

Episode 1: The Tinkering Cycle

Time • 19:31

SPEAKERS

Ihuoma Ihuekwumere, Child, Anya Kamenetz, Educator, Child and Educator, Ernesto Rodriguez, Ryan Kurada

Child 00:00

Why does the wind have to be so pushy?

Educator 00:03

Why does the wind have to be so pushy? That's what I thought you said. Yeah, the wind is kinda pushy isn't it?

Child 00:06

Yeah.

Child and Educator 00:10

Yeah, it pushes your tower over

Anya Kamenetz 00:13

Learning can be a struggle.

Educator 00:16

So I wonder if you could do something to make them more stable to hold up against the wind? what wouldn't make it more stable?

Anya Kamenetz 00:24

it helps if you have something or someone to prop you up when you need it. But when everything comes together, it can be really exciting!

Child 00:32

I did it... I did it!! [screaming]

Educator 00:40

looks like you're excited about that.

Anya Kamenetz 00:43

Welcome to Tinkering Together a podcast miniseries from the Exploratorium's Tinkering Studio, in San Francisco, California. I'm your host Anya Kamenetz, a journalist and author who thinks a lot about how

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children learn. Basically, I get to learn for a living. And over the next three episodes, we're going to be exploring, tinkering. Okay, so what is tinkering? We're not talking about trying to fix up a car. Tinkering in this context is a pedagogy, a particular approach to teaching and learning. It's aimed at learners of all ages. And some of the basic elements of tinkering as a pedagogy are purposeful play, learner choice, and collaboration. Tinkering can happen anywhere, but one of the places it is practiced is at the Tinkering Studio that's located inside the Exploratorium, the museum of science, art and human perception on San Francisco's beautiful waterfront, the Embarcadero. As we get further into these three episodes, will learn about the tinkering cycle, and even some of the challenges of tinkering.

Ernesto Rodriguez 01:47

So it kind of breaks all your thoughts into little pieces.

Anya Kamenetz 01:47

But now it's time to meet our first guest, Ernesto Rodriguez.

Ernesto Rodriguez 02:00

I'm the eldest of six kids. So I have a big family. So I guess I was used to... to hanging out with the kids.

Anya Kamenetz 02:07

Ernesto followed a surprising path to become an early childhood educator. He used to be a chef. Then his daughter started attending a co op preschool. That's where parents are invited into the classroom as volunteers.

Ernesto Rodriguez 02:20

My daughter was enrolled by the time and I started volunteer over there making a snack, hanging out with the kids and then I really liked it, so I started taking classes. I got my permits. So I become a lead teacher. And now I'm enrolling my master for special education, so...

Anya Kamenetz 02:41

in the summer of 2021, Ernesto his early childhood classroom participated in a tinkering experiment, the Exploratorium's Tinkering Studio, partnered with early childhood classrooms, so that both the teachers and the students could try tinkering together. It was called the STEAM Starters project. STEAM, you might have heard, it stands for science, technology, engineering, arts and math. And the start was storytime.

Child and Educator 03:07

Here come the birds, half on the left side, half on the right side.

Anya Kamenetz 03:14

The book they read was called "Balance the Birds".

Ernesto Rodriguez 03:16

They were birds on the tree, and then three birds were in this side of the branches. And we read the book first during circle time, and kinda just talk about it right? oh, what do you think, see the pictures.

Anya Kamenetz 03:32

So reading this book, which brings in the mathematical concepts of counting, balancing weights and measures, addition and subtraction — and all of this started the tinkering, in Ernesto's class...

Ernesto Rodriguez 03:43

you know, like, they were like, putting so much attention. They were like, oh, what is next? And what do you think is gonna happen? We were asking questions like, What do you think if all the birds go to one side? What do you think's gonna happen if all the birds go to the other side, and then they were doing this thing like with their own bodies right, like copying, whatever was happening in the book,

Anya Kamenetz 04:05

right away, the kids do what they often do. They took what was happening in the book to real life. Just like these two girls on the playground, if you can picture them, they're standing on a little teeter totter. [Children in the background] So this is the start in STEAM Starters. In this example, tinkering started with the book. That's a fun, familiar activity and lots of early childhood classrooms. And the book is one that's been picked specifically to introduce these concepts that children already have a little knowledge of, so their curiosity gets kind of tickled. [Children and educator in the background] and the next step is the grownups who are facilitating the tinkering, bring out some materials, so you can really start that purposeful play. Now, with tinkering, a lot of the work happens before you even get to the classroom. So the Tinkering Studio carefully and intentionally chose the materials that each classroom had to work with. For example, in the balancing activity, it was paper towel tubes, cones, blocks, balls.

Child and Educator 05:11

[Background conversation]

Ernesto Rodriguez 05:18

there were pieces of cardboard. There were bowls. There were vases like the flower plastic vases that we use in a regular... for a desk or a table. There were tiny boxes, tapes, cylinders.

Child and Educator 05:41

Well, If your... your bottom is not exactly straight [Children and educator chatter]

Anya Kamenetz 05:46

But there's also room for the kids to add on their own stuff. So Ernesto said, in this case, they were inspired by the birds book.

Ernesto Rodriguez 05:53

And the funny part is that we put the materials in there with their books. And the kids is like, "No, we need animals." So they were going and grab dinosaurs. Or they were going and grab lions. And they were making this structure in the wall, I know we need a bigger animal here. So we can balance with the other one, because we have too many small ones.

Anya Kamenetz 06:18

So this is what's called the exploration space. It's a literal open space in the classroom where very specific materials are set up for the children to explore. And for tinkerers this is also metaphorical space, where there's just enough boundaries, just enough adult direction to keep kids exploring and progressing along a specific line of inquiry. So even though you have all of this preparation going on, on the back end, it can look pretty spontaneous, Ernesto said it was like the kids seem to just get in there and start messing around.

Educator 06:53

These machines have a motor that spins, and when I plug them in...

Child 07:01

It goes into a helicopter? Well not quite a helicopter, but that vibration makes these new... you know...

Ernesto Rodriguez 07:08

So one of the things that really, really amazed me is that. That, that you are just giving them materials, and they start using it and they come up with more ideas.

Anya Kamenetz 07:18

He says that it's pretty similar to the way he operates his program in general.

Ernesto Rodriguez 07:22

Yeah, I think that the fun because... is: we really respect the kids lead, we really respect their ideas. I think our philosophy as a as a program is to let them be, you know, if a kid wants to build a castle, okay, let's build a castle. If a kid wants to make a meal for everybody, let's go, let's go. So we just let them explore whatever interests they have.

Anya Kamenetz 07:55

And you know, you see a lot of this in progressive and play base styles and early education, although it gets a lot less common as kids get older. However, with tinkering, things are a little bit different, it's actually a bit more structured than it first appears. So instead of the play, and the topics of the play, being totally driven by the kids, you kind of present the children and invitation with words and with objects. And that invitation is probably going to connect to basic science principles. So in this case, it would be let's explore balancing and what it takes for objects to balance.

Ernesto Rodriguez 08:28

We just put the materials on the table, and just let them see what they do. We just support them. Like, when questions we ask questions, or what do you think about these? What are you doing next? We just ask them like open ended questions and see how their creativity goes. I think that was the most fun part.

Anya Kamenetz 08:51

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And Ernesto found in this exploration space, grownups have to walk a fine line so that the kids can explore and discover their own internal questions. So adults, you know, it's fine to give words of encouragement. Definitely ask them questions. Make sure everybody's stays safe, of course. And step in when you see those opportunities to take things a little bit further, pursue a child's question that comes up naturally, maybe offering a new material to try

Child and Educator 09:18

ok, can we get another ball? [Child background]

Anya Kamenetz 09:24

so this case is kind of a fun one. A girl was lying on the rug. She's got her feet up, and there's a basket balanced on her feet with tennis balls in the basket.

Child and Educator 09:34

Anyone tried to get Braden to add one more? Yeah, okay. [Children and educator chatter/laughter] oh ooh!

Anya Kamenetz 09:49

So Ernesto's was a co-op classroom. So Ernesto had parent volunteers helping out. Parent volunteers just like he used to be. And sometimes he had to guide them to be more hands off.

Ernesto Rodriguez 10:00

Sometimes the parents is like, no, no, no, don't start this here, start in the other way. So my role kinda has changed a little bit to try to show the parents that, let them figure it out by themselves and see what they do. And for the, for me was like a little harder at the beginning, to try to step back a little bit.

Anya Kamenetz 10:26

Ernesto says, when you're really engaged in facilitating the tinkering, you might ask a question like, What did you expect to see here? Or what might you try next. And what he's discovered is that the kids are pretty focused. And they keep solving new problems as they come up,

Ernesto Rodriguez 10:40

they tried to solve a problem. Like, for example, when the balanced materials, they tried to balance everything, and it was falling over and over and over, until they figured it out how to start the materials, and balance them, so it doesn't fall. So little by little with the pass of the time we notice they're using the materials, they they think, and they learn how to solve a problem.

Anya Kamenetz 11:10

And another dimension of tinkering, Ernesto found is that when kids are really set free into this kind of purposeful play, it's very social, they're generating their own questions. And they start talking with each other comparing notes. And that builds vocabulary, which is important, especially in his program where the students speak English and Spanish.

Ernesto Rodriguez 11:28

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They were taking turns that were talking, they were interacting, they were having ideas, they were sharing ideas. So for me, it was kind of surprised to see them to see them so engaged. And they were using all these skills that they were talk... that we were talking about during the year, but in a different, in a strong way. It's like they really want to do it like, for real.

Anya Kamenetz 11:56

And Ernesto said in his classroom, these STEAM based tinkering explorations, they had real staying power.

Ernesto Rodriguez 12:03

So they really, really embraced the concept. And they were using it, in everything, like I mean, they couldn't stop talking about it. They were like, talking about balance for months.

Anya Kamenetz 12:17

You know, I've also been emphasizing grownups role as sort of being stepping back not being too involved. But tinkering is a process that affects adults very much as well. And in one way is that you just really start to delight in children's problem solving abilities and their imaginations. And Ernesto told me a story that really stuck out about this from a different tinkering topic they took on later in the STEAM Starters project. After balancing, they did light and shadow. And in this case, he said the children were transforming their exploration space with lights.

Ernesto Rodriguez 12:52

They create this shadow room, and we put the lights there. And they have different materials, and they were doing shadows. And they build like a little, like, almost like a little stage. And they put the lights on one side, they were doing the shadow. And they they were like, oh, we need, we need music. So some of the kids they we're playing music and other ones that we're doing the shadows. And the other one says I know we need to make a movie. But then they make a shadow movie when you see in the shadow room.

Anya Kamenetz 13:33

So that's the magic of tinkering. Basically, you have kids reconstructing the entire human history of dramatic storytelling in an afternoon, from moving hands and making shadows to a stage with lighting to cinema. So at this point in the story, we've covered some of the what of tinkering and some of the how of tinkering. Now let's take a little minute to talk about the why,

Ryan Kurada 13:59

on average elementary classrooms spend about 20 minutes per day, if not less on science.

Anya Kamenetz 14:05

Ryan Kurata is a teacher and a STEAM instructional coach with the Sonoma County Office of Education. And he says the people who teach young kids don't always feel like they have the tools or the training they need to cover science well.

Ryan Kurada 14:19

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Science is not taught to a level that it should be taught. And I think teachers are a bit hesitant to... to do science in the classroom. Because, you know, teacher preparation, it can be really scary to not fully understand ideas yourself, to embrace it with your learner's,

Anya Kamenetz 14:39

that is why he's such a big fan of tinkering.

Ryan Kurada 14:42

But I feel that if you use books as a way to invite that it makes it a little less scary that we're learning together with our students. So I think the more we can build on, you know, just invitations for... for science learning in the classroom. I think it's really going to be powerful, powerful experience for teachers and for students too,

Anya Kamenetz 15:05

And Ernesto really agrees with this because he sees tinkering as an invitation for teachers to learn alongside their students.

Ernesto Rodriguez 15:14

I feel like the person who's gonna learn more with this project is the teacher, and you're gonna learn a lot about yourself, which is great. And then you grow with them. And then you come up with new different perspectives to see how you're teaching. And why you're teaching like that. I think that was the most important part that I found out is like, why I'm doing this, why I'm doing everything this way, or why not this way.

Anya Kamenetz 15:45

So from the child's point of view, yes, tinkering has a few different steps. You get the introduction of the ideas, maybe with a book, then the introduction of the materials and the exploration space. Adults kind of take a step back, ask some questions, the children experiment with trial and error, they discover things which can go on as long as you like. And if all of this sounds a little bit like the steps of the scientific method, where you form a hypothesis, test it, then reflect on what happens... that's no accident. That is exactly why Kurada says that introducing science in this way can actually be more authentic and more effective than direct instruction. Because it's not pushing science facts into kids brains. It's giving them the opportunity to think like scientists. Here's some kids in Ernesto's classroom.

Child and Educator 16:32

Dallas has a plastic light. Yes. So that was cool teacher Ernie. That was cool? [Children continue to chatter]

Anya Kamenetz 16:41

And they are totally in to trying again,

Ryan Kurada 16:43

that more open ended leads to true engagement and true understanding of science concepts.

Anya Kamenetz 16:50

Teachers also have a tinkering process or tinkering cycle. First you plan, then you facilitate, which includes stepping back, cheering on, asking questions. And then you observe and you document what happened. So the classroom sounds in this podcast, by the way, they come from videos submitted by teachers in different parts of California, who took part in the STEAM Starters program. And those videos are an example of documentation. Documentation is one way to reflect on what happens in the classroom. So plan, facilitate, reflect. And for teachers, the final step in the tinkering cycle is relaunching. That's right, as a teacher, when you tinker, you want to do more than once you want to incorporate what you learned the first time that you saw the first time. So you can try again, just like your kids do,

Ernesto Rodriguez 17:33

that teachers cycle, like, you have a concept, then you find a book. And then you have the materials and you put it on the table, and the kids use it. And then they keep using it. And the kids learn the concepts and they add stuff. And then we reflect. So that's how they call it the tinkering cycle.

Anya Kamenetz 17:55

So tinkering is not something that happens just once you can find your own style as a teacher, and make it your own

Ernesto Rodriguez 18:01

working with these materials in this experience, by the end of the project, you have your tinkering style as a teacher. Because we realize that we are teachers, we are different, right? And I think that was the most important part about the project that you can see different styles.

Anya Kamenetz 18:19

So for Ernesto, it really boils down to this,

Ernesto Rodriguez 18:22

but in my case, I feel like a tinkering is just how you make the children's to think and solve problems. That's how I see.

Anya Kamenetz 18:36

So the not so secret is teachers are tinkerers, too. Thanks for joining us for this episode of the tinkering podcast.

Child 18:44

Thank you, tinkering friends!

Anya Kamenetz 18:47

In the next episode, we'll get in a little deeper and we'll hear a little bit more about the social and emotional side of tinkering

Ihuoma Ihuekwumere 18:53

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The activities, I call them frustration rich, and children having those opportunities, like multiple opportunities for them to fail at something – and, you know, get over their failure quickly like to accept failure as part of their progress – is something really amazing.

Anya Kamenetz 19:19

If you have feedback on the podcast, please go to tinkeringtogether.org. We're going to have a forum for comments through April 4 2022. We'd love to hear from you.