The "S" in STEAM:
Research on the Go Podcast

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Announcer: Welcome to Head Start Talks, where big ideas support your everyday experiences.

Amelia Bachleda: Hello, and welcome to Research on the Go, a podcast where we explore some of the latest research in the field of child development, its implications, and practical applications. My name is Amelia Bachleda, and I'm joined today by Marley Jarvis.

Hi, Marley.

Marley Jarvis: Hi!

Amelia and I are from the National Center on Early Childhood Development, Teaching, and Learning, and we're both based at the Institute for Learning and Brain Sciences at the University of Washington in Seattle.

Amelia: In this podcast, we want to not only talk about the research itself, but also to provide a space where we can talk a little more deeply about ways to incorporate that science into your work supporting programs and grantees.

Marley: And today we're going to be chatting about STEAM – Science, Technology, Engineering, Art, and Math. STEAM – all of those letters, all of those different subjects are really united by a common approach – using evidence to gain knowledge, create new things, and solve problems.

Amelia: Yeah, and STEAM also touches all developmental domains. So, for example, STEAM skills like reasoning and problem-solving – those are maybe pretty easy to identify within the cognition domain of the ELOF, or the Early Learning Outcomes Framework. But developing and building STEAM skills supports learning across domains.

So, for example, from being able to perceive, observe, and make sense of the world as described in the Perceptual Motor and Physical Development domain to using increasingly complex language to be able to communicate, which is indicated in the Language and Literacy domain.

Marley: Yeah, absolutely. These STEAM skills are really supporting learning across all developmental domains.

Amelia: So, now that we've talked a little bit more about STEAM, let's think more closely about the "S" in STEAM.

How do infants and toddlers explore scientific concepts?

Marley: Yeah, it's a really great question. Children are born scientists, and, in a way, they kind of have to be. They're born into this world where so much is unknown to them, and the way that they learn about the world around them is just like how scientists do – by carefully observing and running little

tests. So, some examples of some tests might be like seeing if the stranger in the grocery store will smile back at them.

Amelia: And if that stranger is me, the answer is "yes."

Marley: [Laughter] Absolutely. Me, too!

So, through running little tests like this, babies methodically explore their world just like the way scientists do. To give you some more examples here, I want you to think for a moment what do babies know about physics already?

Amelia: Well, I'm thinking that they probably have a pretty close and personal relationship with the floor.

Marley: [Laughter] Yes. So, babies, when they're trying to learn to walk, they've probably fallen quite a few times, so this idea of gravity.

Maybe they have tried banging their sippy cup on the table, and through that, they might recognize that objects have solidity. The cup and the table both are solid objects.

Amelia: Yeah, and, in fact, research backs that up.

So, by 12 months old, babies already recognize when something defies the law of physics, and they run little experiments to try and figure out why.

So, for example, if baby sees something that doesn't quite make sense to them – like imagine a car that seems to magically float in the air – they're going to be more likely to repeatedly drop that toy when they have the chance to play with it.

It's as if they're asking, "Hey, is there something about this toy that I don't understand?"

Marley: Yes, so sometimes these little games that babies are playing, we might notice it, and, at first, it might seem just kind of a silly or inconsequential little game.

If you're observing what little tests they might be running, it's actually quite sophisticated. So, babies are constantly running complex little tests to try and figure out the world around them. Just like older children and adults, babies are using the inquiry cycle.

Amelia: Okay, so the inquiry cycle – what is that? Can you tell me a little bit more about it and how I might use it?

Marley: The inquiry cycle is something that you use every day, and so do babies and so do older children. So...

Amelia: Great. That seems good. I like hearing that it's something that I might use every day.

Marley: Yeah, so you're already using it. That's always a nice first step.

Amelia: Absolutely.

Marley: So, the inquiry cycle is a way that we think through solving a problem, and this includes babies. So, that first step is observing where we notice something about the world around us, and from that observation, we end up with a question, usually.

So, we've noticed something, and then have a question or are wondering about it. And then, from there, we might make a prediction, conduct an experiment, and reflect on what just happened. What are the results?

To get us thinking about this, let's run through an example.

Amelia: Great.

Marley: So, imagine it's snack time, and a toddler has some avocado and might notice that she can squish the avocado with her fingers.

Amelia: Yeah, so then an adult can help turn this experience into a guided exploration by voicing her observation and asking a question.

So, she might say, "Ooh. Those avocados squish when you squeeze them in your hand. I wonder if your apple slice will do the same thing. What do you think will happen?”

Marley: So, you notice that we had the observation there, and the question, and a prediction. With older children, you can ask them, "What do you think will happen?”

Younger children can just play with it. That's, essentially, experimenting, which is this next step. So, if we have the toddler playing with an avocado and maybe an apple, an adult can narrate what is happening. "Hmm. The apple is hard. It doesn't squish like the avocado when you hold it. Should we try another one? What about the carrot?”

So, modeling this type of observation, questioning, wondering, and experimenting helps children build their already blooming STEAM skills.

Amelia: And active exploration and language modeling is also a really great way to support children who are dual language learners.

For children who are learning a second language, it's particularly important that they're able to engage in this type of hands-on learning, that they, for example, are able to feel the difference between that squishy avocado and the harder apple slice.

Adults can support dual language learners by doing these activities alongside the child, narrating in their home language, if possible, as they also squish that avocado or squeeze that apple slice.

Marley: And providing these kind of opportunities for active exploration is also really important for children with suspected delays or disabilities.

So, if you're working with a child with suspected delays or disabilities, think about really following that child's lead. This is essential.

So, children may want to try squishing the avocado over, and over, and over again, or maybe they quickly lose interest, and maybe it turns out that they don't really like the feel of that squishy avocado at all. And that's okay. So, by paying attention to the child's cues, and by adapting the experience to meet their individual needs and interests, adults can support STEAM learning for all children.

Amelia: And that is so important – supporting STEAM learning for all children. These different techniques that we're talking about – language modeling or following a child's lead – those are really best practices that help all children learn.

Marley: Yeah, and so when we're thinking about supporting science, it's all about being curious about the world around us and asking questions and then trying to figure out why. By following a child's interests, you can support these science skills.

Amelia: And I love that so much.

The root of it is just being curious about the world, and that's something that we all have access to.

Marley: Yeah. Absolutely.

Amelia: Most everyone who has spent at least some time with babies has watched as babies run these tests or go through the inquiry cycle. What are some opportunities to help support or scaffold their science learning as they're exploring the world around them?

Marley: Babies are just naturally exploring, and engaging, and wondering with the world around them. So, one of the best things that you can do is just engage and wonder along with them. This is a really great opportunity to begin modeling and questioning a curious mind, because science for young children is all about exploring the world. Children of any age and ability can engage in science learning.

Amelia: And if programs are feeling a little overwhelmed or maybe looking for a place to start, the outdoors is a particularly rich environment for exploring.

There are so many opportunities for wonder or for noticing something new. Maybe it's just that that fall air feels a little chillier than it did the other day, or there's a new animal in the neighborhood, or even exploring in that little grass strip between the playground and the school building. You don't have to have a lot of space or access to a huge park to really enjoy and explore the outdoors.

Marley: And you might even consider bringing some of the outdoors inside if you don't have access to an outdoor play space. So, adults can bring in leaves or other types of things that are easy to transport inside. Any activity or any time of day can be a chance to help children explore the world around them in an organized way.

So, if you think about that inquiry cycle, that can be a way to structure explorations together to help boost these STEAM skills in young children.

Amelia: And I love the inquiry cycle, because not only is it a great way to support children's learning, it can also be this really nice framework to help adults think about an organized way that they can support children's science learning.

So, today we talked about some of the many ways that adults can help young children learn about science. Exploring and wondering together, as we've said, is the best way to help build young children's natural science skills.

Marley: To get started supporting programs in this area can be helpful to initially prompt a program to discuss what it is that they're already doing to support STEAM learning with infants and toddlers, what their questions are, and what concerns they might have – support programs in feeling confident that they have the capacity to help young children develop STEAM skills.

They don't need to hire biologists or other professional scientists to help children learn about science.

Amelia: Everyone can access STEAM learning and science just by wondering and asking questions.

I think that's the real beauty of it.

Marley: And a good way to help support this is as you work to support programs, you might also consider providing programs with trainings or information about the inquiry cycle that we've been talking about. And you also might want to emphasize the importance of active exploration and language modeling for infants and toddlers.

Amelia: For more information on supporting children's STEAM learning and resources you can provide to programs, visit ECLKC and search for "STEAM."
Thank you so much for joining us today, and we hope you join us for our next podcast in this series, Babies and Tech: Exploring the "T" in STEAM with Infants and Toddlers.

Announcer: Thank you for joining Head Start Talks.

For more information on what you heard today, visit the Early Childhood Learning and Knowledge Center, or ECLKC at eclkc.ohs.acf.hhs.gov.

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