You need to do it in small chunks. You need to provide opportunities for students to use tools to manipulate. To use visual representations. To have discussions. And to have fun. That was very important too. And so I started following that method of teaching. And the systematic part of it was so important, too, the way that students learn their multiplication by tens first and then the fives, because they can make sense of that. And then going on to learning their twos and their fours, because they can double. And then their eights, because they could double their eights. Going through that process, I realized that my students coming into fourth grade — even though the standard of fluency for multiplication and division lives in third grade — they would come into my class at the beginning of the year, and at best they would know their fives, because they were skip-counting. Which is not considered fluent. They might know some of their twos, just because, you know, they know how to add the numbers twice. The tens, I found that many of them just, quote unquote, added a zero at the end, without really understanding why.

Bethany Lockhart Johnson (09:47):

The meaning of what was happening. OK.

Myuriel von Aspen (09:50):

Yes. So even though I was a fourth-grade teacher and I knew that that standard lived in third grade, I felt that it was my responsibility. Because fluency is such a foundational knowledge and skill for them to continue doing higher math. I felt that I was responsible for them learning — and I don't mean learning by just memorizing their facts. But really understanding and making sense, and having discussions, sharing their thinking, using tools, all those things that really supported their learning. That was my responsibility. And I just felt like I couldn't outsource that to families. I couldn't outsource that to even a computer program. Because that didn't provide all of these things that I have mentioned so far, for them, especially for the community of learners that I had. Every single student was a language learner. Half of my students had Spanish as their first language, and the other half had English as their first language. So they were all developing either English or Spanish or both when it came to academic language. Every student is a learner of language. Right?

Bethany Lockhart Johnson (10:58):

OK. I wanna pause you there for a second, because I would love for you to say more about that. Because I think so often, we say a "language learner" and someone would only assume that you're talking about your student for whom Spanish was their first language. Or Japanese was their first language. Or I know especially we have a lot of dual-immersion schools in California. But going into your classroom, as the teacher, seeing every single student as a language learner, and knowing that the supports you are going to create and the scaffolding and the visuals or whatever it is you're doing for your language learners — or, actually, for everyone, because they're all language learners — I would love to hear a little bit more about that. Because I don't feel like we hear that point of view often enough.

Myriuel von Aspen (11:46):

Yes. I think when you have that label of "English language learner" ... first of all, I'm not into labels very much. I think they're all seen with this deficit lens. Right? Beginning with that. But I think it also takes away from the other students that are not labeled that way. Because when it comes to schooling, there's so much we need to learn. We are all academic language learners. Our students don't walk into our classroom knowing what the distributive property is, or "I'm going to decompose numbers." So those opportunities for discussion, sense-making, using language to explain your thinking, needs to be provided for every single student.

Bethany Lockhart Johnson (12:27):

That's huge. So, you saw your students have maybe some of their facts, but they weren't fluent. And I love the way that you said, "I wasn't then saying, OK, well, parents, this means you have to handle this." Or you mentioned something about computer programs and you knew, "OK, well, no. No. No. We're gonna break it down. We're going to learn these facts in a strategic way." And you owned it. You said, "This is gonna happen here in our classroom." And I find that so powerful. Because our students are gonna come to us with varying backgrounds. So by making sure that your students had that strong foundation, what did you see happening? How did it evolve over the year?

Myriuel von Aspen (13:18):

It was such a pleasure to see the confidence that my students displayed, once they had ... you know, maybe they knew their tens and their fives and their twos. See how they could use even just those facts to figure out everything else. Even if they didn't have that efficiency aspect of it yet, they were having that flexibility not to say, "Oh, I don't know. I don't know what nine times four is." In my classroom, you

could hear my students say, "Nine times four is 36, because 10 groups of four is 40, and you take one group of four away."

Bethany Lockhart Johnson (14:01):

Wow.

Myuriel von Aspen (14:01):

It was amazing. Like, you think of sevens being, you know, the difficult facts, right?

Bethany Lockhart Johnson (14:06):

Ohhhh, sevens and eights. Ohhh, they're coming <laugh>.

Myuriel von Aspen (14:09):

Yes. They could use their groups of fives plus their groups of two to figure out their sevens. And with enough practice, they became fluent. Either by practicing in different ways through games, or just communicating, they just knew them at some point. And I think for me, it's so important for teachers to know that for students to acquire this language, they need to use language. I guess I'm always surprised to hear ... I've heard sometimes that if students that are designated language learners use programs or use ways to learn their facts without any language, if they don't have that language demand, that then it's better for them. Because they don't need to worry about the language part. We know that to learn language, we need to use language, right? So we need to provide those opportunities for our students to have those discussions. Not only to develop the language, but also because we're social human beings. <Laugh> And that's the way that we learn. And that's the way that we feel, like, "If I don't know something, my friend can help me out," or "I can help my friend out." So there's that social aspect of it as well. But it was, to me, such a joy to see that confidence built. Dr. Henry actually came once to my class to videotape some of my lessons. And I was sharing with her that I had one student that would've been considered someone who is challenged by math, because they don't know their math facts. So at the beginning, she didn't know any. And towards the end of the year, I sat down with her and I said, "So I noticed that you know your facts. It is amazing. When you came into the classroom, you didn't know them. And now you know them! What did you do? What happened? How come you know them now?" And she kind of made this sound, like, "Duh, You taught me." <Laugh> And that was the joy. That was one of the joys. And one of the things that I'll never forget. Because yes, that is a responsibility. And for some children, their parents might be working two jobs, three jobs, and they're not there to help them memorize. Which is actually not the right thing! We don't want our children to just memorize! Right? And so when we talk about work of equity, teaching fluency in the classroom is the work of equity. And taking away those opportunities from our students, we're taking away the chance for them to learn higher maths later on. Because we are what they have, to learn those foundational skills.

Bethany Lockhart Johnson (16:55):

That's so incredibly powerful. And, you know, hearing that story of that student who said, "Well, you taught me," I'm picturing how it could have gone. Where she maybe decided that math just wasn't for her. Because if she'd gone into fourth grade and felt like she had somehow failed, or gone into fifth grade and she didn't know her math facts and just decided, "Well, I'm not good at math," or "I'm not a math person," whatever story might have been created, she may not have pointed and said, "If only I knew my math facts, then I'd be stronger at math!" But by empowering your students to own these facts, and be able to see themselves as mathematicians because they're using strategy, because they're

thinking through problems ... I just find that so incredibly powerful. And I want to go back for a second to something you said about language learners. You were talking about the importance of language and using language as students build their fact fluency. And I would love for you to talk a little bit more about that. Because it sounds to me like if I walk in your classroom, I'm hearing those conversations, that sense-making, happening together. And that isn't something necessarily that folks are going to equate with fluency development. So I would love for you to talk a little bit more about that. That that feels so powerful to me.

Myuriel von Aspen (18:32):

Yes. Exactly right. If you had come into my classroom, you would've heard a lot of sense-making and explaining their thinking. How did they know that fact? So we know that there are different components that make up math fluency, and accuracy is one of them. So when students work into being accurate at their facts, they need to be able to use tools to prove to themselves, "Yes, five times seven is 35." And so I think at the beginning of learning ... let's say the fives. Or any fact. You would've seen in my classroom my students using tools like number racks or Unix cubes, because that would provide them the opportunity to ensure that the fact that they're working on is what it is because they're actually seeing and visualizing it. So that's kind the first step. And then moving away from that, they could start using representations like number lines or area models, and moving them away from the physical. But now that they have the concept, and they have proven to themselves that that's, you know, the number, we could actually chart together. And they could actually check on the work that they're doing by looking at the chart as well. But they could start using representations. But, with all of that is this explanation. I know that seven times five is 35, because I already know my fives. And I know that five groups of five is 25. And I already know my twos. And I know that two groups of five is 10. So if I put 'em together, it's 35. And they're all doing that. And you can see how that's providing them the opportunity for the language, explaining to someone else, justifying their thinking. But the more they make sense of this fact that they don't know, the more they internalize it. To the point, eventually, when they're playing games and they're doing this a little bit faster, they are able to say seven times five is 35. So, tools, representations, explanations, and games for fun. Once they're getting more into the efficiency kind of component of fluency.

Bethany Lockhart Johnson (20:54):

So a teacher might say, "Well, if my students have a timed test in front of them, even if I take off the timing aspect of it, they're still gonna be practicing" And any student could do that because it doesn't require that language. Because they're saying the numbers. They don't need language for that. But what I'm hearing is, "Well, sure, but you're missing the power of what language can bring to it. We don't want to separate the numbers from that language." There's a rich, rich connection that's building a stronger foundation, is what it feels like I'm hearing.

Myuriel von Aspen (21:37):

Yes. Absolutely. Going back to that timed test or to those practices where there is no language or justification. When I did work with in-service teachers, I had the opportunity to assess hundreds of students on their math facts. And I walked into classrooms where you could say, "Oh, all these students are fluent with their facts." Because they could say them within half a second and they were so confident and secure. But a student could, for example, know 12 times eight, let's say. Because they learned them up to 12, let's just say. If I asked the student what 13 times eight was, that student did not know, and would say, "I haven't learned those. I don't know them." I actually had one student get upset at me, and say, "Why are you asking me that? We don't learn 13."

Bethany Lockhart Johnson (22:33):

Ohhh. "We don't..." Yes.

Myriiel von Aspen (22:36):

We are robbing that opportunity. We're taking away that opportunity. Not just from our students that we think are struggling with math facts, but also from students that go home and memorize their facts without the conceptual understanding of equal groups. I can decompose. I can use the distributive property. They don't know what they don't know, because they don't understand the relationships of numbers. They just memorize the facts

Bethany Lockhart Johnson (23:04):

And what's going to give that student the most solid foundation for further math work. Dan, he has not been shy about sharing that he was not too excited about fluency. Like, "No, let's get to the exciting stuff." But this is what I think is so rich and exciting. That you're not spending forever and ever on learning math facts once you have 'em. It's not just knowing the answer, it's then knowing those strategies that are gonna allow you to deep-dive into all that juicy new stuff that he's teaching, right?

Myriiel von Aspen (23:41):

Yes.

Bethany Lockhart Johnson (23:42):

What a great example. That's really huge.

Myriiel von Aspen (23:46):

It also gets to this aspect of math that's not about answer-getting.

Bethany Lockhart Johnson (23:49):

Mmm!

Myriiel von Aspen (23:49):

It's not about "I get it right or I don't." But "Can I really — do I deeply understand? And can I justify and explain?" And, you know, all those math practices that we know really shows that a student knows math deeply.

Bethany Lockhart Johnson (24:07):

You know something else ... I feel like I'm getting such a picture of the culture and of community that you were creating in your classroom. And even you talking about tools, I feel like so often I didn't see students using tools even in first grade, second grade, but especially in fourth grade. It's too rare to see students using tools. And, I wonder if you could just briefly share about that. Because there's a whole lot of pushback I've gotten when I suggest making tools readily accessible for students to use and choose. To use and choose what's gonna help them make sense. So, for folks who are feeling maybe nervous about breaking out tools for their older students, how did you approach it as a teacher? Or how did you overcome those fears of "Oh, they're just gonna play with it," or "Oh, then they're going to always need them." Or whatever it is. The stories we make up right about tool use.

Myuriel von Aspen (25:13):

It is interesting, this idea. First of all, I find it interesting that many students get the idea that only the students that don't know are the ones who get the tools. Right? So you're already setting up that perception that you only go get the tools if you're not good at math. Or this idea of, "If they use the tools, they're gonna become dependent on them." Like, they're always going to be using the cubes. Or the number rack. I have to say that my experience was, if using tools is an expectation of being a mathematician, if everyone is expected to use tools as we're exploring the facts, then it doesn't become, "Oh, it's only those kids that are going to get tools. We are expected to use tools." And I have to say, just the use of tools ... first of all, it's important for everyone. But for someone who is developing their language skills in another language, it is really useful. Because you have a visual. It kind of puts you in a position of describing what you're seeing, rather than just not have anything to anchor your communication on. You have a physical object to describe and to take the time to think about why a fact is what it is. You are seeing. You're decomposing. A student might know, like I said before, that four groups of four is 16. And maybe adding four groups of five ... now I can see that if I add one more group, then it makes it 20. So it really supports the language. But then, also I wanted to think about this idea that they will become dependent on it. And what I've seen sometimes is that when there's no systematic approach to learning facts, the math facts, then using the tools is not strategic. For example, if you are just find out what four times seven is and eight times five, of course a child is just going to be using all these cubes and counting versus using the tool to just figure out something that you can relate it to. And see the patterns. I don't know if I'm making sense. If there's a system, you're relating everything to what you know, and you're using the tools without having to count. But if there's no system, and there's this randomness, then students are gonna find themselves counting everything.

Bethany Lockhart Johnson (27:50):

I totally think that makes sense. And you said the word "anchor." I think that's so key. The tools are serving as an anchor for the student's language development, but also for their conceptual understanding. And you're going in it, and you as a teacher have thought about how this representation — or this concrete representation of this number — will really help to build the connections.

Myuriel von Aspen (28:19):

For example, if students are — let's say they're using tools to figure out six times eight. At this point, when they're learning their six, they already know their fives. So they might model six times eight. But when they're seeing "five times eight," they're not going to count every single "five times eight." They're going to know, "Oh, five times eight, I already know that five groups of eight is 40. And now I just need one more group of eight. And so that's 48. So six times eight is 48." And by seeing those relationships, it supports them in not having to count and become dependent on, every time they get a random fact, having to count to try to figure out what the fact is. And I think what happens is exactly that: students are learning their facts in a kind of random way without seeing the relationship between numbers. And so they do have to count. And I think that's what teachers sometimes refer to when they say that students become dependent on the tools.

Bethany Lockhart Johnson (29:23):

That makes a lot of sense. I love it. You're normalizing — norming — tool use. Mathematicians use tools. And we want our students to be able to show and represent their thinking, as well as use tools to make sense. And you're not just saying, "Here's some cubes." You're being systematic, as the teacher, to show the power of using these tools and using facts you already know.

Myuriel von Aspen (29:49):

Yes. Exactly right.

Bethany Lockhart Johnson (29:50):

That speaks to you and the strategy and the way that you're being so intentional about teaching facts. I also think you've held ... I love getting to hear these stories and the journey in your classroom. And I also wanna make sure we get to share that you've also had these other roles, of being a mentor teacher of pre-service teachers, as well as coaching teachers with math instruction. And sometimes, I feel like teaching in your own classroom can feel a little bit like a silo, and you can feel kind of isolated. So you, getting to have this outside perspective of being able to coach and being able to see all these pre-service teachers through your role, currently, at UCI ... I was wondering if you could share a little bit about either or both: How these roles have shaped the way you think fluency instruction should look in classrooms, or what do our pre-service teachers need to know, so that they're ready to teach fluency and make it a part of their priorities in math?

Myuriel von Aspen (30:59):

Yes. If I were Queen of the World,

Bethany Lockhart Johnson (31:02):

Ooh, yes, please!

Myuriel von Aspen (31:03):

I would have one course <laugh> in the credential program that would just focus on fluency for our multiple-subject teachers. But given that there's this time constraint, our pre-service teachers only get to hear a little part, I I have to say, about how to teach fluency. So, what I've done as a coordinator is, I get together with Val Henry. And we set up some workshops so that our pre-service teachers have more of an opportunity to learn about the systematic approach, before they leave our program. What I find is that our teacher candidates who are at placements where they're experiencing fluency work, in the ways that we've been talking about today, are much better prepared to go to their classrooms and teach in these ways than if they're placed in a classroom where teaching fluency is more of a traditional kind of way.

Bethany Lockhart Johnson (32:08):

That makes a lot of sense. So I'm thinking about our listeners who might be heading to the classroom as they're listening. And overall, I feel like we've talked about so many tips and ideas. Which ... they're not simple things! It's like a fundamental shift in the way we think about fluency instruction! So, tips isn't even the right word. It's like, "No, we need to rethink about how we are teaching fluency in our classrooms." So I'm just wondering, what would you hope that folks would get out of our time together, as they're maybe listening on their drive to school?

Myuriel von Aspen (32:51):

Yes. I think you're exactly right, Bethany, when you say it's not an easy thing. It isn't. It's very complex. And it's a commitment. It definitely is a commitment, with taking those 15 minutes or 10 minutes a day — we know that teachers lack time throughout the day. So making that commitment — and I think it starts with that belief of the power, the power that they're providing their students, by supporting them

with these foundational skills. It's huge! It's huge, not only in what they learn and what they're able to do, but also in the beliefs about themselves as mathematicians. And so, if you do commit to doing this work, start small. Start with 10 minutes a day! Just, first of all, try to find an approach that is systematic. Just like in reading. We need a systematic approach. The same thing happens in math. Think about the patterns that students need to learn. Just like I mentioned, for me it was the tens, the fives, the twos, fours, eights, three-six-nines. But even with just the tens, the twos and the fives, students can figure out anything else. Make sure you provide those opportunities for your students to use tools to use representations. So slow it down a little bit. You know, that standard takes a whole year for students to learn. There is time. Don't think that it's gonna happen right away. Do it regularly. And another thing is make it fun. Play games. But don't let games be the only thing that you do. Because students need to be able to come together to have those discussions to, at the end, just think about, what was something new that they learned? What fact did they figure out by something else that they knew? And ask for support! Ask for support. Reach out to people that have been doing this work. Because it's hard to do it alone. So, if you find a buddy at school, someone — a colleague — that can work together with you, and you hold each other accountable and you learn together, that's probably the best way to go about doing this work.

Bethany Lockhart Johnson (35:08):

That's such great advice. And just like we're not expecting our students to take everything all on at once, hopefully teachers are getting curious about how they could be more systematic and strategic with their fluency work. And I feel like your perspective is so phenomenal, and I will not forget that story of the student who's like, "Well, you taught us," and the pride and the ownership she must have felt, after having done the work. But you set her up for success. And I really, really appreciate you sharing your stories with us, and your perspective. And, you know what I was thinking, maybe we take the dance floor to Italy. While you're in Italy! <Myuriel laughs> Because I just wanna keep hanging out with you! This is great. This is great. <Laugh>

Myuriel von Aspen (36:03):

We do need to do that. <Laugh>

Bethany Lockhart Johnson (36:06):

Thank you so, so much for your time. Thank you for joining us in the Lounge. And I really appreciate your perspective, and your sharing of the work that you have done. And I am excited for those pre-service teachers that get to work with you. That's how lucky they are. So, thank you. Thank you again.

Myuriel von Aspen (36:27):

Thank you so much Bethany, and thank you for this opportunity for sharing about this very important work.

Bethany Lockhart Johnson (36:34):

Thanks so much for joining us in the Lounge and tuning into this conversation with Myuriel von Aspen, Coordinator of the Multiple Subject Teacher Credential Program at the University of California, Irvine, School of Education. Check out the show notes for links to more about Myuriel's work. You know, we have had so many great conversations about fluency this season. If you missed any of the episodes, you can find them right on our podcast feed. And next time on the show, Dan will be back. We missed you, Dan. Dan will be back, and we'll be speaking to another one of our favorite math educators, Fawn

Nguyen. She actually joined us Season 2, Episode 3, way back in Season 2. Here's a little preview of Fawn's return to the Lounge.

Fawn Nguyen (37:22):

People would just abruptly say to me, "How does my student be able to engage in this problem if they don't know their facts?" And I think, out of all the things that I hear, that one breaks my heart. It really breaks my heart. Because somehow we're equating computational and memorization with being able to think, being able to enjoy mathematics.

Bethany Lockhart Johnson (37:43):

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