

Podcast: Good Enough Homeschooling

Episode: 14: Teaching Math in the Homeschool Part 2

File Name: episode 14 – Teaching Math in the Homeschool Part 2

File Length: 22:02

Transcription by Keffy

Courtney: [00:00:00] Welcome listeners to the Good Enough Homeschool podcast where we cheerfully eviscerate popular homeschool curricula. In today's show, we have a special guest, Lu Allen of Epic Education Illawarra is joining us from Australia to talk about mathematics in the homeschool. This is our second episode of two in our short series on teaching math in the homeschool.

AJ: [00:00:21] Lu Hello,

Lu: [00:00:22] Hi there, I'm calling in from a regional city called Wollongong, which is just south of Sydney. First of all, I'd like to acknowledge the traditional custodians of the land here, I'm on D'harawal country and I'd like to pay my respects to the elders past, present and emerging.

Jenn: [00:00:36] I had an epiphany during this conversation that maybe Lu, when you said how you actually give kids permission to say, "I'm feeling anxiety." If anyone had ever done that to me when I was a kid or said that to me, that would have been fantastic because instead I got myself so wound up in a ball of, "I don't understand, everyone else understands, why don't I understand?" That I didn't hear anything for days, and you get farther and farther behind.

Lu: [00:01:03] And the more that anxiety builds, and that association with panic builds, the harder it is to break away from it. I would much rather involve a student in identifying their own emotions and their own needs and choosing their activities around that. I do tell anxious students to step away from the work, do something that helps them feel better. Try it again later.

[00:01:25] And another thing that I speak about often with anxious parents and anxious students is that I feel that there is a myth about confidence in students and in their learning. The confidence myth says build confidence in the students, then they will feel empowered to try things, to make mistakes, to discover things. And that sounds really great. That sounds really lovely, honestly. But I find that competence precedes confidence and not the other way around. And that students know when

we are giving them a pat on the head and a participation certificate and saying, "Go you, you're awesome, you can do anything." And they can't, because we haven't taught them the skills that they need yet. They know that it's not true. But they don't have the language to say, Thank you, but I actually don't have the technical skills for that." Or, "I actually don't have the prerequisite subject matter knowledge for that." They don't know how to say actually, I can't do it. So they sort of accept this pat on the head and move on and end up feeling like frauds, because all the adults in their lives are saying you're awesome, you can do anything. And they find that they actually can't do anything, not knowing their seven times tables.

[00:02:35] I really like to back right up and give students skills before we ask them to do anything with them. So this is where, Courtney, I imagine you're thinking, direct instruction.

Courtney: [00:02:46] You know me, Lu.

Lu: [00:02:48] We need to give the students information and skills so that they can learn them, and then feel good about being able to apply those skills to novel situations. But yes, you need to teach them, and then they know things. And then they feel good about knowing things. It's really, really difficult to get to work the other way around. It's unfair, as well, on anxious students to tell them, you can do anything you set your mind to. And for them to sit there panicking, and they can't do anything. And their mind isn't set. And it's just not working.

Courtney: [00:03:21] I couldn't agree more. I really couldn't. If anyone is mathy. It is the person who can hold in their working memory longer and have bigger chunks. You know, long division, think about it. Six goes into 54. What is six times nine and running through all my sixes. You have to keep all of that in mind and balance it and do it all at once. And if you don't know that stuff right offhand, it becomes an exercise in torture. Because where was I? What was I doing? Especially if you have a low working memory. It's just absolutely maddening. This is when kids cry.

Lu: [00:03:55] Yeah,

Courtney: [00:03:57] It's not their fault that they don't know six times nine like the back of their hand.

Lu: [00:04:04] Yeah, and when I back up with students and say, let's go back to some more foundational skills. what I tell them is, this is going to be boring, but I would much prefer for you to be doing maths and feel bored than for you to be doing mathematics and feel panic. The relief on these

students faces when I tell them, let's go back and do easy things until they're really, really easy for you. It's amazing just to see. I've had students cry with relief when I've said, Let's stop trying to do the maths at this level. There's nothing wrong with you. There is nothing wrong with the way that you learn. But you haven't been taught the things that you need in order to approach the problems that are in front of you now. So let's take you back. Let's teach you those skills. And I actually find that backing up a really long way ends up being more efficient than backing up a little way and still having gaps.

Courtney: [00:04:57] Absolutely. I think that I as a teacher had a long time coming to understand that there is a difference between performance and learning. Having your student leave your session or you know, having the kid leave the dining room table and be like, Oh, yeah, I understand long division, I can do that. Can they do it in a month? Can they do it in six months? Can they do it next year? And what kind of practice do you need to build into your life, to make sure that they have the information on a long term, ongoing basis? And I tell my students, I don't want you to just to understand it, I want you to practice it so hard that you engrave it into your neurons. I want to be able to poke you awake at 1:30 in the morning, ask you the formula of a circle and you mumble it before you even awake. That's how hard I want you to know it. And they just look at me like I'm crazy. And I'm like, "Oh, yeah, you swim? How many times did you practice laps? How many times did you practice flip turns? How many times do you practice your scales on your instrument?" You know? And then they're like, "Oh." But no one has ever taught them to apply that to learning. We do our students a disservice.

Lu: [00:06:09] Courtney, I have a question for you. What do you do with students who are struggling with rote memorization? Are there any students who you think that's just not ever going to work for? Does that ever fail? Or do you find that if you put in the time and the drill and have them practice, that eventually, anybody will be capable of memorizing those tables?

Courtney: [00:06:31] So yes, and no. So remember, I don't tutor, I teach classes. So there's a little bit different, there. I think that if you practice long enough, in the right way, and what looks right for one student will not look right for another. It may look very different. Like Gwen would practice... Gwen would practice addition jumping up and down on the trampoline, right? But Elena is a real visual creature, and she needs to see things. I was scribing for her addition and making 10s and little equations. And that works for her. That would not work for 99% of kids.

[00:07:10] If you do the practice, if you get it in the right way, if you have the patience to do it day after day after day, it doesn't have to be long, you know, 15-20 minutes, but day after day, after day. Every day. Then yeah, I think you can do it.

[00:07:23] On the other hand, in terms of doing it in the boundaries of a class, there are some students, I'll just be like, "okay, you're using a calculator. Maybe you can sit there and figure it out? But we're moving on and this is not worth you banging your head against a brick wall, because I have other things I want you to learn. I don't want you to feel hamstrung by this at this point."

Lu: [00:07:48] Yeah. I sometimes have students not know certain facts. And for many of them, I'm fairly sure it's just because nobody's ever actually taught them those facts and taught them how to study them. But then sometimes I have students who are further along, I'm thinking, and there might be kids who have come out of school, as well. And I do know that they do a lot of drill of multiplication tables in school. And I'm like, if you haven't got it, if you haven't got your rote memorization of your tables by now, maybe you haven't got a brain that does rote memorization very well. And that's where I start to sort of look at other options to try alongside more memorization. I'm like, well, if this student can't memorize, well, let's get them really, really good at skip counting, for example, and they can use their fingers. Repeated addition, other than the exact equation for the two factors.

Courtney: [00:08:44] I don't care if they memorize the exact equation, I'll be real honest. Just so long as they can get where they need to go. Being able to get 'er done is a skill.

Lu: [00:08:54] Yeah, so something that I've found that has surprised me in how useful it's been, and how underutilized it is, as well, is the fundamental theorem of arithmetic. And being able to express... you either have a prime number or a composite number. If it's composite, you can express it as a product of primes, because I've got the students who are trying to learn like a 12 by 12 times table, 1 to 144. And I say to them, actually, every single number on this chart is either prime or it's a product of primes. I teach them the Sieve of Eratosthenes, we circle the prime numbers from two to say 11. Those are all the numbers that you need to be able to divide by. So if you see a number, you can tell pretty quickly whether it's divisible by two, or by three by five, or by 11. Seven's a little bit harder. But if you have like limited capacity for memorizing tables, learn your sevens, get really good at skip counting everything else,

and go. And it just keeps working really, really well for the students I'm meeting who are struggling to memorize things.

AJ: [00:10:01] I wanted to move on to ask about mathematics instruction. Obviously, there are a lot of different philosophies. Question for Lu, do you think that there is a particular teaching approach that you find superior to others? Are there readily available curricula that reflect that teaching philosophy that you could recommend to listeners? Or, on the other hand, ones that you really, really hate because they don't work under any circumstances?

Lu: [00:10:27] I really like natural learning of mathematics in the younger years. Games, and conversations and more games, it's just a lot easier to get a lot of practice in playing a game than it is to set a young child in front of a worksheet. For my young child, he was nowhere near being ready to write his own solutions. I scribed for him for a very long time. So we did a lot of natural learning for the first few years. And then before sticking him in a curriculum, he started Beast Academy level three, when he was, I think about seven. He'd done natural learning from about kindergarten, year one, year two. I was pretty sure that he was ready to start Beast Academy at level three. But I wanted to call together his threads of understanding and formalize them. That's one of the things that we need to do with mathematics is, it's cool to know a thing, but you kind of need to be able to state it formally to communicate it to other people.

[00:11:19] I just ran him through the Khan Academy, early math mission. We didn't do any of the videos or anything, it was basically just checking that he had mastery of those topics. And every now and then we'd find one that we hadn't covered through playing a game. And so I would just teach it to him on the spot. He was quite receptive to that.

[00:11:37] But even then, working through a curriculum, games, they are so much bang for your buck if you want a child to be practicing. Yeah, we played a lot of games. I sometimes pause in recommending natural learning of mathematics to families who haven't seen much of that before, because it's one thing to say, we do natural learning of maths and it's another thing to actually do natural learning of maths. It's very easy to say, we love living maths, we learn mathematics through being in our environment, and recognizing patterns and having conversations and they all sound like really nice things to be doing. A lot of people who say those things are not doing them.

Jenn: [00:12:18] You mean, it's not just counting Monopoly money.

Courtney: [00:12:20] Or baking cookies.

Lu: [00:12:21] It's... no. We all know that there are fractions in baking. There are limits to how far that's going to get your child. There are some great living math resources online, I think there's LivingMath.net. I also really liked the videos at Education Unboxed, and they use cuisenaire rods.

Courtney: [00:12:36] Those are great.

Lu: [00:12:36] Yeah, they're great. Yeah. And the games and you can just, you can watch a short video as a parent. And suddenly, you've got this great new game that not only demonstrates the concept that you're trying to teach over and over again, but turns it into a game. As soon as you're playing a game, you get to demonstrate that same thing over and over and over again, and the kid thinks it's really fun. That can work quite well. I do think, though, at some point, you're going to, as I said earlier, collect those threads of understanding up and have them formalized. Some people will want to do that earlier than others. For some people having a very structured schedule for homeschool is really important to their family, others will want to be doing natural learning for as long as they possibly can just because it suits their family rhythm and values a little better.

[00:13:21] Even then, you get to choose, here's where we're a little bit spoiled as well. Mathematics and the curricula that are available to us are probably the easiest to customize to a particular student. There are so many different options. And they do use quite different approaches. So you might have a student who learns best doing lots and lots of review. And so you choose say a curriculum, where they sort of spiral through the topics and add a little bit more challenge every time you sort of come around to topic A, and then topic B will be built on in another three months and things like that. Others need a mastery curriculum.

[00:14:01] Okay, so on one hand, we can customize our children's mathematics education very, very closely to what they need. On the other hand, if you've got a thing and it's working, just do that, because while I say on one hand, we can get a perfect fit. On the other hand, you don't actually need a perfect fit. You just need it to be good enough. It needs to be something that the parent feels confident using, that seems to be working for the student. I mean, as long as they're not crying, that's good. You probably can work with anything else. Yes, I recommend getting a curriculum and if it's working, just stick with it.

Jenn: [00:14:38] So say we all.

AJ: [00:14:40] Yeah, it's true. There's a reason that we have the bookcases full of all of these things. So what would you recommend for parents who don't feel confident about their own skills? What can they do either to increase their competence, as you say, so that they can feel more confident? So what can they do to make up for say a less than ideal education in mathematics that I and many of my peers I know had.

Lu: [00:15:06] I would recommend that you get a curriculum, which is designed specifically for homeschoolers, and not for a school teacher where they assume a certain level of subject matter knowledge and teaching skills. Start from the beginning, if you need to. Start from whatever level you and your student both need to be at to start learning these things. Probably the easiest way for a parent to learn with the student is to scribe at least half of the lesson. I recommend scribing for children, even if they don't need it, because I like to offer more support than I believe is necessary. And then have the student communicate to me later on, I don't need you to do that for me anymore.

[00:15:47] Working with my own child who is quite anxious, anytime I've tried to slowly withdraw some support and see how he goes, he panics. And we're back to square one. So, I like to offer more than is necessary, and in some cases, be quite overbearing, and I mean, I can scribe an entire lesson for him. And how that benefits us is that I know exactly what he's working on. And it's teaching him to pretty much smash through one question after another. Whereas I hear many stories of children who sit with a worksheet for 40 minutes and don't write anything down. You're not learning any maths by doing that. You're not learning any study skills. I don't know, these kids are just sitting there bored to tears dropping their pencils over and over again. I would preemptively be an involved parent, even if a student doesn't need it at that level. And it just means that you get to learn together as you go. And because we have been talking, you know, in particular, about parents and children who are anxious about mathematics, the child will benefit from having a calm, collected, adult at elbow, breathing deeply, and the child will benefit from that co-regulation.

AJ: [00:16:54] There is a tendency, which I've seen this in multiple subjects, but I think it's particularly true in mathematics that parents who are busy and often stressed and pulled in many directions, want their kids to be able to work independently far, far earlier than is actually possible for most children.

Lu: [00:17:11] And it backfires so hard.

AJ: [00:17:14] It really does, it really does. So even kids that I'm working with who are 13-14 years old often need a significant amount of hand holding. And certainly, the seventh graders, that year for many kids is just a pit of hormones and changes and confusion, and so on. And we often think that, well, you know, they're almost a teenager, they should be ready to do all these things on their own, but they can't, they really, really can't. And they do benefit tremendously from having that, yes, that calm presence there that says, "Okay, this is the next thing. We're going to do the next thing, even if the next thing is, okay, now pick up your pencil." You know, whatever it is to just keep them moving forward.

Courtney: [00:17:55] As someone who's perpetually strapped for time, and someone who very much finds, say, for example, teaching phonics to be incredibly boring, it is much easier to sit there and walk through it with your kid than it is to nag them for an hour.

Lu: [00:18:12] Yes. Yes.

Courtney: [00:18:13] You can get it done in like 15 minutes, and then they can go play rather than have to be like, "Pay attention. Look at the worksheet. Pick up your pencil. Stop scratching your nose." Just sit there with them, walk through it with them, get'er done and move on in life. It actually saves you so much time.

Jenn: [00:18:29] Oh, and I would say that's true for all of homeschooling. I sit with my kids through everything.

Lu: [00:18:35] One thing that I see many people getting quite caught up with in mathematics education, in general, is this idea that we need to make it appealing to our students. I see that generally one of two ways. It will be either let us show the students the applications for this mathematics so that they will understand how useful it is. And that's where we do things like ask them to design a veggie patch, or I had one high school teacher tell me very proudly, one day, that all her year seven students have to plan a barbecue. So it either is, here are the applications. Here's why you're learning maths. You might one day need to calculate a taxi fare. Or people go the other way. And they're like, "We need to show students that mathematics is beautiful." And that's a cool idea. It's really difficult to communicate beauty of mathematics to people who don't know very much of it. So that's where I see people pulling out things like, "Let's look for mathematical patterns in nature." And that could work quite well because there are a lot of them. But it sort of ends up with people saying things like, "Is this a Fibonacci spiral? What does Fibonacci spiral mean to you?" And the mathematics that you need to be able to generate something like that is rather advanced. Children aren't going to really

learn much by seeing a picture of a thing that maths can produce. I just don't think that they would find that particularly motivating.

[00:19:57] So I wish that when we were demonstrating the beauty of mathematics to students that we do it at a level they can actually engage in. Things like, prime numbers are really fun, a little bit of basic number theory can be great because it's working with the natural numbers, meaning 1, 2, 3, 4, and so on. And those are numbers which are very, very accessible to even very young students, because those are the numbers that they'll start learning to do arithmetic with and as soon as you know what multiplication is, there is a whole lot more that you can do with the natural numbers. And there are some pretty cool results that are fun to demonstrate and fun to play around with. I wish that it were being taught by people who genuinely love it and can communicate the beauty of numbers to children.

AJ: [00:20:41] Yeah, it's very difficult to find the way to present this stuff that actually does capture a student's attention. The United States is kind of notorious for having poor teacher preparation in mathematics, particularly at the elementary level.

Courtney: [00:20:54] And that is why I recommend curricula when I talk to people who want to homeschool and do math, because most of us just don't have the necessary background. We need that help.

Lu: [00:21:07] And I agree. And that's what those curricula are specifically designed for. Parents who do not have that background, who do not have those teaching skills. You can get a pretty high level of hand holding out of a homeschool curriculum, and you should use it.

Courtney: [00:21:23] Even someone like me who teaches math, I really appreciate the elementary curricula for mathematics, because it covers things that I would not have thought to cover, it covers them in a way that I would not have thought to cover it. It covers them with a degree of thoroughness that I would not have previously said was necessary.

AJ: [00:21:42] Well, awesome. Thank you so much, Lu. This is fantastic. I mean, this is really—

Lu: [00:21:46] It's been really fun. Thank you for having me on your show.

AJ: [00:21:49] Oh, you're very very welcome.

Courtney: [00:21:49] Thanks for listening to Good Enough Homeschoolers. Before we go, show some love for your new favorite podcasts by leaving us a

review and stay tuned for next week when we will show some love and hate for a curriculum. I promise.