



Dr. Rich Rosen

Annalies Corbin: [00:00:00] So, welcome to Learning Unboxed. And we're excited to be here today. Our guest today is Dr. Rich Rosen, Founder and Executive Director of Indigo Strategies, an organization created to mobilize practicing engineers to use systems, and analysis, and design skills to address education problems in their local community. And I'm very, very fortunate to have known Rich for many years and seen a variety of different components of his intriguing career over time. One of the other things that Rich does and has set up is something called Engineers Helping Educators. And I think that gets to the heart of the spirit of Dr. Rich Rosen. So, welcome.

Dr. Rich Rosen: [00:00:40] Well, thank you for having me.

Annalies Corbin: [00:00:42] So, I want to start with the fact that you are an engineer, but you are heavily involved, not just in your local community, but a global community around STEM education, and a lot of work around the creation of successful public-private partnerships as they relate to the disruptive elements that are so desperately needed to address the educational system. So, tell me a little bit about the journey as it relates to getting to the space where you're kind of a guru of making this stuff actually work.

Dr. Rich Rosen: [00:01:19] Or at least making this stuff up, right? So, here's the relevant journey to how do I sit in this chair right now with you. When I finished college, I was an engineer. I was both a biomedical engineer and an electrical engineer. And that was a long time ago back in the early '80s. And I went to work for a company called Battelle here in Columbus, Ohio.

Dr. Rich Rosen: [00:01:43] And Battelle is kind of a very unique place. It's very unique in the sense that it's a large contract research and development organization, and it also has this kind of very, very intriguing public mission to use the proceeds from its work to help advance, essentially, education of men and women for employment. And it developed way back in the '20s when that charter was set.

Dr. Rich Rosen: [00:02:09] So, I went to work there. I didn't go to work there in that area. I went to work there as an engineer in what would become the healthcare division. And I ended up, eventually, operating that division at one point in time. I spent 30 years at Battelle. And, sort of, the first kind of aspect of this journey is that Battelle is a place in which nothing that it does is not done in partnership with somebody else because it's a contract R&D organization. So, it's always working for a client or a partner.

Dr. Rich Rosen: [00:02:39] And so, in my journey there for the first 20 years of my 30 years there, I was basically in charge of setting up the relationships between us and other organizations that needed this healthcare R&D completed. And over that period of time, I think -- I was kind of reflecting on this as I was coming in this morning. I think I worked with something like 600 different organizations, big and small, public and private. And when you're working on their problems, you tend to get a good sense of kind of what their motivations are and so on.

Dr. Rich Rosen: [00:03:14] I had an opportunity about maybe 20 years into my career to move from the healthcare division to work in what would essentially be the global community relations part of Battelle, the part of Battelle that uses its proceeds and donates them to worthy causes that are within the mission of the organization. At that time, what was going on in the US, at that time, was the Rising Above the Gathering Storm had just come out, sort of the periodic call to action that the United States is having all these difficulties, and the right kind of workforce, and loss of science as a basic, fundamental literate skill that people have.

Dr. Rich Rosen: [00:04:03] When I took over, essentially, what was the foundation, we were doing a variety of really, really good things, but we didn't have a lot of focus in one area. And it was obvious that if any place was going to kind of put a mission together, why shouldn't we work in STEM education? That seemed to be a thing we could do. We didn't know what we would exactly do, but it was a thing we could do.

Annalies Corbin: [00:04:26] But you might know something about that, right?

Dr. Rich Rosen: [00:04:27] But I might know something about it, right, yeah, from my other background, and it was what we did as an organization. So, what I decided to do was, "Well, okay, we're going to focus on that," but, again, the only thing that we knew, the only thing that I knew how to do was do something in partnership with somebody else. So, that's what we started to do. We went around to other places that looked like they were doing things like this, and we interviewed them. We wanted to find out what they were doing.

Dr. Rich Rosen: [00:04:58] What we knew was we knew a lot about STEM. We knew nothing about what would be the best and highest use of our kind of work to help. What we also knew was that we didn't want to invent something new because, as an engineer, I think, back then, if you're an engineer, you typically don't engineer something new without reverse engineering everything else that's ever been done. You take them apart. When I was a kid, my parents would throw something away, and my brother and I would go into the trash and take it apart before it got thrown away. So, it was all about kind of what did other people do.

Dr. Rich Rosen: [00:05:34] And so, what we ultimately found was we could help put partnerships together. And as I talked to corporations about doing this, they said, "This is a really worthy endeavor. It's really hard to do. It's really hard to do it for very long because even though we all want this to work, it's not what we do for a living." So, public-private partnerships, especially between education and businesses, they share an intention for the world to be better, but they are culturally hundreds of thousands of miles apart.

Annalies Corbin: [00:06:07] But there is also a sense of urgency. And this is where before I met you, our journeys intersect in the urgency that's coming as mass of folks getting ready to retire. And so, I think that globally, corporations, businesses, and industries were ready to embrace the conversation. But to your point, very few were ready to stand up and say, "We have no idea, but we will give that a try."

Dr. Rich Rosen: [00:06:31] Right, exactly. So, the awareness was really high. We're losing welders, we don't have his, we don't have that. But the goal was, in many cases, we'll give money to that because that's what corporations can do. But what, probably, their most important asset was their skill base, their employees, their variety of other things. It wasn't something that they wanted to do.

Dr. Rich Rosen: [00:06:55] And mostly, it wasn't something they wanted to do, first, because it wasn't what they did for a living, number one. Number two is it's a big unknown. All you have to do is look at the paper in any city that's got a large school district and realize that the last thing that you want your CEO involved in is the middle of a scandal someplace. So, you always wanted to do things at a distance. So, they were always interested in funding some third party to put that relationship together. We saw that that wasn't the way that we wanted to do it because we knew how to partner in different ways.

Annalies Corbin: [00:07:30] Because it wasn't deliberate enough.

Dr. Rich Rosen: [00:07:32] Right.

Annalies Corbin: [00:07:32] And then, that had been the historical trend, obviously. That conversation often takes place between schools, and businesses, and industry, and how do we even have a conversation to get them. Much less, roll up our sleeves and do something very meaningful together.

Dr. Rich Rosen: [00:07:44] So, not only wasn't it deliberate, it wasn't intentional, and it wasn't systematic. So, it would be very -- People would talk about, "Let's do this, and then it will impact the rest of the world," but there wasn't necessarily a mechanism where that would spread. One of things that we know is a good idea doesn't spread just because it's a good idea. It may do that in iPhones and in commercial electronics. It's not going to do that in education.

Dr. Rich Rosen: [00:08:12] But we also knew that there are plenty of really, really good ideas all over the place, but they don't spread. So, our whole focus was, "Well, what if we created ways for people to intensely spread ideas that already existed or spark ways for them to work?" And, ultimately, that's what I ended up doing for a long time. It was about 10 years of, essentially, funding's not systemic STEM initiatives but systemic partnership formation. So, ideas about how if one organization would fund another organization, could they use their expertise for a while to tell a third organization how they did that?

Dr. Rich Rosen: [00:08:53] And, ultimately, that led to a number of pretty good successes. STEM networks around the country, individual public-private partnerships where schools got formed, and so on. When I retired - and now about 10 years ago - one of the interests that I had, at the time - and I still do - is I had all these really good experiences, the experiences of what motivated people to do public-private partnerships both in industry, and then in education. I had seen a variety of things that never worked. I've seen the demise of really good ideas.

Dr. Rich Rosen: [00:09:28] So, as an education entrepreneur, which is essentially -- I call myself now an education engineer, not in terms of education engineering, which is engineering systems that help in furthering education causes. And so, I wanted to teach that. And somebody else who had known me had encouraged me to, "Look, you've had this really interesting career doing these things. And, now, you're interested to explore them little further. Maybe you should research what works in what doesn't work or what you see out there from a standpoint of a researcher, not a practitioner."

Dr. Rich Rosen: [00:10:04] So, I ended up becoming a fellow at Johns Hopkins University at a time when they were involved in STEM education advancement. And then, ultimately, joined a program there and graduated with my Doctorate in Education, so I could teach Entrepreneurship Education.

Annalies Corbin: [00:10:19] And so, just to be clear, after you retired, you had an entire career, and made a conscious choice to take the experiences and the learning that you had along the way. And we're going to circle back around a little bit to some other pretty valuable lessons at that time because they influenced your research heavily.

Dr. Rich Rosen: [00:10:35] Absolutely, right.

Annalies Corbin: [00:10:35] And so, that's a pretty brave thing. I'll be honest, grad students ask me all the time, "Should I go to grad school?" and I almost always say, "Oh no, don't do that, not unless you really, really want to do it." So, that's a leap.

Dr. Rich Rosen: [00:10:47] Well, I really, really wanted to do it. And I wanted to do it because I was so -- First, I was interested to learn more about I wonder how these things actually work out. And I had an opportunity to research some of the things that I had done, and other people had done. So, what ultimately brings me here is that I got to the other end of doing that research about what is it that makes certain types of public-private partnerships work and endure while others, with virtually the same circumstances, meet their demise. I was really interested in that.

Dr. Rich Rosen: [00:11:25] Secondly, as you know, I had a chance to work with your organization when I was funding things like this. So, I got to know that work and, ultimately, joined the boards of a couple of places that were really integral to this. And my interest, especially in things that we'll circle back around the past, was that one observation is that one of the difficulties of advancing things like education, when corporations want to work with them or other entities, is that despite the best efforts of schools, there's so many fixed conditions going on in schools that you set up the best idea you ever had, and it'll tip over right away with the first thing that sort of goes array because there isn't a lot of time to explore that kind of work in that environment.

Annalies Corbin: [00:12:19] Yeah, built-in systems of constraints that we just can't, quite frankly, engineer around in those moments.

Dr. Rich Rosen: [00:12:24] Yeah. And there's nothing to indict them about. It's just the way that system works.

Annalies Corbin: [00:12:27] Correct, correct.

Dr. Rich Rosen: [00:12:28] So, what are ways to get out that were important. So, that's how I get to be here. Thank you again for having me here.

Annalies Corbin: [00:12:35] Well, we're thrilled to have you here. And it's been an amazing journey. And I do think that when I step back and think about the role not only that your work has had in the sort of serial startup, and that's one of the ways that I kind of like to think about it as we look at some of the alternative education movement that's happened over, quite frankly, many decades in the US and around the world, we see the cyclical nature of what's going on with that.

Annalies Corbin: [00:13:01] And there's a lot of repeat, to your point earlier, of things that didn't work, but we thought they might work, so let's maybe try them again, rather than sort of a giant step back and saying, "Let's really take a look at why we're where we are, how we got here, what we need

to be thinking about a little bit differently as we spend some time reflecting on it before we lean in, and then try to say 'Okay, and here is a possible tangible solution.'

Annalies Corbin: [00:13:29] And my very first experience and exposure with Battelle was having a conversation with a philanthropy person about what it is that we, as an organization, the PAST Foundation, we're doing. And I'll never forget this moment because it was very tangible to me. And I think it sort of set direction and course for the way I was thinking about all of this.

Annalies Corbin: [00:13:50] And so, I'm talking to two Battelle, this leader in the STEM world, even though we hadn't really put that label on it specifically even at that time saying to me, "Well, we don't fund that. We fund the ballet. We fund the art museum. We fund all these," and all worthy, wonderful things that many corporations do, in fact, do in their communities, and we need them to do those. But there was, to your point, a tangible disconnect between the power of the entity, that corporate thing, and the potential as that corporate thing could influence both workforce, and need, and community, and direction.

Annalies Corbin: [00:14:27] So, share a little bit of that with me because you really did the architecture and the driving behind taking, in this case, Battelle and in partnership, ultimately, through that journey with many other leading corporations around the US and saying, "We are going to change the landscape of education through our focus on STEM."

Dr. Rich Rosen: [00:14:47] So, you're correct. We had done plenty of worthy things. It was time to to focus. And so, it began with a question, which is a very good way to get any STEM conversation going. And our question was, basically, "What's the best and highest use of Battelle now to make some difference in the issues that were arising from things like Gathering Storm and others?" But the operative thing was, "What's the best and highest use of our total organization?" And that meant beyond our money, it meant our knowledge, it meant our access. We had a variety of those things, but it was a best and highest use question. What would we do? And so, one that I would say other organizations should always ask is not -- because that one is different than what should be done.

Annalies Corbin: [00:15:41] Correct.

Dr. Rich Rosen: [00:15:42] Because what should be done looks at the global landscape and says, "Well, there is a lack of these workers. We should do more of that." And then, you find others 5000 other people doing that. And it isn't that you shouldn't do something that 5000 other people are doing, but you should look at and say, "In light of that, what's the best and highest use of our work in that area?"

Dr. Rich Rosen: [00:16:01] Some organizations will say, "The best and highest use of our organization is the money that we can give because we can't spend the time, or we can't do whatever." Other organizations, and especially the question for us was, look, we are an organization that does this; and yet, the biggest part of our knowledge base doesn't seem to or isn't involved in that. It's involved in something else. The second thing that led us where we did is we did not assume that we knew what we were doing. That's always a good place to start.

Annalies Corbin: [00:16:34] It's the best place to start, right?

Dr. Rich Rosen: [00:16:36] Yeah, yeah, yeah.

Annalies Corbin: [00:16:37] Acknowledge everything you have no idea about.

Dr. Rich Rosen: [00:16:39] Yeah, yeah. I mean, think about it this way, I mean, when I started this, my total experience in schools is that I had gone to one.

Annalies Corbin: [00:16:47] Right. And you had children in one.

Dr. Rich Rosen: [00:16:50] Yeah, and I had children in one, but I mean that. So, in one end, it makes me an expert in something that happened 35 years ago. So, we began by saying, "What would be the best thing we could do by going and asking other people? What kind of things could we help with?" And that's where you have reflection. You talked about walking and saying, "This is terrific. You're doing all these things, but why wouldn't you be working in these areas more specifically?" That was what everybody said.

Annalies Corbin: [00:17:19] Exactly, exactly. That was power for the course. That was one of many conversations that as we were launching the PAST Foundation that we had over and over again. You had to justify the need for not just the participation but, I would argue, for the informants. So, what I was really asking Battelle for was, yes, help us do this via the power of your funding capability but more important than that is help us do what you do in this space that's ready to be reimaged.

Dr. Rich Rosen: [00:17:54] Right. And that was the second point that we heard was you could do a lot of interesting things, but the other thing is that you have a reputation, not necessarily in this area, but you're known. So, if you did something, you probably could get more access to things, right?

Annalies Corbin: [00:18:09] Correct, right.

Dr. Rich Rosen: [00:18:11] And you may be able to make more introductions and so on. So, the other thing that we saw was how hard it is to work with educators, given their other constraints. The best things that they want to do, but they can't find one hour in a month to schedule a teacher meeting because they're so booked up doing other stuff.

Dr. Rich Rosen: [00:18:34] And so, we had all these really great ideas at the beginning about if you were Battelle, and you were doing this, everything we did was with laboratories, and we prototype things, and we thought about systems-related influences and progressions of stuff. And so, we thought, "Well, schools could be laboratories." And the answer is, no, they really can't. They're not designed to experiment with things that don't have a certain outcome. And not only that, but the people who are in them were never trained to be explorers like that.

Dr. Rich Rosen: [00:19:12] And so, because of that, we started to think about, "Well, there needs to be-" In every other field, there's R&D centers. There are places where an idea goes to be nurtured, to be tested with real people, but it's in a safe enough environment that the downside of the experiment is not going to collapse society. It's going to inform us somehow.

Dr. Rich Rosen: [00:19:38] So, that's how we got involved with you guys in the beginning. It was like, "Okay, you are-" We saw this sort of agile entity that could try new things, sort of have the same philosophy start before you're ready, be smart about the way that you go about doing it, be respectful about the culture of the people that you're in, which was the other thing that I think we -- So, we also had this idea that we didn't go in with the idea that this system is broken, and everybody in it is guilty, which I think, oftentimes, it wasn't a prevailing win of those who were informed, but you'd take two steps back, and it's obviously guilty because just people that don't know what they're doing have designed it.

Annalies Corbin: [00:20:25] It's the common conversation out in the public that education is an epic and utter failure. And it's just not true.

Dr. Rich Rosen: [00:20:31] Yeah, there's nobody guilty, right?

Annalies Corbin: [00:20:33] Right. It's a systemic issue tied to obsolescence, right?

Dr. Rich Rosen: [00:20:36] Yeah. So, we were intrigued with anybody that had sort of this explorer mentality and could figure out ways to sort of set up the experiment and get willing participants with an idea that you could set up the best experiment, but if the people involved in it are either too fearful to do it, or they're already against it from the beginning, it doesn't stand a chance. So, we started to do that.

Dr. Rich Rosen: [00:21:09] And, ultimately, that's what led me down this path of public-private partnerships because the observation that I had at the time was there are a lot of people that want this solution, there are a lot of people that want to participate in helping to resource it, there are a lot of people that will benefit from the solution, but they're not necessarily interested in being part of the exploratory journey because it's a distraction for them, quite frankly, when they're doing other things.

Dr. Rich Rosen: [00:21:38] So, our thought was, well, we could we could find ways to put partnerships together that would be with the right kinds of partners, not just Battelle and others, but just what were the styles of things. Toward the end of my time at Battelle, and then as I retired, and my wife and I did the Engineers Helping Educators thing, it was sort of like one of the things that engineers are good at doing is not just problem solving but sort of being in the middle of, "I wonder why this works like this." And secondly, I wondered what we could do to help other organizations who were interested in doing this. Find, in essence, what's their best and highest use. How would they answer that question?

Dr. Rich Rosen: [00:22:24] And that's what led me to kind of understand or try to understand more about why did some things fail or meet their demise? I would say failure is, again, not the best word for when partnerships end because, again, they may not have met their objectives, but, most of time, partnerships end because they meet their demise, not because they're designed to end. But other ones do. Other ones make it, and all the same kind of things happen.

Dr. Rich Rosen: [00:22:53] And so, I started to spend most of my time helping design structures or relationships between organizations that would be more robust. As opposed to thinking, "How can we make this sustainable?" thinking about the end, I would think about instead, "How can I make this endeavor that these two organizations are trying to do more robust in the journey, so that the first time that it goes off the rails - because it goes off the rails, usually, on about the second day - that it doesn't meet its demise because it's too fragile?"

Dr. Rich Rosen: [00:23:28] And so, that's what led us to this idea of creating sort of safe spaces for where things could be developed, to look for what are the key ingredients of the starting of a partnership that you just sort of have to have in place, so they can survive those first really fragile days, all that kind of stuff.

Annalies Corbin: [00:23:49] So, let's wrap this up with circling back around to that safe space a little bit because in my journey and talking with teachers, or school administrators, or community leaders, or even our CEOs, our industry leaders, oftentimes, one of the things that you see over and over again, especially when you get those folks in that room for the very first time, and everybody lets go of, "It's not working," which is step number one and, sometimes, a really tough step to take.

Annalies Corbin: [00:24:20] But once they do, there's still a hesitancy. You can watch it happening by looking at the faces around the room. And the folks on the school's side of the equation, if you

could have the imaginary thought bubbles, the thought bubble would be everything from these people think, "We're failing," to "I have no idea how to have a conversation with Mr. X or Mrs. Y about what they do, and how could I possibly incorporate what they're doing out in the world into what I'm doing right here in this moment with my little kids, with my middle school kids, with my high school kids." Even with my collegiate kids, some folks struggle.

Annalies Corbin: [00:25:00] And the industry folks, their thought bubble is very similar. It's like, "I don't know how to talk to these people. I don't know how to influence what's happening. Is there a meaningful role for me?" And, oftentimes, we find that it boils down to removing all the parties from the place that they are comfortable on their own and creating another space for that creativity to flow. So, share just a little bit sort of best practices, I guess, if you will, in that closing for folks who are contemplating, grabbing a hold, and saying, "We're going to do it different," what would that be?

Dr. Rich Rosen: [00:25:39] Right. So, a couple of things. First off is if you think about those first conversations, you have typified them exactly right. What's going on in my thought bubble is, "I may never be able -- If I'm a teacher, I've never sat with a CEO before. I'll never have a chance to do this again. I don't even know how to answer these questions." So, you've got an anthropological background. You know that these are two dramatically different cultures. They speak the same English language, but that's about the end of it.

Dr. Rich Rosen: [00:26:09] And so, one of the things that tended to be taboo. So, go to a corporation and say, "Why are you helping educators?", the last thing that they would typically answer would be, "Because there's something in it for us." Because that's taboo. Instead it would be, "Because the world should have better X." And that's a true statement. But the first thing that I would say to anybody who does this is you have to walk in the room with your enlightened self-interest on your sleeve. You should be able to answer a question that the reason I'm helping with this is because it's going to help my company. And if it's enlightened self-interest, and it helps my company, and it helps advance education at same time, then that's a good endeavor.

Annalies Corbin: [00:26:54] That's a win.

Dr. Rich Rosen: [00:26:55] Right. It's a win, and it probably has more likelihood that it sustains itself the first time something breaks apart.

Annalies Corbin: [00:27:02] Exactly.

Dr. Rich Rosen: [00:27:02] So, what does enlightened self-interest look like, especially in this day and age? Well, there's a lot of anecdotal evidence that says if you get your company involved in education in some intentional way, let your employees go work with students, let teachers come in and shadow you in your laboratory, pick something that enables people to not end the meeting with just, "We'll get together and talk again in in this artificial room," but that they actually see each other for what they do. That will give you an idea that your employees might like your organization better. Maybe they want to stay longer, especially in a millennial time when people really have a focus on kind of their own contributions to the world. They want to work in places where there's purpose. So, show them that. So, some of it is that.

Dr. Rich Rosen: [00:27:53] But whatever it is, don't be afraid to say that the reason that I'm here is because I'd like to find the best and highest use of my organization to help you, and also help me at the same time. That's number one. And then, the second one, the second question, which follows that is to not assume that you know what's hard for the other person to do.

Annalies Corbin: [00:28:15] Exactly.

Dr. Rich Rosen: [00:28:15] Right? Because if we sit around, and we design in a room, and we get really excited of what we're going to do, we'll design something that is absolutely unachievable. It'll be grand. It'll be unachievable. So, I would ask you, "Tell me, of everything that we just described we're going to do, what's hard for you to do?" And you might find the simplest things come out of it, like a teacher might say, "It's wonderful, but I have no budget for this, and I can't afford the bus to get my kids from here to there." How much will that cost? \$57. So, now, the conversation becomes, "In order to do this big grand thing, the lack of \$57 is one of the problems."

Dr. Rich Rosen: [00:28:57] But the question is, "Here's what I'm in it for. What are you in it for? What's hard for you to do?" And, sometimes, the hard for you to do will be, "I'm afraid to fail," or "I'm afraid that if I do this, it'll take away eight precious hours that I have to do something else. I don't know how I'll get that done. So, I can't imagine a future where that is."

Dr. Rich Rosen: [00:29:19] And then, culturally, if I ask you what's hard for you to do, that's an invitation for you to share something that in the other conversation you were describing, the last thing in the world that you would do if this was your first and only sit-down between an educator and a corporation would be to say, "Oh, by the way, of all the things we're talking about, here's all the reasons why this might fail," because it's just not in our nature to do that.

Dr. Rich Rosen: [00:29:44] So, those are the first two practices of kind of how you enter into it. And then, the next thing I would say is if you want to look at what is it that causes the demise of hundreds of thousands of partnerships, it is a change in something. Change in leader or founder of the initiative. Whatever it was, that person, he or she goes away. A change in funding. We funded it for the first round, but we don't have any funding for the second round. Whatever it might be, it's a change in something. And then, sub changes like the key person who was working on it left, or got distracted and did something else, or we got a result that we didn't like, and we don't know how to report on it, whatever it is.

Dr. Rich Rosen: [00:30:25] The other parts of the setup are if your senior most leader is not integrally involved, not just as a part of the endorsement, but somebody who really is accountable to it, it has a lesser chance of success. And I don't say this with -- I understand how hard this is to do but to get your CEO, or your division president, or whatever to come forward and declare that they're involved, not just to say, "I endorse this," but as you know, when we were starting off things in some of these partnerships, one of the first inclinations that I would have is we're going to have some sort of a public event where all the leaders will come out and declare what they're going to do.

Dr. Rich Rosen: [00:31:13] And part of the reason that I always wanted to do that was I wanted it -- At the time, I wanted it on tape, not a podcast, but it was earlier, but I wanted to be able to go back later and remind somebody that there's a video of you somewhere saying that you were actually committed to doing this. And not as blackmail, although, maybe, that's part of the design criteria too, but as a way to remind people that same state of mind you were in before, that's what -- The first time that somebody meets a challenge in the partnership that you help them design, they're going to turn around and see whether or not the person who said they could do it is still in their corner. And, again, human nature knows that if people are rooting for your success, you will succeed, or you will overcome an obstacle.

Dr. Rich Rosen: [00:32:02] And then, the last thing that I learned from the research that I did is that partnerships go through these critical events. They lose funding, but they continue, let's say, or they win a big project, or a school opens, or something. The thing about it is when a critical event happens, positive or negative, if they endure it, then they have, at least, a pattern in their background

that says, "We're capable of moving on from that." And it builds a particular camaraderie. It builds a particular set of expectations. So, those things are essential.

Dr. Rich Rosen: [00:32:45] Lack of engagement, the idea that somebody starts it, and then kind of doesn't walk away from it, but basically says, "Call me when you need me," the time you need me is in the middle of the night when something isn't working, and I'm someplace halfway around the world, and I don't have any context of why it doesn't work, so I can't help you. So, being committed to that first kind of vulnerable year or whatever it is is absolutely critical.

Dr. Rich Rosen: [00:33:12] And then, the last thing is safe space, which is, "Where will we do this?" So, if I say, "What's going to be hard for me to do?" and you say, "I don't think I could do this in my classroom," that's what led us to kind of understand that there need to be the equivalent of R&D centers in the education world that are equivalent to R&D centers in every other aspect of industry.

Dr. Rich Rosen: [00:33:35] And those places should be places where the work can take place, but they can't be simulations that don't mimic what the real world looks like because, otherwise, they'll come out of there, they'll be tremendously successful, they'll go into the first education space, they'll die, and then everybody else will declare that the thing was a bad idea when it was sort of like designing a medical product, and realizing it has people sit on the seat of your car in the middle of Texas while somebody is in a Walmart, and it's going to be 180 degrees, and that pump still has to be able to fit to work. So, if I designed it in the comfort of my own home, in my basement, and it was 47 degrees to 90 degrees, it's not going to work when it goes out in the real world.

Dr. Rich Rosen: [00:34:22] So, a safe space is also a space that's real. And the Innovation Lab at PAST has that right. You have real students, real teachers, and you get a chance to see how people really react to things, and you get the surprises of what you thought for sure was going to work, or you see something that you had no idea was an assumption that was like the \$57 school bus cost, and you see those in real time, and engineer around them, and, hopefully, get a good result.

Annalies Corbin: [00:34:50] And it's joyous, right?

Dr. Rich Rosen: [00:34:51] It's joyous.

Annalies Corbin: [00:34:52] That's the other thing. So, transformative education and really stepping outside of that comfort zone, that box, is a joyous experience for all of the participants. And it's certainly been a joy for us in this journey, both to have you along for the ride and, also, today out for this conversation. So, we want to thank you very much for spending time with us.

Dr. Rich Rosen: [00:35:12] It's my pleasure.

Annalies Corbin: [00:35:12] And for those listening, hoping that these pearls of wisdom, which they truly are, can help you make decisions around stepping outside into a world where there is no box. So, thank you so much for joining us.

Dr. Rich Rosen: [00:35:26] It's my pleasure. Thanks.