

Teacher Time Series: Exploring Math with Infants and Toddlers

Treshawn Anderson: Hi, everyone, and welcome to "Teacher Time." It's so good to be back with you guys today. I'm Treshawn Anderson, and I'm with the National Center on Early Childhood Development, Teaching, and Learning. And today we are so excited to be here to talk about exploring math with infants and toddlers. Joining me today is my friend, Judi Stevenson-Garcia. Hi, Judi!

Judi Stevenson-Garcia: Hi, Treshawn. Hi, everyone. Welcome back to "Teacher Time." We're so glad that you've joined us today. Before we get started, we just want to take a minute to acknowledge that things might be a little bit different for you than the last time we were here together. Treshawn and I work from our homes regularly, and so it might not look too different to you, but we're both here with our husbands and kids. Mine are downstairs right now taking an online kickboxing class, so that's not normal. So, we just want to acknowledge that we're in a different space. We hope you and your families are safe and healthy. And while we're here today to talk about math, first we want to really encourage you to make sure that you're taking good care of yourself so that you can keep taking care of others.

Treshawn: That's right, Judi. I know my little ones have been enjoying some kids yoga videos to help them to relax, but it's so easy to forget about myself. But one way that you can help yourself to relax is by taking some time each day to pause and take a deep breath. Try turning off all those thoughts that you have running through your head and just focus on breathing. In fact, since I have you here right now, let's do it. So, close your eyes and take a few deep breaths in and out. Think about our next hour together and what you want to focus on. What do you want to learn about math and infants and toddlers? Just try to be present in the moment. Let's take a few more deep breaths.

Judi: Thanks, Treshawn. That was helpful, and I think I should probably maybe set an alert on my phone to remind me to take some more of those deep breaths throughout my day. Well, let's turn to our topic for today. As you know, if you've been with us this season, we've been talking about STEAM – science, technology, engineering, the arts and math – and we've been taking turns talking about how to support infants and toddlers and preschoolers in exploring those concepts. If you haven't been able to see our previous episodes, you can find them on MyPeers in our "Teacher Time" community, and we're also working to load them onto the ECLKC, which is our resources website for Head Start.

Treshawn: So, our "Teacher Time" team also includes our Q&A facilitator, Jan Greenberg. Hey, Jan!

Jan Greenberg: Hi, Treshawn, Judi, and everyone tuning into today's "Teacher Time" episode. I'll be behind the scenes monitoring the Q&A, so make sure to use the purple Q&A widget if you have questions about helping infants and toddlers explore math concepts and skills. I'm looking forward to chatting with you.

Treshawn: Thanks, Jan. You know, she has been so helpful this season in answering your questions, so be sure to chat with her in that purple Q&A box during this episode. And later in this episode, you'll see our guest expert, Dawson Nichols from I-LAB. He's back, and he's here to share some great ideas for supporting math learning with your infants and toddlers.

Judi: We have such a great team here at "Teacher Time," and I'm really excited to see what Dawson is going to share with us today. He always has such great ideas.

Treshawn: Now let's dive into the good stuff, into our last but not least STEAM topic of the series, which is math. So, we're going to talk today about what math is and strategies that you can use to support infants and toddlers in exploring math concepts. So, starting with what we mean when we say math. So, math or mathematics for the long version of it is just a way of describing the world. It's a way of thinking. It's a way of knowing and problem-solving. And so, in early childhood, probably the first thing you think of when we say math is numbers and numerical operations, like understanding more and less and how many. And, yeah, that's true. Learning about numbers and how they work is a very important part of early mathematical thinking.

Judi: That's right, Treshawn. And what you might be surprised to find out is that even very small babies already have a very sensitive understanding of what number is, and research shows us that children are born with very basic understandings of math concepts that involve quantity or how many. So, for example, babies can estimate quantities of small sets of objects and tell the difference between "more" and "less." There are some fun science experiments if you ever want to look some of those up. It's fun to see how they figure out what babies know about more and less and number and quantity. A recent study showed that children ages 14 to 18 months who aren't yet able to say one, two, or three, they actually already have some understanding of what those number words mean. So, this is important when you are engaging with very young children around number concepts, that even though they might not be able to say the number words, they're already starting to figure out what those number words might represent. For example, you might say, "Oh, you have two blocks" or "Could you get me two blocks?" And even if they can't say, "two," they might be able to hand you two things.

Treshawn: That's so interesting, Judi. I just love learning about research that's done with infants and toddlers. Those little ones are just so amazing to me. And if you're interested as much as I am, you can find out more about the studies that we'll be talking about from the articles that we've included in the resource section on the viewer's guide, so be sure to download that so you can get access to it. So, math also includes things like comparing and sorting, which can be considered classification, and even exploring and thinking about shapes and how they fit together, which is geometry and spatial thinking.

So, let's connect these concepts to the Early Learning Outcomes Framework, or ELOF, as we like to call it. Although you've probably already begun connecting math for infants and toddlers to the emergent math subdomain within the ELOF, connections to early math skills can be made across all of the central ELOF domains. And so, infants and toddlers when they pay attention and persist and exercise their curiosity and creativity, well, this is approaches to learning. And

they also use their senses and fine motor skills as they begin to explore and understand basic mathematical concepts and spatial relationships. But the two domains that we're going to focus on specifically today are cognition and language and literacy.

Judi: Yes, that's right. So, math is really where we see the cognition and language coming together. Think about your toddlers who are starting to use language. Think about maybe snack or lunchtime. One of your children finishes their last piece of fruit, and they might say, "More," or they might even sign the word more. They're starting to connect language with quantity. Your 2-year-olds definitely are going to start talking about the number two for sure. Two is a fun thing. You have two hands. You can hold two objects. So, listen for your children as they start to vocalize what they understand about quantity and offer your children who aren't quite there yet with their language abilities ... offer them that language. "Oh, you have two pieces of fruit left. Do you want more fruit?" So, you can use the words that mean quantity for them to build the foundation for them so that they'll be connecting those cognitive and language skills together.

Treshawn: Yeah, Judi. You know, talking numbers with infants and toddlers is so helpful, and that's an easy strategy to remember, right? So, if you've been with us this season, we've been talking about three major strategies for supporting STEAM thinking and learning, and today we'll apply them to math thinking and learning. So, first is, you want to create an engaging environment, and so what we mean by that is providing a wide variety of open-ended materials that are accessible to all children, and Judi will talk about that a little bit more in detail. Then we want to provide nurturing, responsive, and effective interactions. And this means, you know, really observing children and listening to what they say and watching what they do, and then respond to them in the way that makes them feel safe and really helps them to learn. Because remember, infants and toddlers are more likely to learn and explore when they feel safe and experience consistent and positive interactions with caring adults, and when you actively show interest and support in their explorations, well, that really helps them, too.

And, finally, we're going to offer engaging learning experiences and opportunities for our infants and toddlers, and this means providing math-learning experiences that are based on their interests and their abilities. One thing to highlight, and Dawson will get to this later in the episode, is that learning experiences and interactions can happen throughout the day, during your routines and playtimes, so be sure to incorporate math at every opportunity. But first, Judi, can you tell us a little bit about what we need for early math learning?

Judi: So, for early math learning, it's really important to make sure that you have open-ended, varied, and accessible materials for your infants and toddlers. What does this mean in terms of math? Well, fortunately most of the things that you probably already have can be used to support mathematical thinking. Remember, it's not just counting. We're also talking about making patterns, thinking about shape properties, geometry, and putting things together and pulling them apart. So, you want to make sure that you have objects that can be sorted or matched. Toys, objects, and food have shapes, sizes, and colors and textures that can be described. Lots of objects can be moved or fit together, put into different sized containers.

There are different types of nesting cups or nesting spoons or boxes and bowls that children can stack and put together. All of these things are helping children develop their spatial thinking, their cognitive abilities, their understanding of quantity, their understanding of patterns and sorting and classifying. These are all foundational aspects to early math learning.

So, do you have enough materials for multiple children to explore and use at the same time? You know, if you have something really popular, it's always good, especially for your toddlers, to have several for them to choose from and play with, and if you make sure that they are available for children to get off a shelf and put it back if they need to, then that means that they're accessible. So, think about what you have in your indoor environment and your outdoor environment, and also what is suggested that you offer through your curriculum, and do a little checklist in your head. Are they open-ended? Are they varied, and are they accessible? And then think about what else you can add to your classroom or your family child care setting that will allow children to explore mathematical concepts.

Treshawn: OK, so now it's time for that ideas widget. So, go ahead and open the orange ideas widget with the light bulb and share some ideas with your colleagues here on the "Teacher Time" episode about materials that your infants and toddlers are interested in and how you can see those materials supporting their mathematical thinking. And feel free to keep adding these ideas as we continue throughout the episode, and, remember, you can respond to individuals' comments and even give thumbs-up for great ideas. So, go ahead and share now, and as you're sharing, we're going to take a few minutes to think about how materials and interactions and learning opportunities can be used to support number sense. So, number sense is the ability to understand numbers and what they mean, and infants begin to think about numbers as they see different objects or they see small groups of objects and larger groups of objects and as they hold on to one or two objects in their hands.

Judi: OK, so it's time for some videos. We're going to watch two videos back to back of teachers using materials to support children's thinking about mathematics. So, in the first video, pay close attention to how the teacher is interacting with the infant sitting in the middle. Her name is Melody, and she's holding the nesting cups. Look for open-ended, varied, and accessible materials. During the second video, listen for number words, spatial words like near and far, up and down, slow and fast, even measurement words like big and small. Think about how this interaction with children supports their language development as well as their mathematical thinking and learning.

[Video starts] Woman 1: Yeah. Can you do the rectangle mirror where the bird is? Oh, where did your happy face go? Uh-oh, you put him in the pot, circle pot. Now what? Oh, does it turn? Now what? Oh, two? You have two circle nesting cups, Melody, purple and yellow. Circle dots and stripes. Circle dots like on your shirt. Yeah. [Video ends]

[Video starts] Woman 2: Did you finish all your fruit? You have no more fruit left. Yes, it's all gone. There's no more.

Child 1: No more!

Woman 2: Look. Isabella ate all her fruit, too. There's no more on her plate. Do you want some more fruit, Isabella?

Isabella: Yes.

Woman 2: Yeah? Do you want fruit? Braden, you like your mangoes? You only have one more left. Oh, Sasha has one mango left. She ate all three of the mangoes. What, Zoe? Are you going to drink your milk now? That was a little sip you took. She did drink her milk. You want to drink your milk, too? Yeah. You see the cow on there? How many cows is on your milk? See one. Let's turn it this w. Oh, there's another one. Two. Two cows.

Woman 3: Take smaller bites, OK?

Woman 2: Look. Let's try your rice.

Woman 3: Take a small bite. There you go.

Woman 2: You want to try your rice?

Woman 3: It's a full scoop of rice. That's a big one.

Child 3: I want more.

Woman 3: You want more rice, or do you want more beans? Beans? Yeah? Rice? [Video ends]

Judi: OK. Weren't those videos great? Did you notice how engaged those young children were with the materials, and did you notice how a routine like lunchtime was used to help them think about math concepts? Don't forget that routines offer great learning opportunities for infants and toddlers. The adults in both of these videos intentionally use math vocabulary even with tiny infants. Did you hear all of the number and quantity words like, one, two, three, all gone, more, little, big, how many, full? All of these words are building children's vocabulary and also helping them to think about mathematical concepts. The adult in the second video held up two fingers when she said, "Two. Two cows." So, now she's connecting the quantity of what she has with another way of representing the number and the language as well. All of that math talk took place during play and daily routines like mealtime. The adults paid attention to what the children were seeing, what they were doing, and even what they were communicating, and then they responded to the children appropriately and in supporting their mathematical thinking.

Treshawn: Yeah, Judi, those children were really exploring their math concepts. And so, when you think about the ELOF, we saw in the video Melody mouth and shake that yellow nesting cup, and then she looked down, and she picked up a larger nesting cup and then stared at them both before figuring out that she could bang them together. Well, that behavior reflects the infant and toddler cognition goal, number eight in the ELOF for children birth to 9 months, who attend to quantity by reaching for and looking for more than one object because, you know, she reached for the other object. So, we're going to watch another video, this time focusing on

the teacher's responsiveness to the infants as she supports the development of number sense, and when we're done with the video, we'll give you a chance to write down some of your thoughts. Go ahead. Let's watch.

[Video starts] Woman 4: It's going back, and the little one is coming in. One, two little animals. Two little animals jumping high and jumping down low. This one is coming close, and this one is coming close, and now they go far, far, far. Oh, no. Where are they going? They're going to jump up and down, up and down. Now they're going to run fast, fast, fast, fast, and then they're going to come back slow. And then they run fast, fast, fast, fast and then slow. And then here comes the big elephant. The big elephant says, "No, stop running so fast. Go slow like this." Slow. Fast, fast, fast. No, no, no, slow. You must go slow. And they come back, and the little elephant comes back, too, and now there are one, two, and three animals. But then the little monkey says, "I want to come in, too. I want to come right in between you two." There's one, two, and three! [Video ends]

Treshawn: There was so much happening in this video, right? So, we're going to give you a "Teacher Time" minute to reflect and write all of your ideas down. So, use Box 1A of your viewer's guide and write down what you saw this adult do and say to help the children develop their sense of number and quantity. Also, tell us what you thought was nurturing or responsive about this interaction, and when we come back, we'll share with you what we saw. Go ahead. Take a minute. [Music]

Judi: OK, so here's what we noticed. There was a lot of math talk going on in this interaction, and this teacher was doing what we call mathematizing, which is basically looking for opportunities in your regular interactions to use math language with infants and toddlers. This teacher mathematized her story and intentionally used math language to build their vocabulary and their receptive and expressive language skills. In addition to that, she was focused on supporting their understanding of concepts like number, measurement, and space. On top of that, the interaction was great, and this was also a very engaging environment, and her interactions with the children were definitely responsive and nurturing.

Treshawn: Yeah, Judi, I just love how sensitive and responsive this teacher was in her interactions, and I really love how close she was to the infants so that they can respond to her and reach out for the materials that she was using to explore math concepts. On a different note, remember that infants and toddlers have a lot of receptive language before they start talking, so they understand what you're saying way before they start talking themselves. Because of this, we want to make sure that we're using familiar words for math concepts, from the children's home languages if we can, and that really helps them connect their new learning. So, if you don't speak a child's home language, that's OK. Just ask parents to teach you some words or phrases for math ideas that their children seem interested in. And you don't have to make a whole vocabulary list of words that you want to learn. Just start by trying to use some of the same words that parents use for things like "all gone" or "more" or "two hands" or "last one" or "in and out" or "same and different" and maybe vocabulary words like the names of

shapes. And don't forget to use vocal emphasis and gestures and repeating sentence patterns to help children understand what your words mean.

Judi: So, the second major concept that infants and toddlers learn about as they play is matching and sorting. These terms are often used together, so let's talk briefly about what they mean. When young children explore their environment, they notice how things are alike or similar and how they're different. So, for example, infants can tell the difference between familiar and unfamiliar adults. "I know you" and "Wait, you're a stranger." They explore the way different objects feel by moving them from one hand to the other and definitely by putting it into their mouths.

Treshawn: Yeah, Judi, and, you know, as they learn about people and objects in their environment, they begin to sort by characteristics that have meaning to them, such as color, size, and shape, even textures and sounds and maybe even some smells. Hopefully you're smelling good those days. Matching also involves finding things that are the same or have similar characteristics, and so infants may bang two blocks together, recognizing that they're kind of the same material. Older infants and toddlers begin to match objects by similar or related characteristics such as picking up two balls that are the same size or maybe two balls of the same color or putting one baby doll in each chair around the table. Sorting involves separating objects into groups according to their characteristics. So, you might see older toddlers begin to sort objects into two groups based on one single characteristic, like putting all the toy animals in one pile and all the toy people in another pile. And during lunch, you may observe toddlers moving food that they don't like to one side of the plate and food that they do like to the other side so that they don't touch.

Judi: That's right, Treshawn. I still may be guilty of pushing some food to the side of my plate that I don't like. Remember, an important aspect of the sorting and classifying materials that you provide is that they are accessible. So, for example, if you're helping older infants and toddlers with matching and sorting, some children who have some fine motor delays might need objects that are larger in size and easier to hold onto. Or a child who is visually impaired might enjoy matching and sorting objects based on touch or the way that they feel, putting bumpy things together or soft and fuzzy things together. Smooth objects go in one place, and rough objects go in another. A child with motor delays might enjoy matching and sorting larger, softer things like stuffed animals or large, soft blocks.

Treshawn: Matching and sorting is probably one of my favorite things to do with infants and toddlers. I know my son likes to match the socks as they come out of the dryer, so that's a good way to start things. So, we're going to watch some videos of adults interacting with infants and toddlers, and so I want you to use your viewer's guide to write down what you might say or do to help these children explore matching and sorting. So, look for engaging environments and nurturing, responsive interactions, and use Box 1B of your viewer's guide to write down some other things that you might say or do to help children explore matching and sorting concepts. Go ahead. Let's watch.

[Video starts] [Chatter] Woman 4: It's round and bumpy. [Chatter] Look at this ball. Yeah. Oh, now you have it down low? Oh, pick it up. You got it. Now it's in your mouth. Trying to put the whole thing in there. Look at this ball. It's a blue ball. Look at this shape. It's round. [Chatter] Put it in your mouth. [Chatter] Up high. Down low. Now it's coming towards you. [Video ends]

[Video starts] Woman 5: See if you can find it. Where's it at? Where's the scissors?

Woman 6: This is a square.

Woman 5: Is that red or blue?

Woman 6: Where is the square at? Can you find it?

Woman 5: That's red. We need which one?

Child 4: Right here!

Woman 6: Where is it? Which one? [Chatter] There you are. That's going to go in here.

Woman 5: What's another color we can find? [Chatter] Bless you. Oh, we're trying the square. This that one?

Child 4: That's green.

Woman 6: Green? What shape is that?

Child 5: I found another one.

Woman 6: You found another one?

Child 4: That's green.

Woman 5: Green? This one... Say, "Square, green square." That's a long word, isn't it? That's a long word.

Child 4: A circle.

Woman 5: A circle? How many holes... [Video ends]

Treshawn: So, here are some ways that we thought the teaching staff in these videos could support children's math learning. So, for the infant video, you could definitely expand on the language. For example, you might say things like, "The ball is round and bumpy. Now it's in your mouth. Does it feel bumpy in your mouth?" Or maybe things like, "The blue ball is round and smooth, and I bet the smooth ball feels very different than the bumpy ball." That's kind of helping them with the sorting and matching and things. And so, for the toddlers, we can help the children focus on one attribute at a time. So, you might say things like, "Can you find or can you name all the red shapes and put them in the pegs?" or "You found two circles. Can you find

the rest of the circles and put them on the pegs?" So, that's also helping them with matching and sorting and figuring out what's similar and what's different about certain shapes.

Judi: I love those examples, Treshawn. Those are examples of mathematizing your interactions with young children. So, let's finally talk about geometry and spatial awareness, some of my favorite math topics. So, everything in the world that we see and touch consists of objects that exist in space, and infants and toddlers are starting to understand the attributes of those objects or what makes them unique and where they are in space and how we can get to them. Think of a young baby on her belly reaching out and trying to get a toy. She's learning something about space. Does my arm reach far enough to get to that toy? These are some of the most important aspects of development in a young child's life. So, knowledge of object categories and attributes are things that make objects unique. It allows children to mentally and physically organize things in the world. My favorite blanket is here, or my favorite stuffed toy is here. This is food. This is a toy. They start to think about similarities and differences.

And then when we think about spatial awareness, that baby trying to reach out and grab a toy, that allows children to locate objects and find their way successfully in environments. Once babies start to become mobile and toddlers start toddling, they are learning about how their body moves through space and how their body interacts with space. So, when you use spatial language, this allows children to understand and then eventually express their needs. So, they might say, "Oh, no. Ball under chair." They're learning how to describe the space where that ball is existing. They can talk about shapes. "I put two triangles together. I made a square." So, they can start to tell you what they're thinking about mathematically when you provide them that language first. As it turns out, young children's use of spatial language actually predicts their later spatial problem-solving. So, for infants and toddlers, the spatial language that they'll use is basically about describing location and position: in, out, up, down, under, top, bottom. So, they're beginning to learn how to describe where things or where they exist in space.

And then some more advanced language would be: in front of or behind, next to, near and far. So, you can incorporate that language into your daily interactions with children to start giving them that receptive vocabulary, and then eventually it's going to come out in their expressive vocabulary as well. In addition, geometric shape names include words for two-dimensional shapes, like circle, square, triangle, but don't forget about those three-dimensional shapes as well. You can use words like cube, sphere, pyramid. All of those words are mathematizing language for children, and it's going to build their vocabulary and concept development.

Treshawn: That's great, Judi, and while we're on the topic of shapes, another example is helping children learn about shapes by using puzzles. So, you might start with the shape puzzles that include, you know, just the square and the circle and the triangle and the rectangle. Here's a tip: Start with the circle piece first. It's going to be the easiest one to get into the hole, and starting with this shape gives the child the best chance of being successful at completing the puzzle. Also, puzzles with knobs are going to be great for beginners or children with fine-motor delays. And, lastly, look for puzzle pieces that are very thick and easy for the children to hold because that's going to provide the most accessibility. So, we're going to watch a video of

interactions with toddlers, and as you watch, use your viewer's guide to write down in Box 1C some of the spatial or geometry language that you hear the teacher use. Go ahead. Let's watch.

[Video starts] Woman 1: Do you know what shape this is? It's a triangle. [Chatter]

Woman 2: Can I help you?

Woman 1: This, let's see. It's got one, two, three, four, five sides. It's a pentagon. These are stars. Do you want to find it on here? Where can you find it? Stick it in the hole.

Child 1: There, there.

Woman 1: Where does it belong? Oh, you have to find the same shape. What shape do you have to find to match it? Can you find the match? Which one matches?

Child 1: This one. I did it!

Woman 1: You did. You fit it in. Uh-oh. You have to find the exact same –

Woman 3: Say, "Excuse me."

Child 3: Excuse me.

Woman 1: Look, four. Turn it around, and see if you can find the match. [Chatter] You found the match, very good.

Woman 2: I don't know. You show me where it is.

Woman 1: Oh, this is a trapezoid.

Child 4: Where is it?

Woman 2: Are you matching it?

Woman 1: Do you know what? You have to turn the block around and see if you can find the match.

Woman 2: High five!

Woman 1: OK? Let's turn it over. Do you see a match?

Child 5: What's another one?

Child 1: I find it!

Child 4: An octagon.

Woman 2: Yeah, how many? [Chatter] [Video ends]

Judi: OK, so there was definitely some mathematizing happening there. Did you hear the geometry words, like "sides" and "same," talking about the attributes of the shape? Spatial orientation words, like "turn" and "match"? And then also shape names, including some more sophisticated ones, like "pentagon," "trapezoid," and "octagon." Yes, you can and you should use words like that with infants and toddlers. You can use it in their home language, in English, and sign language, or even through communication devices that young children might be using.

Treshawn: That's right, Judi. Using those sophisticated terms may be a little scary at first, but using them more frequently really helps build your confidence as a teacher and helps you feel more confident in providing more math-learning experiences for your infants and toddlers. So, our friend Dawson Nichols, from I-LABS, is back with us to share some new ideas and some new strategies with you. So, use Box 2 of your viewer's guide to write down some things that you may want to try or learn more about and how those things might fit into the curriculum that you're using. Hi, Dawson. I'm glad you're here with us for our last infant-toddler "Teacher Time" episode for the season.

Dawson Nichols: Oh, hello! Thank you for having me back again. I can't believe we are already at the end of the STEAM series. That went fast. But math seems like a great place to end the series because we know that early math skills are a great predictor for later school success, so we want to be sure to share these principles with infants and toddlers and share them often. Repeating things is a wonderful, wonderful technique. Thankfully with math, that's a pretty easy thing to do because math is everywhere. It's just in the world around us. Math is a way of understanding the world, a way of seeing things, and so our job, really, is just to call out the mathematical principles in the world around us as we're working with infants and toddlers because the world is made of physical things, and you can count them. You can count the things around you, wherever you are. You can talk about the shapes of the things around you. You can look for patterns, and when we're talking about infants and toddlers, those are really the three things that we want to share with them. We want to talk about numbers.

We want to talk about patterns, and let us remember that patterns do not just exist in space. They also exist in time, so rhythms, routines, cyclical patterns, music. Let's not forget music and the arts. Please don't forget the arts. They are important in and of themselves, but they're also important because they have these underlying mathematical principles just embedded in them, and we can share that with the infants and toddlers that we're working with. So, we have numbers, we have patterns, and then the final one is shapes. And when we talk about shapes, we're talking circles and squares and triangles, but we're also talking about length and distance and size, proportions. If you have a glass of water and you pour it half-full with water – and I hope your glass is half-full – you can share that concept with a child that you're working with. And this idea of half or just even a little full and a lot full, less and more, these are important mathematical principles. And again, really, it's just a matter of sharing it by sharing the language and drawing children's attention to these different things.

Now, it can seem overwhelming. OK, it's in the world all around me, but how can I share all of these things with children all the time? And I like to say the best technique is to not do that.

Don't try and share everything all the time. Give yourself a task on any particular day, and say, "Today, I'm going to share numbers," and then work on numbers that day. Count the things that you see. Count the number of windows. And then the next day, work on patterns, and then talk about the patterns that you can see in the window. Talk about shapes the following day. "Wow, this is kind of round, and I can find some other round things around me." And in doing it that way, you will make sure that you're covering all of the mathematical principles, but with certain activities, it will make that activity much more enjoyable from one day to the next.

Let me give an example. Here we have some Play-Doh, lots of different kinds of Play-Doh here. I've got a big purple blob here, and if I'm concentrating on numbers one day, I can say, "Whoa, look at that. I have one piece of purple Play-Doh, and when I take it apart, it's two. One, two pieces. Wow." Now, the other describing words that I have, they don't change, right? This is purple. It's always going to be purple. It's squishy. It's going to stay squishy, but just by separating it, now I have one and two, and if I do it again, I have three. Those are pretty difficult concepts, and I'm going to need to practice with them over and over again. But as we heard earlier in the webinar, children as young as 14 months old are beginning to understand numbers, which is why if I say, "This, this, this," that really isn't as helpful to a child as if I say, "One, two, three." And they may not be able to use those words. They may not be able to share that with me right now, but it is starting a process in their brains of making these connections and helping them understand number. That's how it works. And if I worked on number one day with Play-Doh, maybe the next day I want to work on shape, and so I've got some pink Play-Doh here. This is a nice ring, and inside is a circle, and I've made a cube over here, and notice I can talk about the surfaces and how it's flat on the sides. I could count the sides if I want, too, but today I'm going to concentrate on shapes. I've made a sphere, a ball and, again, simply by drawing the children's attention to different aspects of the world, you can make what is essentially one activity new from one day to the next, and that will make it enjoyable for you, but it will also make it really enjoyable and really helpful for the children in your care as well.

I like to use big gross motor skills, and so sometimes what I like to do is I get painter's tape. This is blue, but it also comes in purple and green, and what's good about is that it is sticky, but it's not super sticky, so I can put this down on the floor. I can put it on a rug. I can put it anywhere, and I don't need to worry about it doing any damage to the surface. But I can make patterns, and then I can ask the children to explore the patterns with their bodies. I could make a square and ask them to stand in one square and now find a circle to stand in. I could make a line and ask them to follow the line, and as we are playing, we are learning these really basic mathematical principles, and the more you can incorporate it into play, the better, because play is, of course, the way children learn. That's their mechanism for learning. And I wanted to share one final idea with you, and that is, people sell pattern blocks of all different kinds, and they're great, but I like to point out to people that, you know, you can make your own, even just with a simple piece of paper. You take the paper, and you cut off one corner to make a triangle, and then you cut off another corner to make another triangle, and then let's do it one more time, and what I have done is I have made myself a very interesting little puzzle. And I like to put it on another sheet of paper just so that I can see it a little better.

And now what I can do is, I can take this triangle, and I can do all sorts of things with it. I can count the sides. I can rotate it. I can talk about the shape. We can do a treasure hunt and look for other triangles in the world, but I could also say, "OK, well, how does this fit in... Triangles are different sizes!" Now I'm talking about sizes. I'm talking about flipping it over. I'm talking about rotation, lots of mathematical principles in something as simple as this. And it doesn't need to be expensive. It doesn't need to be complex. Again, math is everywhere, and you might have a book that doesn't have mathematical principles as a subject, but I guarantee there's things in there that you can count. There are different shapes. There are patterns that you can discern, and you can talk about children with when you're playing with books, when you're doing tummy time and looking around the room.

In so many different ways, so many different times during the day, there are opportunities to share mathematical principles with infants and toddlers. So, that's all the time I have. I wish I had more. These are really fun things to do, but I appreciate your attention, and I hope some of this has been helpful, and I hope that I will be able to talk with you again sometime soon. Thanks very much. [Video ends]

Judi: Oh, my goodness. Thank you so much, Dawson. You always have such great ideas to share with us. What a great summary of how we can support infants and toddlers in developing their mathematical thinking skills. So, let's watch a video of a teacher putting this into practice. In Box 3 of your viewer's guide, you can use that to write down how she has turned water play into a math-learning environment. What concepts is she supporting? What math language does she use, and how does she invite the child to communicate? Let's watch.

[Video starts] [Chatter] Woman 3: We're filling it all up. Thank you, Bria.

Woman 4: Let's pour it.

Woman 3: What color is this one, Bria?

Bria: Yellow!

Woman 3: Yellow! What color do you have?

Bria: Red!

Woman 3: Red! You have a red one, and I have a yellow one?

Bria: Yeah.

Woman 3: Yeah? And what color is my shovel?

Bria: Blue!

Woman 3: Blue. What color is your shovel?

Bria: Yellow!

Woman 3: Good job, Bria. Is it all filled up now?

Bria: [Shouts]

Woman 3: It's all full?

Bria: All full.

Woman 3: All full. What are you going to do with it?

Bria: Ooh. Woman 3: You want to keep it?

Bria: Yes.

Woman 3: OK. Let's keep it right there. You want to fill up the green one?

Bria: Yes.

Woman 3: The little green one. [Video ends]

Treshawn: This is such a great video. I just love water play with infants and toddlers. I mean, I just love infants and toddlers, don't you? So, anything you do with them is fun, but in this video specifically, the teacher turned this water-play interaction into a math-learning opportunity by using the water-play toys to draw Bria's attention to the water level. She said things and asked questions about whether the container was full, and this helped Bria think about some spatial concepts, like how much water does it take to fill up this space? She asked questions, and she waited for Bria to respond, like, "Is it all full up now?" And when Bria responded, she repeated what she thought Bria said, like when Bria said, "All full." She repeated that and then asked what Bria was going to do with the container now that it was full, and she waited for Bria to answer. That's being responsive. And she expanded Bria's vocabulary by asking if she wanted to keep the container full, and when Bria said, "Yeah," she responded with, "OK, let's keep it right there," and she put the container on the bottom of the water table and asked the child if she wanted to fill up another container. Also, one important aspect of supporting children's thinking and learning is to engage in the learning opportunity with them. Did you notice how the teacher was playing alongside the child, scooping up her own water into her own container? She wasn't just observing and commenting, but rather she was exploring with the child.

Judi: That's right, Treshawn. Exploring together is so important, and one way we can do that is through the arts. Let's talk about the arts for a minute and how they can be used to support math learning. So, in addition to offering sensory, creative, and problem-solving opportunities, the arts are a powerful way for children to connect with their culture and identity. So, for example, if making beaded jewelry is important to the family, you can find large plastic or wooden beads that an infant can hold and mouth safely or a toddler could put onto yarn or a

leather string, or you could make your own beads out of cardboard, homemade clay, or aluminum foil. Remember, beads can be moved, counted, matched, and sorted.

Treshawn: Yeah. Beads can be a lot of fun to play with. You know, just make sure that they're big enough that children can play with them safely. And music is another great opportunity to support children's mathematical thinking because there's so many repeated patterns and rhythms and rhyming words when you have music involved. And children just love music, and they're naturally drawn to it, and music supports the very earliest understanding of some mathematical concepts. So, it's also a great chance to connect children with their culture and identity through the music and the rhythms that are important to them and their families. So, we're going to watch one last video that shows an adult and an older toddler playing with Play-Doh. The toddler has asked the adult to create Play-Doh balls of different sizes, so we're going to watch and listen as this adult helps the toddler count the Play-Doh balls all the way to six and identify some of the different sizes of the balls, too, that they've made. And notice at the end, when the toddler uses math vocabulary, "Big ball," and laughs as he bounces the Play-Doh ball on the table. This is math learning through the arts.

[Video starts] Woman: Now, how many do we have?

Boy: Five.

Woman: Five, good job. We have five now. Look at ...

Boy: Oh, six.

Woman: Oh, six, you like six? Each one is bigger now. Is this bigger or this? What is big ball? Yay, and where is small one? Where's little one? Yes, good one. Two, huh? Three, four...

Boy: Five, six.

Woman: Six, yeah.

Boy: Big ball.

Woman: That is big ball, yeah.

Woman 2: Aman, put that in the bin, honey, please. [Chatter]

Woman 3: I'm catching it. I'm catching it. [Laughter] [Chatter]

Boy: Big ball.

Woman 2: I see it. Big ball, huh? [Video ends]

Judi: What a great video to end with: a teacher and a child working together, cocreating together and learning about mathematical concepts together. It's fantastic. Well, we could talk

for a lot longer about infants and toddlers and math, but we're going to end here, and I just wanted to recap a couple of the ideas that we covered. First of all, math is everywhere. So, in your daily interactions with infants and toddlers, remember to mathematize your language, to highlight the concepts that they may be observing and to offer them new language to express what they're thinking. From birth, we know that children are exploring everyday math, and this includes informal knowledge of things like more or less, understanding shapes and size, spatial thinking, like distance. All of these things children are beginning to learn at birth and continues through their infant and toddler years. You make these math concepts concrete and visible for children when you speak the language of math and when you use the language or the languages that children know best and when you ask questions and wait for responses and then scaffold their learning as needed.

You also make math concepts come alive when you provide engaging and accessible environments, when you interact with children in ways that are nurturing and responsive to their needs and interests and when you provide many opportunities for children to explore math concepts. So, supporting math learning helps children develop in all of the ELOF domains, specifically cognition and language like we talked about today. So, be a mathematician with children and explore together and encourage your colleagues, too, who might feel intimidated at the idea of using more sophisticated shape words or language with infants and toddlers. It's probable that you do a lot of the things that we talked about today, and so, remember that supporting infants' and toddler's math learning, actually their STEAM learning, is all about being intentional and consistent in your approaches and by getting down and learning together with the children that you work with.

So, thanks again for being with us today. Before we end, we're just going to share a couple of last resources that we have for you to support your work with the little scientists and mathematicians that you work with each day.

Treshawn: Thanks, Judi. So, guys, if you or your ed manager are looking for more videos and strategies for supporting children's mathematical thinking and learning, visit the "Math Learning Trajectories" page on the ECLKC. The link is in the resource section of your viewer's guide, so be sure to download that viewer's guide if you haven't already, and there you'll find videos and suggestions for teaching practices that support infants and toddlers.

Judi: That is a really helpful site. I hope that you check it out. There's lots of great videos of infants and toddlers thinking about math and teachers who are supporting them. The other opportunity that you have to get engaged is MyPeers. If you haven't joined yet, you should. It's a virtual informal social community where you can exchange ideas and share resources, and you can lend support to the early childhood community. So, if you haven't joined yet, you can do so through the ECLKC. You'll find us in the "Teacher Time" community, where we've been posting more videos and sharing strategies related to supporting scientists. Currently, there are 58 open communities on MyPeers with over 10,000 members, so in addition to "Teacher Time," you might find some other communities that look interesting. There is a handout in the green

resources widget that will help you get started, and we hope that we see you in our "Teacher Time" community soon.

Treshawn: Text4Teachers is another resource that sends you two free text messages each month with information and tips and research and resources to strengthen and support your teaching practices, and then there's the ELOF2GO app, and that's available in English and Spanish, and that helps you learn more about the ELOF and gives you quick, on-the-go access to the ELOF goals for children and provides examples of effective teaching practices to support children's growth and learning. And then, finally, if you work with children who are dual language learners, the Ready DLL app provides ideas for weekly activities and resources and videos to help you learn more about effective teaching practices and also gives you key words and phrases in several different languages.

Judi: Thank you so much for joining us today, and for those of you who have been with us all season, we really hope that you've gained some valuable strategies for supporting infants and toddlers and exploring STEAM concepts. We have definitely enjoyed sharing those strategies with you. Before we go, we just want to, again, send you our best wishes from all of us here at "Teacher Time." Thank you for all that you do and all that you're doing to care for children and families. We hope you and your families stay safe and healthy. And please remember, take some time to take care of your mental health. Take some deep breaths. Stretch. Go for a walk if you can. Maybe listen to some music. I know my kids and I, we've been having dance parties every day just to kind of feel good and get some of our energy out and to spend some time enjoying each other's company. Just for your information, if you are looking for resources related to COVID-19, we do have a link in the green resources widget that will take you to the COVID page on the ECLKC, so please take a minute to check out the resources there.

Treshawn: Yes. Let's continue the conversation in MyPeers over in our "Teacher Time" community. We would love to hear from you about all the new ways that you're supporting children and families in your programs, and if you haven't seen it already, we posted a survey in the "Teacher Time" community asking you about how we can help. Go ahead and take a minute to tell us what we can do to support you as you transition to online teaching and virtual communications with families. We know it's a little different, but we are in this together. So, take good care of yourselves and your families, and our next and very last "Teacher Time" episode of the season will be in May. We hope you'll join us because we're going to be talking about exploring math with preschoolers. So, until then, be well.