**Episode #5.mp4**

**Speaker 1** [00:00:01] Welcome to the Cabrera Lab podcast. What's up?

**Speaker 2** [00:00:05] Hey. Hey. How you doing? I'm good. Let's talk. About what?

**Speaker 1** [00:00:12] I always have a lot of anticipation for what you're wanting to talk about.

**Speaker 2** [00:00:17] I. I want to talk about a little bit of sort of our origin story.

**Speaker 1** [00:00:22] Geez.

**Speaker 2** [00:00:23] In that, you know, when we met. Yeah. You were working on all of your theory and theories about learning and cognition. And I was doing translational research, and I think we were both at Cornell. And I remember when we were all about to get on a flight, going to a conference. An academic conference.

**Speaker 1** [00:00:48] Okay.

**Speaker 2** [00:00:51] Do you remember how we met right now, these things? Well.

**Speaker 1** [00:00:54] Yeah. I didn't know that you were talking about that story.

**Speaker 2** [00:00:57] No, I want people to understand why we ended up or why we started the bulk of our work in the education system and why we decided to spend ten years really trying to understand how to how to use the elements of what your own research was.

**Speaker 1** [00:01:15] Yeah.

**Speaker 2** [00:01:16] With humans. Small humans.

**Speaker 1** [00:01:18] Yeah. So NSF wanted. They had just given us a grant. They wanted to. At the time, my theory was pretty, you know, same theory that is now, but. But much more difficult to understand. Yes. And I mostly taught it to doctoral students and scientists and stuff like that. Yeah. And it was hard to understand. It was like, you know, mathematical and.

**Speaker 2** [00:01:47] Abstract.

**Speaker 1** [00:01:48] Abstract and just not.

**Speaker 2** [00:01:50] The theory you.

**Speaker 1** [00:01:51] Had to work at it. Yeah. NSF gave us a nice script to work on, making the theory accessible to people.

**Speaker 2** [00:02:03] Yes.

**Speaker 1** [00:02:04] And and so you as a translational researcher, you might want to say what that is because people know what that is.

**Speaker 2** [00:02:13] Translational research is when you take what is considered to be empirical or really rigorous research and you translate it into tools and techniques by which a broader section of people can actually use it.

**Speaker 1** [00:02:28] You were on the grant for that, I guess, and it was a metaphor for you. I mean, I didn't know you at the time. So the grant kind of brought us.

**Speaker 2** [00:02:36] To see why you're here.

**Speaker 1** [00:02:38] And I was on the grant because I came up with a theory. So, yeah, we. I think we met, like, in your office or something, but. Yes, but then we pretty quickly had a trip that we had to go to a conference and yeah.

**Speaker 2** [00:02:55] With the whole.

**Speaker 1** [00:02:55] Team in Seattle. Yeah. Was it Seattle?

**Speaker 2** [00:02:58] Yes. Yeah. Wow. So it's really testing and go all those.

**Speaker 1** [00:03:02] Details and everything. But so we were in the airport waiting for our plane and and, you know, we were like, okay, well, so this is like the grant and we got to get started.

**Speaker 2** [00:03:15] So and I said, Yeah, to explain this theory of yours.

**Speaker 1** [00:03:17] Yeah. So you said, tell me that theory in like a short, short, as short as possible. Yeah. And so I actually had my, like, piece of paper ticket.

**Speaker 2** [00:03:27] Yeah. And back when tickets were paper.

**Speaker 1** [00:03:30] I scribbled kind of I always scribbled on things. So I scribbled kind of different formulas and things like that.

**Speaker 2** [00:03:38] All that notation.

**Speaker 1** [00:03:38] Notation. Yeah. On the back of the back of the ticket. And I was impressed that you kind of picked it up pretty quick.

**Speaker 2** [00:03:48] Yeah.

**Speaker 1** [00:03:49] Because my most people at that time didn't. And. And and I was like, so when out when were that? When I was done explaining. And I said, So, you know, what should be what should we do? And you said something that really kind of blew my mind, which was you said, I know exactly what we need to do.

**Speaker 2** [00:04:13] Yeah, I was a little specific.

**Speaker 1** [00:04:17] And I said, Really? What? Because I have no idea what we exactly what we have to do. So you said we need to go teach kindergartners?

**Speaker 2** [00:04:26] Yes. And that was at the beginning.

**Speaker 1** [00:04:28] And that was the beginning. And it was a great thing to do. One one, because kindergartners are fun. And you didn't literally mean kindergartners. You met kindergartners and first graders and third graders and ninth graders and all kinds of different age groups and stuff like that. But we did actually teach kindergartners the theory. And it was remarkable because it immediately just kind of made it you had to make it practical. You had to make yeah, you had to make it accessible. You had to make it.

**Speaker 2** [00:04:59] We had to reduce it to its most understandable, smallest unit possible, which meant then we could always go up. Yes. Right.

**Speaker 1** [00:05:08] Well, and what's remarkable is, you know, in 20 years of doing that, so, I mean, for the next ten years, we literally did that and studied the act of doing that.

**Speaker 2** [00:05:16] Yeah.

**Speaker 1** [00:05:18] And, you know, in the present time.

**Speaker 2** [00:05:21] That's a whole number.

**Speaker 1** [00:05:22] I got married and all that stuff. But, but it was a remarkable journey because it really it was easily the best thing we could have done with with it because it was fun. It was important work and it. I mean, I think I learned probably more than the kindergartners did because I learned I learned how to make it accessible.

**Speaker 2** [00:05:50] Well, I don't know if I would put them against each other because in a weird way, yes, we learned a lot from them. But if you remember, I there was a moment where you and I were standing in a kindergarten room in a district in Virginia. And all the kids were in a circle. And they were, I.

**Speaker 1** [00:06:12] Think the one you're talking about. There are so many so many different rooms.

**Speaker 2** [00:06:16] Yeah. While we were standing there, they were in a circle or in a circle? Yes. And they were talking. And there was a kid that a child who raised their hand and explained with great eloquence how they had come to understand something. And it was like we both metaphorically saw that lightbulb. And we both got, like, a tear in our eye. And we're like, yeah, we can do this. Yeah. It was like, We can do this. Yeah. And it was a moment that I think. To me, I think it was like the origin of every ounce of motivation. Yeah. That has pushed us forward for 25. Gosh, we're getting old along time. Yeah. But I think that was the moment for me when I realized we can teach this. Yeah. And this is thinking. Yeah. And that's very important.

**Speaker 1** [00:07:04] It's funny. I'm on the other side. It made me think of there was another moment we had where I don't know all the details, but, you know, you. You'll remember you have a better memory in them. So there was a teacher at first they would just kind of talk about thinking and they'd say, You need to think about that or you need to think.

**Speaker 2** [00:07:22] Yes, Yes.

**Speaker 1** [00:07:23] And there was this teacher that we were, you know, trying to help her understand how to teach thinking. Yeah. Rather than just teaching information.

**Speaker 2** [00:07:33] Yeah.

**Speaker 1** [00:07:34] And. She's saying, you know, Johnny, Bobby, whatever you need to you need to think about that. And remember, the kid came up and he says, Mrs. Wilson or whatever.

**Speaker 2** [00:07:48] Yeah, I remember that.

**Speaker 1** [00:07:49] I don't know what you mean when you say when you keep saying, Think about it. Yeah. What do you mean? And it Don, that was the moment like when it dawned on the teacher that there's more to to what thinking is than just saying. Think about it. Yeah. Which. Which I think is like it was such a such a profound moment because. So much of what we see out in the world today, even even 20 something years later. Yeah. Is like, well, just analyze that. Yeah. What do you mean by analyze that? What does the analyze mean? What does it mean? What do we mean when we say you have analytical skills? Like what? Evaluate that. Yeah. Or go think about that or. Yeah. And this kid. This kid was saying it. He was sort of exposing me. What do you mean when you say Think about it. What exactly am I supposed to do? And we were showing them the answer to that question. What exactly? She had an answer.

**Speaker 2** [00:08:48] Had an.

**Speaker 1** [00:08:48] Answer. And she was like, yeah, now I get it.

**Speaker 2** [00:08:52] Yeah, No, I know that great moment.

**Speaker 1** [00:08:54] Now I get why I'm. Why I've been practicing, you know, practicing these things. That was a cool mark. Yeah, there were.

**Speaker 2** [00:08:59] A lot of good moments from that.

**Speaker 1** [00:09:01] Yeah. Yeah. There was another one. Where? You know, this is a lot. I mean, I don't know if these are in was it in the documentary film?

**Speaker 2** [00:09:11] There's my favorite from the documentary from Remember.

**Speaker 1** [00:09:14] So there was a documentary and educational documentary done on our work, Rethinking by the director, Deborah Ward.

**Speaker 2** [00:09:24] Yes.

**Speaker 1** [00:09:25] Great director and great, great film.

**Speaker 2** [00:09:28] You and I were both standing there, McKayla actually, Deb was filming and this girl McKayla was probably in first or second grade. Adorable child. I mean, they're all adorable. You know me. And she came up to us and she was saying how? She had done, she had used thinking. So they just called it thinking. Right? Which it is. So she had used thinking to make her story about fish. And then she came out to she goes, This is my story about fish. And this is how I related my fish to this. And I took this perspective like she's using these words. And then she says to me and you she says, But and and I'm so glad Deb caught this on film. She said, But. Then I realized I could do the same thing with my math homework.

**Speaker 1** [00:10:19] That's right.

**Speaker 2** [00:10:20] And she's like. And then she says, which means? And she lights up. She goes, I can do this about everything and everything. I don't know. I'm like, That's the moment. She had it. So it's like she had this little toolkit now on her back grade to grade, topic to top. She's always going to be able to do it. And I mean, these actually these are fun story.

**Speaker 1** [00:10:41] These are good stories.

**Speaker 2** [00:10:42] Those were good. That was good. That was a good.

**Speaker 1** [00:10:44] Yeah, there was the time. I mean, think of the time where we we they had I don't even know. I was like, third grade or something with the. The fireman.

**Speaker 2** [00:10:54] No, that was pre-K.

**Speaker 1** [00:10:55] That was pre-K.

**Speaker 2** [00:10:56] Three and four year olds.

**Speaker 1** [00:10:58] Three and four year olds. Yeah. So they do they do what's called the standard is like community helpers. Yep, that's right. And, you know, it's like there's a bunch of different community helpers, police, firemen, doctors, whatever. Not So they. They usually have the firemen come out with the fire truck. Yeah. The firemen come with their.

**Speaker 2** [00:11:18] You know, pulling the.

**Speaker 1** [00:11:19] Mailman, them, the mailman come and all that. So this one particular class had been doing this for years and years and years and you know, she, she, this teacher had done it many times where the firemen come with the trucks and then then the kids build a fire truck out of cardboard in their rigs, milk jugs and stuff. And and then they draw a fire truck and they label things. And so she taught them a she took one of the patterns of thinking asks are systems are old. Yeah. And she taught them this, this very simple song which was like something to the effect of every hole can be broken into parts and every one of the parts could be a hole that gets broken into parts.

**Speaker 2** [00:12:02] It was literally that I'm not going to sing it. I'm going to sing on camera.

**Speaker 1** [00:12:06] So again, gives sing this little song for like a minute.

**Speaker 2** [00:12:08] Every girl has parts. Yeah, it has all.

**Speaker 1** [00:12:11] So literally, the treatment was like a minute.

**Speaker 2** [00:12:14] Yeah.

**Speaker 1** [00:12:15] You have a song and then the kids go out to the fire truck. That's right. And they go like, you know, what do you see? Basically? And the kids this year, when they had been taught the song, they've been taught metacognitive play to to do this on purpose. Yeah. Their descriptions were so much more advanced, so many more terms. And the actual fire truck that they built was more complex. They usually had a front in the back and a steering wheel and wheels. And this time they had a ladder. And then the kids I remember the kids, they said, Well, but it's not just a ladder. The ladder has two ladders. Yeah. So as to a two part ladder.

**Speaker 2** [00:12:56] Right.

**Speaker 1** [00:12:57] And then they said and the, the those ladders have these things in there that go across. They learn they didn't even know the words for the letters, but they knew the parts.

**Speaker 2** [00:13:07] Right.

**Speaker 1** [00:13:07] Right. And then they knew to search for the words. So they learn new vocabulary on top of that because they had the structure and they needed a word to to put in there. And then they said and even the cross things, the rungs, the rungs, which they learned. But at first they just called them cross the.

**Speaker 2** [00:13:24] Things.

**Speaker 1** [00:13:25] Things. And then they learned the word wrong. They have grippy stuff. They have grippy stuff on them. That's right. Right. So it seemed and so they were seeing more and more parts. Parts of parts of parts. Yeah. Such a simple thing. But they they were able to.

**Speaker 2** [00:13:41] I don't want to lose the simplicity, get lost in the simplicity of that story because what that meant is because they learned one one of these ways of thinking differently. They saw more parts of the fire truck. Then in their work, they had more parts in the thing they built, and then they had more because there were more parts, they had to find words for those parts.

**Speaker 1** [00:14:05] Yeah. So their vocab, right.

**Speaker 2** [00:14:07] And so when that so then they kept that group of kids with the same teacher for kindergartner remember this? And then the school district called us and they said, We need you to come down and help us up. Trained the first grade teacher. We're going to keep these kids together because their scores.

**Speaker 1** [00:14:22] Are so advanced.

**Speaker 2** [00:14:23] Are so much higher. The benchmarks, I should say, not scores, because they were they're not in the testing yet. So they actually literally kept them together.

**Speaker 1** [00:14:32] And they.

**Speaker 2** [00:14:32] Had to train and they had to train the first grade teacher so that she could keep that thread.

**Speaker 1** [00:14:37] That's right.

**Speaker 2** [00:14:38] So they were like little superstars. Yeah.

**Speaker 1** [00:14:40] Yeah. And that that actually was the same group that. Do you remember they had either that so we did the fire truck thing then later that that couple of weeks later.

**Speaker 2** [00:14:53] A school year.

**Speaker 1** [00:14:54] In the school year they had lockdown which is I guess, you know like a some threat. And it wasn't it didn't end up being anything but. Yeah but the threat caused them to have to lock the doors and yeah, they have a whole protocol. They go to the back of the room and all this stuff and it's pretty, pretty scary for little kids.

**Speaker 2** [00:15:11] It's terrible.

**Speaker 1** [00:15:12] Terrifying. Four years old. Well, so one of the kids comes up after the lockdowns over. The kid comes up to the teacher and says, Hey, Ms.. Wilson or whatever. That's always, well, that's funny because Ms.. Wilson was this, like, terrible teacher that I had.

**Speaker 2** [00:15:31] We'll talk about that in a second.

**Speaker 1** [00:15:33] So I don't know why I call it Ms.. Wilson because this was a really good teacher, so. Ms.. Smith? Smith Whatever. The kid comes up to her and she says, Hey, Ms.. Smith, can we hold the lock down?

**Speaker 2** [00:15:51] Right?

**Speaker 1** [00:15:51] And then they broke the lock down into parts. And these are the things we do and these are the things we think and, you know, and blah, blah, blah. And so she had she had used the same structure that they used on fire trucks on some completely different information without being asked to.

**Speaker 2** [00:16:09] That's transfer.

**Speaker 1** [00:16:10] That's called for transfer in the in the vernacular. So and that's a really important thing. That's like the that's like the holy grail of, of learning theory as far transfer. Right? Because when you when you can transfer something, you learn in one scenario to another totally distant scenario, then you can teach yourself, you know, instead of learning one thing at a time, you can teach yourself 20 things at a time. So you learn one thing and you can transfer it to lots of places, right? So she had done that.

**Speaker 2** [00:16:42] But then and now and gone. Yeah.

**Speaker 1** [00:16:46] So then we get an email like, I don't know, a couple of weeks later and it's, it's the same thing. It was more kids months whatever the time.

**Speaker 2** [00:16:53] Yeah.

**Speaker 1** [00:16:54] My sense of time is crazy. So so I get an email and it says, Dear Dr. Cabrera, this is the, you know.

**Speaker 2** [00:17:01] Class Mrs. Smith class.

**Speaker 1** [00:17:03] In this class and blah, blah, blah. We are, we went to an apple orchard. Yeah. And we decided to part whole the apple.

**Speaker 2** [00:17:12] Yes.

**Speaker 1** [00:17:13] And we discovered a number of parts of the apple and here they are. And they named all the parts.

**Speaker 2** [00:17:18] Yeah.

**Speaker 1** [00:17:19] One of the parts we were wondering because it was pretty new to us, if the scientists at Cornell have and know about this part.

**Speaker 2** [00:17:32] We wanted to let them know.

**Speaker 1** [00:17:33] We wanted to let them know about this part. Right. And we have taken the liberty to they didn't say at liberty, but basically they had taken the liberty to to name the part.

**Speaker 2** [00:17:45] Yes, I remember.

**Speaker 1** [00:17:47] The name they had given this part, which was the fuzzy bit of the apple. Yeah. Is the belly button says.

**Speaker 2** [00:17:55] Great name is a.

**Speaker 1** [00:17:56] Great name.

**Speaker 2** [00:17:57] I think we.

**Speaker 1** [00:17:57] Should celebrate the Big Apple. Yes. And we just wanted to know.

**Speaker 2** [00:18:02] You know.

**Speaker 1** [00:18:02] Does anybody else know about it? Could you, you know, ask your science friends or whatever? And so I. I was like, interesting. So I actually contacted one of the people in genomics. Yeah. And I said, you know what? Give me a little background on this stuff. And and she said, that's the that's the calyx, that's part of the flower structure. And then ends up at the end of the apple. Right. We call it the Calyx scale. Why? That's right.

**Speaker 2** [00:18:28] Yeah.

**Speaker 1** [00:18:30] And yeah, which is kind of a big technical science word, but I thought Belly Button was a pretty good name for it.

**Speaker 2** [00:18:36] And belly button is easy to remember and it certainly structurally looks like a big I mean, it's a fuzzy.

**Speaker 1** [00:18:41] Fuzzy about flat belly button with a bunch of lint on it. Right.

**Speaker 2** [00:18:47] Which for kids probably.

**Speaker 1** [00:18:48] Probably too too so form so. So these kids were like, I brought them back. I said, It turns out, yeah, you know, it's great that you broke down the apple, but. But they do know about it. And they call it the K like. So then we went back months later and they were all using the word K, like some stuff.

**Speaker 2** [00:19:08] Nancy kindergartners use in the right case.

**Speaker 1** [00:19:09] But what's interesting about that story is pretty it's pretty important. Is that for transfer, right? Yeah, for transfer again is like the holy grail of learning theory. Right. And what those kids had done was they took an abstract structure of part whole infinite ad infinitum, part code going up and part whole going down. Every hole has parts, and every part can be a whole that has ensuing parts and vice versa going upward and scale. Yeah, they took that basic concept and there's a couple more that they learned, but that was one and they just applied in, in so many different places without the teacher even encouraging them to read. And they learned all kinds of things that they wouldn't have learned as a result of it because they're thinking, Right.

**Speaker 2** [00:19:57] Right. And I think we should. Go up a level here and talk about. That's not the norm. That wasn't the norm. No, in that school, I mean, that school district called us and said we want to focus on developing thinking skills and move beyond just content memorization. And so they had a whole, you know, district. I mean, we were there for years, a district wide effort to get that. But, I mean. I mean, that's not typically how I mean, you know, we have three kids that just went through the whole school system and we went through the school system. And for us, it was all about memorizing stuff.

**Speaker 1** [00:20:37] Yeah. I think one of the one of the things that I'm. Fond of. Challenging. You know, superintendents and principals and folks Web is, you know, imagine imagine that you're standing at the front of your school district right in the morning and all the busses are coming and all the parents are dropping all the kids off. It doesn't matter what grade. It could be high school, it could be could be college. You know, it.

**Speaker 2** [00:21:06] Could be could.

**Speaker 1** [00:21:06] Be anything.

**Speaker 2** [00:21:07] Could be appointed by you, right?

**Speaker 1** [00:21:08] Yeah, exactly. So, you know, just to kind of close your eyes and imagine all the busses showing up, all the cars showing up, all these kids getting out, and they're all on this particular day, they're all wearing plain white t shirts.

**Speaker 2** [00:21:21] Yes. Yeah.

**Speaker 1** [00:21:22] And every t shirt says a waving instructions in big black letters. You know, if that's true about these these kids, if they're just. They're waiting instructions.

**Speaker 2** [00:21:38] Right.

**Speaker 1** [00:21:38] All right. Then how would you build your school? How would you design your school? How would you design curriculum? How would you design tests? How would you design? What kind of teachers would you hire? What kind of you know? How would you interact with the kids? Every single detail of the school can can be taken from that. That sort of trait, right?

**Speaker 2** [00:21:59] Yeah.

**Speaker 1** [00:22:00] But now imagine, same day they all show up with white T-shirts, but instead of awaiting instructions, it says under construction. Yeah. And how would that change? The way you design your school, the way you design your curriculum, the way you think about information, all that kind of stuff. And I think that is really important because the human mind is not awaiting instructions. It's not waiting for information. It's under construction. It's constantly it's taking in information and it's building it. Right. Yeah. It's, you know, Maria montessori talked about the absorbent mind and people talk about the brain being like a sponge. The brain's really nothing like a sponge. It's a it's terrible metaphor for the brain, really, if you're going to think about it. As a metaphor is like a construction site. You know, it's taking raw information, which is the building materials, two by fours and nails and stuff. And then it's and then it's structuring that information to make.

**Speaker 2** [00:23:11] Meaning, to build, to.

**Speaker 1** [00:23:12] Build something. I mean, you can build all kinds of things. Right. And so under construction is a much more appropriate, appropriate metaphor. And if you think about our whole school system, think about it. Instructional design.

**Speaker 2** [00:23:28] Yeah. Yeah. Coverage.

**Speaker 1** [00:23:31] Correct. Cover. It's curriculum. It's all about what we're covering, what information we're giving them, what the teacher's saying or doing at the front of the room. What are we instructing? Not what are they learning? Not what are they building? Right? Yeah. But what are we teaching? What are we instructing? What are they? What are they getting tested on? It's all information based.

**Speaker 2** [00:23:59] Yeah. And way, way back. I would imagine. And I mean, way, way back. That was sort of sufficient because things weren't changing that fast. And like, right now, you learn something now and. Before you know it, that something has changed, Right. Because things with the, you know, global exchange of information and like just things we have, like almost too much information.

**Speaker 1** [00:24:22] Sure.

**Speaker 2** [00:24:22] So if teaching and learning is only about information. Well, what you learned today is not going to be true tomorrow. Right. It's going to keep moving. Yeah. So it makes sense that you should be focusing on how people are coming to understand information so that as the information changes, they still have facility with it. Right? They still have the ability to.

**Speaker 1** [00:24:44] Well, knowledge. Yeah. You contrast that with the the utter lack of value that information basically has today. Right. If you have if you have a an exponential amount of information, then the value of any given piece of information is far less. Right.

**Speaker 2** [00:25:03] So because there's so much you know.

**Speaker 1** [00:25:04] If you think about a taxi cab driver, right? Yeah. You know, in the old days, the value of a taxi cab driver is that they knew information about the city, but now they don't need to know information about the city because we have a little device there that that tells them like where to go and it.

**Speaker 2** [00:25:21] Gives them the information they need.

**Speaker 1** [00:25:22] Yeah. So the information is really not that important is a good chance that the information that we learned today is going to be, you know, essentially irrelevant. Outdated. Outdated. Quickly. Very quickly. I mean, not even by the time they get to their careers, you know, tomorrow. Yeah. The outdated.

**Speaker 2** [00:25:42] Forever.

**Speaker 1** [00:25:42] So what exactly are we educating? And I think it for me, it really comes down to this very simple equation of what I call M equals IO. Yeah. Right. Y which is mental models are equal to information and organization.

**Speaker 2** [00:26:04] Right.

**Speaker 1** [00:26:05] Right. So when we organize information, we make meaning or mental models. The meaning is important. Right. Information, you know, may or may not be important, but the way we organize that information to make meaning is what is useful.

**Speaker 2** [00:26:19] Right.

**Speaker 1** [00:26:20] So so really what we should be focused on is are we build it? Are we are we developing humans, future adults?

**Speaker 2** [00:26:29] Yes.

**Speaker 1** [00:26:30] Who are really good at organizing information. Really good at taking information. Sometimes information that is disorganized and organizing it into meaningful ways. Right. And if we do that, we're we're creating things that can't be replaced by A.I..

**Speaker 2** [00:26:48] Well, that's.

**Speaker 1** [00:26:49] Creating skills that. That won't be replaced by A.I..

**Speaker 2** [00:26:52] Yeah, but I remember. Yes. And but the thing that's nice about that with that equation is because the that means that everybody's building. Meaning. Right. And they might be building different meaning out of the same stuff. Yes. Right. Absolutely. Which means teachers and educators, if they if they focus on developing the thinking skills, are the things that kids need to know to organize information, to build meaning then. There's not that you don't have to, like differentiate all of the curriculum, right? They're just teaching them the same thinking skills. And the kids will will develop that understanding and meaning on their own because they have that as sort of a a toolkit. That's right. Right. For understanding anything. That's right. Which is why Mikayla could do transfer, right. Because she she had those the facility with on how she understood how she understood things.

**Speaker 1** [00:27:50] That's right. Right. And we saw that over and over again. That transfer. That high. Far transfer. Yeah. For meaning, you know, you learn something in one domain and then you transfer it to a completely different informational domain. Right. You remember the kid that literally asked us this was in a residential treatment center. So these kids were, you know, having all kinds of problems. And and the kid was learning stuff in therapy. Yes. About thinking and metacognition and the patterns of of thinking. And he he asked us through his journaling, he said, is it okay? Literally asked, I'm finding these things very useful in therapy. And I'm wondering, is it okay if I use them in biology? Right. Right, Kyra, I'm teaching a class in biology and he wasn't sure it Was it okay.

**Speaker 2** [00:28:42] To transfer those?

**Speaker 1** [00:28:43] Those. Yes. Something that was useful over here. Over here. Right. And this is what we're teaching kids in a in a weird sort of way. We're teaching them that these that these disciplines are separate. Right. You know, that biology is not, you know, psychology and that that math is not.

**Speaker 2** [00:29:00] Do you remember that teacher.

**Speaker 1** [00:29:01] Biology.

**Speaker 2** [00:29:02] We were working with? Yeah. Who said we were everyone's while we would have interesting conversations and she had all the best intentions, she says, I used, I used.

**Speaker 1** [00:29:13] Right.

**Speaker 2** [00:29:14] I use these thinking skills in English on Wednesday but I didn't use it in math on Friday.

**Speaker 1** [00:29:24] Yeah.

**Speaker 2** [00:29:24] And then where she sort of caught herself like. I probably should use it all the time.

**Speaker 1** [00:29:32] That's right.

**Speaker 2** [00:29:32] They're not they're not domain specific. They're not subject specific. These skills cut across.

**Speaker 1** [00:29:38] Yeah, right. Yeah. I think it required a little bit of of coaching. Yeah. Because I said just say that sentence again. Yeah. Say I use thinking in what was it, English. Wednesdays. But I don't use thinking in math on Fridays. Right. And when she repeated it that way, she was like, maybe that doesn't make sense. We should probably use thinking.

**Speaker 2** [00:30:02] Yeah, I mean, you got a lot of teachers. What they're dealing with the, the, the sort of the systemic. Just like the jets, the rules and the regs and and the standards they have to meet. You know, they they get into teaching because they love teaching and then they end up in this they love the kids.

**Speaker 1** [00:30:22] They love the teaching. Yeah. And then they end up in this thing that that is testing on information, covering information forces them to, you know, to cover its curriculum. And it's very antiquated. Yeah. It's not the teachers. I think that's a big misnomer to to a lot of for a lot of folks is that they think the teachers are driving. So teachers hate.

**Speaker 2** [00:30:45] It. Teachers are heroes.

**Speaker 1** [00:30:46] Teachers are. Yeah. I mean.

**Speaker 2** [00:30:47] That's like a notable profession. Yeah.

**Speaker 1** [00:30:50] And every day, crazy pressures from all sides to do. Yeah. You know, essentially things that they know aren't the most effective things to do. And the teachers know what the effective things to do are. And a lot of times they they they don't have the sort of range.

**Speaker 2** [00:31:08] The resources or support.

**Speaker 1** [00:31:10] To support to do.

**Speaker 2** [00:31:11] To actually use their expertise. Yeah. In teaching, like, you know, you said before, I think somewhere I saw we quoted you where you said, you know, we teach humans not subjects, right? And right now, the school system as it's designed and was designed, which is why we need to modernize it a bit. It was designed to teach subjects and to get kids ready for factories. And it was in, you know, in a time in an age where these were the things that they needed to learn, I'd argue.

**Speaker 1** [00:31:42] Yeah. If you I mean, the history is pretty important because if you if you think about the in the agrarian age, the agricultural age, right. When most most families were going out on the on the farm work in the fields and you know, most families had a lot of kids because they need a lot of help on the farm. So yeah. Even though they weren't super wealthy, they would have ten, 12, 13 kids, you know. And as soon as those kids were of of age to be able to swing whatever they were out working while the kids that weren't of age would stay home with with mom and mom would, you know, bake and do other things, get ready for dinner, get ready for lunch or whatever, care of the house, take care of the house. And they would take care of a lot of work, which is a lot of work. Yeah. And feed all these people that were going to be very hungry after working all day. So what they did was they created kind of the first school, one room schoolhouses where they said, well, instead of having every mom take kid duty, let's have one mom sort of facilitate many kids. Right. And those were the first one room schoolhouses. Yeah. And if you think about that for a second, what the need was babysitting.

**Speaker 2** [00:33:00] Right.

**Speaker 1** [00:33:01] Right. Because the need was custodial care. Right.

**Speaker 2** [00:33:03] So people could work.

**Speaker 1** [00:33:04] So people could work. And we saw this this need kind of poke its head out of, you know, with a lot of that's underneath. Yeah. But during Covid, we saw that where. Right. Where people needed to go back to work or whatever. And they were like, well, what do we do with my kids? You know, like they're not going to school or whatever. So that was sort of the beginning of the agrarian level, a school. And then we as you mentioned, we moved into the the factory age, the industrial age. And what do we need there? We need people that can follow instructions.

**Speaker 2** [00:33:40] Yes.

**Speaker 1** [00:33:41] Right.

**Speaker 2** [00:33:41] Awaiting instructions, schedules.

**Speaker 1** [00:33:43] Stay on schedule. Do the job. Kind of Taylor ism kind of stuff, right? Like just the, you know, just do what you're told. Yeah. That's why we have clocks and bells and brakes and all that in the school system. And, you know, we really haven't updated our schools very much now that we haven't updated them very much. The only schools that have really gotten updated are the ones that the the extremely wealthy send their children to and they teach their children to think.

**Speaker 2** [00:34:17] Yeah. No, that's right.

**Speaker 1** [00:34:19] Right.

**Speaker 2** [00:34:20] Well, yes.

**Speaker 1** [00:34:21] In those schools. In those in those schools. Right. But we haven't updated the the schools.

**Speaker 2** [00:34:26] All of the schools.

**Speaker 1** [00:34:27] All the schools, public schools.

**Speaker 2** [00:34:29] I remember one to.

**Speaker 1** [00:34:30] Be what we need in society yet is people that I can think.

**Speaker 2** [00:34:34] Yeah. And you remember there was a moment when maybe.

**Speaker 1** [00:34:39] We don't want people to.

**Speaker 2** [00:34:40] Think, no, that's a whole nother podcast. But you remember we were talking to a superintendent of a very large district in Virginia that we spent years at. Right. Yeah. And I remember she said one thing she said to me is stuck with me forever. And she said, the reason we really want to focus on thinking in this district is because thinking is the great equalizer. Levels because they had a wide range of socio. Anomic status. And they had a lot of kids that were struggling because they were, you know, disadvantaged and, you know, would show up with empty bellies. And so, like, but if we can teach all of them to think, then they're all in the same place and we're going to bridge those gaps that are causing these societal problems down the road. Yeah. And to me, that was.

**Speaker 1** [00:35:29] So true that.

**Speaker 2** [00:35:30] The best.

**Speaker 1** [00:35:31] Thing that's the great equalizer. Equalizer. Teach people to think and they can do.

**Speaker 2** [00:35:35] Yeah. Yeah. And what's interesting is I think you and I are. How I say this. Examples of school experiences that are the exact opposite. Sure. Right. You struggled in school very much.

**Speaker 1** [00:35:54] School was was the opposite of what it was for you That your school was a haven from. Yeah. For you. For me. Kind of a haven from not a great home life.

**Speaker 2** [00:36:04] Yes. Yes.

**Speaker 1** [00:36:05] For me, it was the school was, like, the opposite. My home life was fantastic and it was all about learning. And then I would go to school, and the contrast was really upsetting.

**Speaker 2** [00:36:17] Right. Because back then, they didn't understand difference.

**Speaker 1** [00:36:20] No.

**Speaker 2** [00:36:20] In students at all.

**Speaker 1** [00:36:22] They didn't. I don't even think the word neurodiversity never existed.

**Speaker 2** [00:36:25] No. And they thought everybody should get it the same way. The same time.

**Speaker 1** [00:36:29] Like asking a fish to climb a tree.

**Speaker 2** [00:36:32] Yeah. So you were kind of labeled.

**Speaker 1** [00:36:34] Yeah. Badly labeled. Yeah.

**Speaker 2** [00:36:36] And mistreated, in my opinion.

**Speaker 1** [00:36:39] Death by a thousand paper cuts.

**Speaker 2** [00:36:41] Well, it's interesting for those people who know you now. Yeah. The fact that, you know, you went through school with such differences that were literally undiagnosed.

**Speaker 1** [00:36:51] Yeah. I mean, they were undiagnosed because I don't I don't even think I mean, the psychological, the DSM five or whatever was than DSM 2 or 3. I didn't even have, Right. ADHD or autism or any of that spectrum disorders or misfolding or any of it was was even. We didn't know about it.

**Speaker 2** [00:37:15] Yeah. And if you if you relate that back to your earlier conscious of awaiting instructions versus under construction, I was thinking think about how that makes the student feel, how disempowering it is to a student.

**Speaker 1** [00:37:30] To just.

**Speaker 2** [00:37:32] To be sitting in a pool of everybody's expected to be the same and are expected to absorb instructions. Yeah, and just process it all the same. And there you are, you know, literally the fish being asked to climb the tree.

**Speaker 1** [00:37:49] But think of how hard it is for us because we you know, we we have the advantage of seeing what our school system creates. Yes. The most successful what is perceived as the most successful of our school system. Right. Because we're in the Ivy League and it's not easy to get into the Ivy League. Right. So these are the people that admittedly have succeeded in this system. They've done everything they were told to do. And yeah, and they did it the way they were told to do it, and they succeeded. So they got access to, you know, Ivy League schools. Yeah. And think of how long it takes us to get them to stop raising their hand to speak.

**Speaker 2** [00:38:31] To.

**Speaker 1** [00:38:32] Me. Yeah. And it's a shock to them. Mike, You know why? Why would we raise our hands to speak? Right. We don't raise our hands to speak in any other social setting. We. We wait for a pause or, you know, we have all the skills to sort of naturally communicate with each other. But we.

**Speaker 2** [00:38:51] Don't need our.

**Speaker 1** [00:38:51] Permission. They don't need our permission to speak. Yeah, but it's it's indoctrinated into them. Yes. And. You know, they're very good at taking tests. You can give any test and they'll ace it.

**Speaker 2** [00:39:06] Yeah, And they just. I think a lot of it is. I mean, just like the kindergartners, you need to teach people how to articulate their thinking, how to understand their thinking, how to articulate it. And and also, you know, for us, because we're in a graduate teaching aggressive to push, you know, to extend and interrogate, sort of push their thinking even more. And that's not something they were taught previously. They weren't even encouraged to do that previously. So we've done a lot of work in schools, and I think a lot of that work, I mean, to be honest, was motivated by your experience inside of the system.

**Speaker 1** [00:39:42] Once I once I understood that I what that there was something different about the about the way that I my brain worked. Then I was able to work with my brain and I'm actually a huge part of. The discovery of de SRP and the discovery of these these ideas was motivated by just literally getting trying to survive in the world. And make it so that my brain would work. Yeah. In a more it you know, in both the way that it worked but also in a way that would satisfy neurotypical people. You know, normal people.

**Speaker 2** [00:40:28] Normal is not really a word anymore.

**Speaker 1** [00:40:31] Well, neuro normal. Like normal. Like not. Not bad. Just. Yeah, just the norm.

**Speaker 2** [00:40:36] Right. So I guess in a way. Thankfully for all of us, your your sort of effort or quest to understand your own self and how you came to understand things as, as you know, with your neurodiversity actually has led to this great thing, which is this universal way of understanding how we understand things that now not only does it level the playing field sort of academically, it kind of levels the playing field neurologically because we can all understand how we understand things. Well, we're all understanding things the same way and socioeconomically. Right.

**Speaker 1** [00:41:19] Right. I mean, a level playing field. And if you can think. Yeah. And if you can outthink other people, then there's. That's good. Very little that you can't do, right? Yeah. Right. It's it definitely levels the playing field. I mean I think. I mean, you know, I guess there's a certain part of it that I. I call my my educational career or whatever. It was my time in education. My time in school was like death by a thousand paper cuts. I mean, it was like, there's no. There's no obvious trauma, but there was like trauma by by just a slow trickle and. You know, I it would be nice if that didn't happen to people.

**Speaker 2** [00:42:08] Right.

**Speaker 1** [00:42:08] Today. Like we're wasting a lot of really great human human potential by doing that.

**Speaker 2** [00:42:15] And in a way, by by focusing on developing metacognition or understanding how somebody is thinking about something, we can speak to sameness in education rather than try to cater to difference and also admonish difference. Right.

**Speaker 1** [00:42:32] Completely.

**Speaker 2** [00:42:33] We can speak underneath all of that. In that similarity because we all understand things the same.

**Speaker 1** [00:42:39] Way, the same way You have this this idea that we think differently is just absurdity. It's it's a popular absurdity, but it's an absurdity. It's like saying we breathe differently. Our heart works differently. It really doesn't. Like at some maybe micro level, we all of our hearts are different in some extremely micro level. Our lungs are different. But for all intents and purposes, you know, a heart surgery can can work on any heart. And because they're all the same and the brain surgeon can work on any brain because they're all the same. And our thinking is. The saying It's you. There are universal patterns of thinking. Now what we think so wildly different.

**Speaker 2** [00:43:23] I can think about knitting and wonder about.

**Speaker 1** [00:43:25] Yeah, but how you think is patterned. And if it wasn't pattern, by the way, there would be no use for science, right? If there's no pattern to the way we think, right, then there would be that there would be no purpose in searching for any kind of science to it. There would if it was just completely random. Yeah. And everybody was just randomly different. There would be no less. Yeah. If it's.

**Speaker 2** [00:43:52] Chaos.

**Speaker 1** [00:43:53] Yeah, it'd be chaos. So. I studied on every one of the great evolutionary biologists. This name was will provide an amazing man, a great mentor to me. And and we discovered in one of Darwin's Darwin probably came up with one of the most important theories in science that we know of today. You know, still today, one of the greatest thoughts that's ever been had by a human mind. And he wrote in one of his journals, A believer in these views will pay great attention to education. And what he meant is, if you understand my theory of evolution, you know this, which is the incredible theory in and of itself, you will pay incredible attention to education because that is the driver of societies, that is the driver of futures. And, you know, there's all kinds of quotes that say that, but we don't seem to believe it. We don't seem to really know it. And it is true that if we don't pay great attention to education, if we don't start fixing it ASAP, if we don't change it to be, you know. Better and more in alignment with the times than it is the driver of society's.

**Speaker 2** [00:45:16] Will, not just more in line with the times, but also more in alignment with the reality of how we all function and how we all learn and how we all evolve.

**Speaker 1** [00:45:24] That's right.

**Speaker 2** [00:45:25] And that could change society entirely.

**Speaker 1** [00:45:27] Completely. And you're seeing it today. I mean, you'll remember when we worked with we taught a course at a local high school and in the end as the project.

**Speaker 2** [00:45:39] Yeah.

**Speaker 1** [00:45:40] We said, let's design, let's redesign the education system. And what's remarkable is those kids knew instantly what to do and they said, we want to be adults in training, not students. We want to have guides, not not teachers yet. And we want real life skills that are going to that we really need to be adults. Yes. You know, that's that's what we want.

**Speaker 2** [00:46:03] They wanted to be prepared.

**Speaker 1** [00:46:04] They wanted to be prepared. And they knew it. They knew what they needed. They knew how to redesign it. We all know how to redesign it. We all know that's needed. And when we talk to executives and we talk to business folks and people on the on the consuming side of of what education creates, they all say we have to retrain them. They're not coming to us with the ability to think in all this kind of stuff. When we talk to parents, they say, you know, yeah, what am I sending my kid to? Like, It's right. It's not working. He's not learning. He's learning all these negative things and blah, blah.

**Speaker 2** [00:46:37] Blah, because it's all about instructions. And when.

**Speaker 1** [00:46:39] We talk to teachers, they're frustrated with what they're being subjected to.

**Speaker 2** [00:46:44] Because he just.

**Speaker 1** [00:46:45] Wasn't happy with it. Nobody I know is happy with it. I don't know. I don't know why we don't. We all know exactly what to do.

**Speaker 2** [00:46:54] Probably a few people are happy.

**Speaker 1** [00:46:56] With who?

**Speaker 2** [00:46:56] The curriculum.

**Speaker 1** [00:46:58] Yeah. I don't know.

**Speaker 2** [00:46:59] The curriculum ones that send all of the. Yeah, the coverage curriculum. They're making a lot of money for that. And the the, you know, the people that put an iPad and a computer in every kid's lap that they don't need. You know, I don't know. Big business of some sort.

**Speaker 1** [00:47:16] I remember when our kids had it. Memorize the capitals of every county in New York to something, 62 counties. That's a question I've never been asked them a job in there do What's the county know? You know.

**Speaker 2** [00:47:28] And our future doesn't.

**Speaker 1** [00:47:29] The counties are there and.

**Speaker 2** [00:47:30] I think it's 62. I they they all remember that because we literally made like flashcards of them.

**Speaker 1** [00:47:37] Yeah. But we're focused on that information and the whole, you know, it's very simple. It's very simple. Yeah. Our system. If we take that equation m equals I'm meaning our mental models equals information. Our organization or organization is the is the thing that we do with thinking. Thinking is organization. We organize information to make meaning. That's thinking it's right. Yeah. Our school system is entirely based on information, right? Teaching information, testing information, memorizing information. But information is abundant all around us, so information is just like the norm. Yeah. What we should be focused on. Is teaching thinking. Teaching kids to organize information. And what information doesn't matter. Whatever information they're interested in, which would engage the kids more because it doesn't matter what the information is there, it's definitely not going to be the counties of New York.

**Speaker 2** [00:48:37] No.

**Speaker 1** [00:48:39] Maybe, maybe.

**Speaker 2** [00:48:40] Maybe a few.

**Speaker 1** [00:48:41] He's really interested in the counties in the area, in which case he can study the counties in New York. Right. But for most kids, it's going to be something else.

**Speaker 2** [00:48:48] Right.

**Speaker 1** [00:48:48] And so let them study whatever they want to study. Let them figure out what interests them. Yeah. And let them organize that information.

**Speaker 2** [00:48:56] Well and be excited about education and learning and and to feel like it's all of it's possible.

**Speaker 1** [00:49:04] All of it's.

**Speaker 2** [00:49:04] False. Right?

**Speaker 1** [00:49:05] Because yeah, if they learn to organize information, which is thinking. Yeah. They learn to think in order to organize information to make meaning, then they will be prepared for any adult at any future. Yeah. And they will be prepared. And that's what these kids knew. We want. We're adults in training. Yeah, we're adults. We're not employees in training. We're adults in training. Right. We're not just designed to be employees of something. I'm not just trying to go get a job in life. We're adults in training.

**Speaker 2** [00:49:38] And that sort of with that metaphorical backpack or toolkit of metacognition all the way through their life. Yeah. Not just at school all the way through.

**Speaker 1** [00:49:50] It's super simple. Yeah. We just have to have the will to do it. We do. Okay. I think we'll get there. We'll get there. I think we'll get there.

**Speaker 2** [00:49:57] All right. That's a high note. Let's.

**Speaker 1** [00:49:59] Let's end on that note.

**Speaker 2** [00:50:01] That's a wrap. That's a that's a wrap there. Right? Everything's possible.

**Speaker 1** [00:50:05] The main roads and.

**Speaker 2** [00:50:08] Unicorns and rainbows and glitter. My favorite unicorn kitty for sure.

**Speaker 1** [00:50:13] The unicorn kitty out.

**Speaker 2** [00:50:17] The first.