

**The “E” 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 today I'm joined by Marley Jarvis.

Welcome, Marley.

Marley Jarvis: Hi! Thanks for having me.

So, Amelia and I are both from the National Center on Early Childhood Development, Teaching, and Learning, and we're based at I-LABS – 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 it into your work supporting grantees.

Marley: Okay, so today, we'll be paying particular attention to how babies engage with the "E" in STEAM for Engineering.

Amelia: Marley, to get us started, I have a question for you.

Marley: Okay.

Amelia: When I say, think of someone who is always asking why and wondering how things work, who do you think of?

Marley: I think of my little cousin.

[Laughter]

So, really, anyone who's spent some time with an older toddler or preschool-age child, you're probably thinking of that person. It seems that young children are constantly asking why about anything and everything that they see.

Okay, now think about the first thing that comes to mind when I say "Engineer."

Amelia: So, often the first thing that comes to mind when I think of engineers is really somebody maybe wearing a hard hat, working on building a bridge, and maybe someone wearing a reflective vest, some bright colors, and while some engineers do wear reflective vests and help design buildings and bridges, that's not all.

Just like curious toddlers, engineers are trying to understand why and how things work.

Marley: Yeah, and so when we think about engineering, it's not just about these buildings and bridges. Engineering is all about using materials – any materials, not just building materials – in creative ways. It's also about solving problems, designing, and, yes, building. Like engineers, infants and toddlers are trying to figure out how things work. They're also looking for creative solutions to problems. So, every new toy or new utensil is a brand-new puzzle to explore, and young children also face a lot of challenges.

So, maybe they're thinking, "How can I stack these cups like my teacher does?" or a popular favorite – "How can I wriggle out of this hat that I do not want on my head?"

Amelia: I have definitely seen that creative solution being worked out before.

Marley: Kids are masters at getting hats off, I've noticed.

[Laughter]

Amelia: A special skill.

Marley: Yes.

[Laughter]

Amelia: So, it's wonderful that children are thinking about how things work – like how do I get this hat off my head? But how can programs help support children's innate curiosity? How can they boost this skill that children are so eager to develop?

Marley: Well, I'm so happy you brought up curiosity, because curiosity is at the core of all of these STEAM skills. Curiosity is an essential part of learning, and because of this, it's a key developmental milestone. It even has its own subdomain within the Approaches to Learning domain of the ELOF – Initiative and Curiosity.

One way that you can support grantees in this area is by helping them link STEAM to their Early Learning Outcome efforts and to this ELOF subdomain.

Amelia: So, some of the things that programs may be looking for are, for example, within the first few months of life, children are beginning to show excitement as they learn new things.

By 36 months, children ask questions about what things are, how those things are used, and what's happening. They'll also experiment with different ways of using new objects or materials, and they're usually aware and interested in changes in the environment.

So, for example, let's say one day the Circle Time Rug is at the front of the room. Then the teacher decides, "Mmm, this rug works better in the back." Those children are going to be able to recognize that the room has changed around.

Now, when we think of environmental supports for boosting engineering skills, often the first thing that comes to mind is building blocks, and that's for good reason. Blocks are an excellent way for children to learn and build engineering skills.

So, let's spend some time here thinking more about why it is that blocks support engineering and how programs might scaffold that experience.

Marley: Research indicates that how well preschool-age children do on tasks that involve spatial play with blocks is related to their math skills. For infants, block play really might just be as simple as learning how to pick it up. They might discover its texture, its size and shape with their hands, and – you guessed it – with their mouth.

When children get older, their block play might become more sophisticated. They might experiment with stacking, sorting, and building with the blocks.

Amelia: Blocks provide endless opportunities for creating, building, problem-solving, but blocks don't just have to be used for building. They could be the base of a ramp or maybe even a pillow for a doll's head, an imaginary phone, a car, a truck, picnic food – anything.

The possibilities are really endless.

Marley: Encouraging this kind of creative play with blocks helps children not only build spatial skills, but also helps children design creative solutions, which, if you remember, is a key engineering skill.

Amelia: And blocks can be a great way to explore engineering, but engineering doesn't just have to stay in the block corner. Marley, what are some other creative ways that programs can help support young children's engineering learning?

Marley: One of the best things that you can do to support programs in boosting young children's engineering learning is to think about creating an environment where there are just lots of opportunities for active, self-directed exploration.

Amelia: So, why is that?

Why is it important to give children plenty of space to explore?

How does that help with engineering?

Marley: So, we know from research that children are learning from their free exploration and play. One study found that if an adult explained how this new toy worked, then children, when they had a chance to play with that toy on their own, actually explored and learned less about how it worked.

So, in other words, when we kind of teach how this toy works, the children explore it less. So, it's really important to make sure that we're giving children plenty of space and time to explore on their own.

And I want to make the point that this certainly doesn't mean that adults shouldn't or can't teach. Instead, you're thinking about how to support teachers in finding opportunities within their curriculum for open play and exploration.

Amelia: And one of the things to think about when you're supporting teachers and programs with this is giving them permission to take a breath.

I think that's a really nice way to go about this. So, when you have that urge to help and support and maybe teach as a child is actively playing, take a minute, take a deep breath, step back, watch what the child is doing, and see if there's an opportunity rather than doing something for a child or explaining exactly how something might work, what sort of question you could ask or prop that you could give that might help push the child in that direction, but still allow for creative exploration and problem-solving.

Marley: And adults can narrate what a child is doing while they're doing this sort of free play and exploration.

This kind of narration is a really great way to help scaffold their learning, and it's also a particularly powerful technique for children who are learning more than one language. Providing children the opportunity to associate words with the objects and actions that they are most interested in in that moment is best for learning.

Amelia: And that can be really powerful.

As a child is actively engaged with something they're really interested in, if an adult is able to provide the name of that object, that's when the child is most likely to remember and associate the name with the object because they're so interested and engaged with it.

Now, as children are exploring and playing in this wonderful, open environment that teachers have created, how can adults identify opportunities to scaffold emerging engineering skills with children?

So, in other words, when is the right moment to jump in and scaffold?

Marley: Yeah, that's a really great question.

So, young children, even babies, are really good at recognizing when something unexpected has happened or when something is surprising. For example, when a child is exploring a new toy, or if something unexpected happens, like maybe the block tower you've been working on falls over, that is a really great time or moment to provide some scaffolding.

Another great time is just as you notice children are playing with loose parts – so maybe they're moving chairs or toys around the room – things like that – adults can help the child think about what they're designing and why or maybe what creative solutions they're coming up with as they play their games.

Amelia: And for children who are at risk for or diagnosed with a developmental delay, scaffolding is key. A child may need some extra support to feel ready to really dive into free play. For example, they might need fewer options to choose from, or maybe a quiet corner that's away from the fray of this noisy and unpredictable block tower where another child is delighting in knocking a tower down over, and over, and over again.

That might be too much for some children.

Marley: Yeah, you might think about helping programs come up with soothing, accessible spaces where children have all the benefits of creative building or block play, but also have all of the supports they need in place in order to be successful.

So, for example, adults might think about creating cozy, quiet spaces where the child can still see the caregiver or adult and that you can still see them, but that they have a little bit of a place that's kind of their own and set aside.

Amelia: Okay. So, today we talked about just a few of the many ways that adults can help young children learn about engineering. For infants and young children, learning about engineering is all about creative play and design.

Marley: In your work supporting programs, consider creating or encouraging specific opportunities for training around how to scaffold engineering during free play or exploration and how to support families to do this in the home.

Engineering can sometimes seem intimidating, but it really doesn't have to be, and remember that so much of children's natural play involves engineering. It may also be helpful to support programs in identifying ways to scaffold the environment so that it's conducive to engineering play.

Blocks are an excellent place to start, but help programs think outside the block box. What else in their environments can be used to support their little engineers? How can they support families to use materials in the home to support this type of play?

Amelia: For more information on supporting children's STEAM learning, visit ECLKC and search for "STEAM."

Thank you so for joining us, and we hope you tune in for our next podcast in this series: Art for All: Exploring the "A" 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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