Empowering Change: Women and Girls in STEM Podcast Transcript

Episode 1: Inspiring Curiosity from Early Childhood to Break Gender Stereotypes

In this episode, we explore the crucial role of early childhood experiences in shaping girls' interest and engagement in STEM. Our guest, Dr. Amanda Sullivan, an expert in early childhood development, shares insights on fostering curiosity, challenging gender stereotypes, and providing equal opportunities from a young age. She is the author of *Breaking the STEM Stereotype: Reaching Girls in Childhood,* a book exploring the various social, cultural, and psychological reasons behind persistent gender disparity in STEM fields. We will discuss the impact of early childhood experiences on long-term attitudes towards STEM and strategies to create an inclusive environment that encourages girls to explore and excel in STEM fields.

Host: Nancy Scales-Coddington, NGCP Director of Strategic Partnerships
Guest: Amanda Sullivan, PhD, NGCP Senior Program Developer, Author

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Nancy Scales-Coddington 0:11

Welcome to Empowering Change: Women and Girls in STEM Podcast series hosted by the National Girls Collaborative Project. I'm your host Nancy Scales Coddington, Director of Strategic Partnerships at NGCP. In this episode, inspiring curiosity from early childhood to break gender stereotypes, we explore the crucial role of early childhood experiences in shaping girls' interest and engagement in STEM. Our guest is Dr. Amanda Sullivan, an expert and author in early childhood development. And she is senior program developer for the National Girls Collaborative Project. Welcome, Dr. Sullivan.

Dr. Amanda Sullivan 0:50

Hi, Nancy, and hello to all the listeners. Thank you so much for having me. I'm really, really excited to be here.

Nancy Scales-Coddington 0:57

Amanda, can you share a little bit about your background? And what inspired your research into early childhood stereotypes?

Dr. Amanda Sullivan 1:06

Yes, absolutely. So, I actually have a background in drama and arts education before I began focusing on research at Tech and STEM education, which is what I do now. But the throughline has always been that I've been really interested in how we learn how we grow, how we express ourselves creatively. And that's what attracted me to arts education. And what attracted me to my later work in STEM education. And I do always try to infuse the arts and all of the STEM work that I do now. But from an educational background standpoint, I have a bachelor's degree in psychology and drama, and a Master's and PhD in child development. I did my PhD at Tufts University, where I was focusing on the impact of new technologies on young children. So it was during that time at Tufts, I was working with a great research group called the devtech research group. It's now based out of Boston College, if anyone's interested in looking them up, they're always doing amazing things. And at that time, I was working on the development of new robotics kits for young children coding tools, coding apps and curriculum for young children. That was all really new at that time. And the research that I was doing there, and the teaching I was doing through that research group really opened my eyes to all the stereotypes about stem that young children have, as well as more broadly the inequities that are in early childhood education in the educational system in the US. And I saw, just anecdotally, even before I started collecting research of my own, that the kids that I was teaching in pre K and kindergarten, as we were testing our robotics tools and our apps, that they really were coming in with so many preconceived ideas, and stereotypes already at the pre K level, these masculine stereotypes about robots and coding, and even things like Legos and other STEM products. And later on, when I was able to do play based interviews, and really chat with children about where these ideas and stereotypes were coming from, I really began to see what a big thing Miss was that they were forming these ideas based on experiences they were having at home, at school, through media and the toys that they were using. And I thought, you know, it made me think about my own life and the stereotypes and inequities that I faced growing up, and now a whole nother generation of girls was, were having that same experience as well. And I thought, I remember actually thinking at that time, I don't want to be a researcher who just uncovers and finds these problems and publishes about them. I want to be someone who comes up with solutions. And that's really that's what kick started a decade of my research on early childhood stem stereotypes, which turned into my book and really influences the research to practice based work that I do now with NGCP.

Nancy Scales-Coddington 4:12

I love that I love to, you know, walking through that history, and that must have been really neat, a tough set that time being able to use the robotics with with such young kids and seeing their abilities.

Dr. Amanda Sullivan 4:26

Absolutely, I think what I really learned is that, you know, a lot of people always ask, When is a good time to start with STEM or when is a good time to start with coding, and people ask those questions about other things outside of STEM as well. And I believe it's never too early to start

with any of these big ideas and concepts as long as you're doing it in a fun, playful developmentally appropriate way.

Nancy Scales-Coddington 4:51

Funds the key word there, isn't it? Yes. So how do early childhood experiences shape girls interest and engage each month in STEM fields.

Dr. Amanda Sullivan 5:02

Well, early childhood really is, I believe the best time to start building a girl or any child's interest and engagement in STEM. So I can say that as a researcher, and educator, but maybe more importantly, as a mom of two young kids, I have a three year old girl and a five year old boy and any other parents listening out there with young kids right now, they know that this is an age when kids are naturally curious about the world around them. And so they're probably asking a million questions every day. And that's because they want to make discoveries. And that's what science is all about. So early childhood really is the perfect time to start capitalizing and building on that natural curiosity that kids have and start giving them these positive associations with STEM and building on that natural desire to learn about the world around them and set themselves up for success and later schooling,

Nancy Scales-Coddington 5:58

Then this is such a great time at this age, because kids are so curious.

Dr. Amanda Sullivan 6:02

Yes, absolutely. And you know, that's been my experience as an educator and a mom. But the research really echoes this as well. We know that children who are exposed to STEM curriculum at an early age demonstrate fewer gender based stereotypes about STEM careers later on, and they generally have fewer obstacles entering these careers later in life as well. And we also know from research that providing students with personally and culturally relevant STEM content in starting in early elementary school can increase their interest in pursuing STEM careers later on. So not only is it just a good time, because of how kids are learning and how curious they are, there really are these benefits where when it comes to the stereotypes they might encounter and their later desire to pursue these subjects.

Nancy Scales-Coddington 6:53

You've written a book breaking the stem stereotype reaching girls in early childhood. Can you share with us what social, cultural and psychological factors contribute to the persistent gender disparity in STEM fields?

Dr. Amanda Sullivan 7:08

Yes, well, I can try to name a few. And just I think your question shows the complexity of what you're asking, right? You're asking about the social, cultural and psychological factors. And that really indicates what a complex issue the under representation of women in STEM is that there are so many different influencing factors there. So we know that women make up around half of the overall workforce in the US, but only 34% of the STEM workforce. And that might actually not sound so bad to some listeners. But if you zoom in a little bit, and you look and you realize, okay, not all STEM careers and STEM fields are created equally, we see that when it comes to the technology, engineering, those technical STEM fields, that's where the persistent gender disparity is really noticeable. So women still only make up around a quarter, a little over a quarter of computer scientists, and 16% of engineers. And these are the fields that are really driving innovation in our country. These are the fields that are determining the apps and tools and technologies that we use every day. So we really need more diversity in every sense of the word in these careers. So you know, circling back to your question, what are the factors that contribute to that really persistent disparity? You know, there's a lot of different things. There's the influence of marketing and branding of STEM products, there's a long history of masculine biases in STEM toys, for example. And just gender biases. In general, in the toy industry, I have a whole chapter in my book about the pink aisle versus the blue aisle, I think it's called. And that's all about those biases in the STEM toys and tools that are out there. There's, of course, greater inequalities in our education system that could be its own podcast, issues of access. And then there are the intersectional inequalities in terms of race, class, and gender. So thinking about girls and young women of color, the impacts of these intersectional inequalities can really hinder their long term identification and participation in STEM. And for my piece, I really focus on the influence of stereotypes, which is just really one part of this really complicated issue with so many influencing factors. And stereotypes are, they're everywhere. They're in the portrayals of scientists or, you know, computer scientists, tech people in pop culture and media. I'm sure a lot of us are familiar with this stereotype of the mad scientist someone with you know, an older white male with wild hair and a white lab coat. That's sometimes the only image that kids see of what a scientist looks like. And it's not something that everyone can relate to or wants to try to emulate. And then there's other stereotypes like that girls are bad at math, or that boys are better at building things. And I even remember in my own life that when I was young, a family member told me, It's okay, your brother's better at math, because he's a boy. And this was a really well meaning family member. And they weren't trying to discourage me, it was just something that was said to me, kind of like fact, and it really sticks with me to this day. And research has shown that just being aware of stereotypes about a group you identify with, even if you don't believe that they're true, even if you know they're not true, it can still impact your confidence, your desire to pursue STEM, your performance on STEM tasks, or projects. And so stereotypes are really, really, really powerful in that way. And so stereotypes aren't the only thing contributing to this persistent gender disparity. But it's the the piece that I've latched on to in my own work.

Nancy Scales-Coddington 11:14

And I couldn't agree more with you. I mean, those stereotypes with those comments can be really impactful. I mean, that was said to you, when you were much younger, right? And it still resonates and has an effect on you. I have kind of a similar story that I can mention to that. And

so it makes you a little bit hesitant, right when you're going into either to taking math tests or something of that nature. So it definitely can be something that kids carry with them into into adulthood.

Dr. Amanda Sullivan 11:41

Absolutely. And it's funny that you mentioned the tests, because research has shown that just filling out the demographic information about yourself before you take a standardized math test, for example, can trigger the thoughts of the stereotypes and impact your performance on a test.

Nancy Scales-Coddington 11:59

And that is really powerful. What are some effective strategies to foster curiosity and challenge gender stereotypes in early childhood settings?

Dr. Amanda Sullivan 12:09

I love that question. Well, I think in terms of fostering curiosity, the best thing is just to encourage their questions, and not just encouraging kids to ask those questions, but to answer questions themselves through hands on experimentation, tinkering, trying things, really empowering young children to answer questions that they have, rather than just relying on an adult to tell them the answer or even relying on just a book to tell them the answer, really allowing them to have those opportunities to take their curiosity and turn it into an experiment or a project where they are, you know, the little researcher trying to figure out how things work, and the answers to their big questions.

Nancy Scales-Coddington 12:58

I love that because that really, you know, brings them into that ‘I'm the scientist’ mindset.

Dr. Amanda Sullivan 13:04

Absolutely. And that mindset is so powerful. And it's that that confidence that's so important, as well. And other things you can do is just providing diverse representative role models, it's never too early to be thinking about that. Those can be real people. Or it can be thinking about the role models that kids are looking up to in their favorite shows or books and things like that. And by the way, any listeners who are a parent or a teacher, you are a stem role model to so the way that you model your joy and your curiosity for learning and experimenting, and how you deal with failure in the process of things related to stem. That's all powerful role modeling as well. That is it's

Nancy Scales-Coddington 13:50

Very impactful. Could you provide examples of how early childhood experiences impact long term attitudes towards stem among girls?

Dr. Amanda Sullivan 14:01

Yes, absolutely. Well, I talked about stereotypes earlier. And stereotypes form earlier than many people might think around ages two to three years of age is when kids start developing some basic stereotypes and they continue to expand and get more sophisticated as kids get older. And it's important to remember that this is just a normal part of child development. This is how kids learn and grow. At this age. They're taking on so much new information about the world around them, that they need to put things into neat little packages in order to make sense of everything around them. And so it's our job as adults, not to think this is a bad thing that kids have these stereotypes, but to really help them expand on these stereotypes and challenge these stereotypes as they're developing while kids are forming these ideas, and while they're still developing their beliefs about her abilities and the abilities of other people, and stereotypes about girls interest in computer science and engineering. For example, research has shown that these stereotypes form as early as age six. And they're evident across multiple ages through childhood. And then through adolescence. These stereotypes can have powerful impacts, such as influencing children's interest in pursuing STEM, influencing their sense of belonging and stem. And so while there are a lot of girls and stem initiatives, a lot of really amazing girls and stem initiatives that begin in middle school and high school, and those are great, we should keep all of them. I also think it's important to start early and think about prevention as much as possible, rather than just fixing a problem, or an inequity later on. That's been building for 10 to 15 years. I really think we can prevent a lot of this if we start with early intervention and early positive experiences for young girls and all young kids.

Nancy Scales-Coddington 16:03

I love that, right? Because that's just changing that mindset, right from the get go when they are when they're young.

Dr. Amanda Sullivan 16:09

Absolutely.

Nancy Scales-Coddington 16:11

So, what are some practical ways to create an inclusive environment in early childhood education that encourages girls to explore and excel in STEM?

Dr. Amanda Sullivan 16:20

Great question. Like I said, I love to think about solutions and not just thinking about the problems that are out there. So thank you for that question. I think the biggest thing that we can do is more exposure to hands on stem from an early age. So we might think we're doing that we might think we're giving all of our kids equal access and opportunities to explore stem. But then when we take a step back, and we reflect on all of those social, cultural stereotypes and other things that I mentioned earlier, we might find that that's really not the case. And even myself, when I'm thinking about my own two kids, I know that my son has gotten a lot of gifts over the years that are Legos, magnet tiles, building blocks, and my daughter keeps getting clothes and dresses, no matter how much I say, you know, she doesn't need them, or she has enough. And that's just one example of how the gifts we receive the messages we receive are influencing how much exposure we have to stem from an early age. Research has shown that boys get more experience with tinkering and building in their early childhood years and their elementary years. And it impacts your confidence later on in high school and, and how you might pursue and interact with these subjects later in your life. Choosing books and media about stem that are diverse and representative, that helped to break or expand on stereotypes is another great way to create an Inclusive Early Childhood stem environment. And actually, in my work with ngcp, we've put together some great picture book lists and other resources in that area. Something else that educators can do and parents is to start fostering a growth mindset. And what that means is moving away from this idea that some people are just naturally good at math, or science or whatever. And instead, what we can do is teach our kids that the brain is like a muscle. And we need to practice and work hard to improve and get better at things. So fostering this mindset can really help girls and all kids persist in STEM fields and projects where they might face challenges and they might face you know, roadblocks along the way. And, you know, along those lines, I think something that I try to practice as a parent and an educator is to help kids value the process over the final product, which means that a lot of times kids are really focused on what their final thing is going to look like whatever that might be. And if we can help teach kids to value, the process and the steps, and maybe some of the failures along the way. This can also really help kids just learn persistence, in fields in STEM fields or any subjects that might be difficult.

Nancy Scales-Coddington 19:11

That persistence is so important, just that you know, you might not be good at something, but you just gotta keep going and trying and you will get better.

Dr. Amanda Sullivan 19:20

Exactly. And you know, when I was growing up people, people used to say practice makes perfect. And I tell my kids practice makes improvement. And you know, it's not about striving for perfection, but we can improve with practice and many of the great scientists and great minds that we might admire. They weren't straight A students in all of their STEM classes. They face struggles and hardships as well. And so when we can start embracing failure and embracing that persistence mentality that can really help kids Excel. And last but definitely not least, I think the best biggest thing that we can do is talk about stereotypes. And to remember that when we're silent, or we brushed stereotypes under the rug, that's us, reinforcing them for our kids. And especially with young children, it can be so easy to say they're just playing or they're role

playing or, you know, I don't want to interrupt what they're doing to talk about this, it's not a big deal. And all of those things might be true. But when we do that, we're reinforcing their stereotypes. And in fact, those are opportunities to expand on their stereotypes, and challenge them and bring in books or ideas or examples that can help them see things from a new perspective. And so if there's one thing that I can recommend, it's to do that it's a talk about stereotypes, rather than reinforcing them. And I love the way

Nancy Scales-Coddington 20:50

that you are coming about this word doesn't need to be alluding to sit down and talk about stereotypes with your four year old. You know, it's bringing in those books and making those opportunities. It's about encouraging that curiosity, how you talked about role models can make such an impact on girls and that exposure. So I love all of the information that you've been sharing with us. Where can we find out more information?

Dr. Amanda Sullivan 21:15

Well, you can definitely find out more information in my book, breaking the stem stereotype, reaching girls in early childhood. It's available on Amazon, Barnes and Noble, or anywhere that you buy your favorite books. And I've also created a bunch of blog posts, resources and webinars and things with the National Girls Collaborative Project, which are all available on our ngcp website.

Nancy Scales-Coddington 21:40

And that will be linked in our show notes. Well, it was great speaking with you, Dr. Amanda Sullivan, about this important topic on breaking stem stereotypes in early childhood.

Dr. Amanda Sullivan 21:52

Thank you so much, Nancy. Thanks for having me.

Nancy Scales-Coddington 21:55

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