



### **Dr. Andy Bruening and Tyler Hertenstein**

**Annalies Corbin:** [00:00:00] So, welcome to today's episode of Learning Unboxed. I am very, very excited to have with me our special guest, Dr. Andy Bruening and Tyler Hertenstein of Metro Early College High School. Dr. Bruening is with the PAST Foundation. And we're excited to have both of these fellows in to talk with us today about robotics education, in particular, and design, and engineering, and the role of design thinking and engineering in education today. In particular, the success that these guys have seen in integrating robotics broadly into what is happening with teaching and learning in their classrooms and their after-school clubs, and the different things that can happen when we get really creative with those opportunities. So, welcome to both of you.

**Dr. Andy Bruening:** [00:00:44] Welcome.

**Tyler Hertenstein:** [00:00:44] Thank you.

**Annalies Corbin:** [00:00:44] So, glad to have you guys here. So, a little bit of background and context just because it's sort of the fun stuff. I've known Andy or Dr. B - as the students so affectionately call him - for, oh man, the better part of 10 to 12 years now.

**Dr. Andy Bruening:** [00:00:58] 10 to 12 years. 10 to 12 years.

**Annalies Corbin:** [00:00:58] It's been a long time. And so, we, first, had the privilege of meeting Andy when the various teams and organizations that came together to start Metro Early College High School. And Andy is the first science teacher and engineer teacher at that school. And so, really on the cutting edge of thinking about doing some of these things very differently.

**Annalies Corbin:** [00:01:19] And over the years, we found that Andy had a natural leaning, I guess, if you will, to very applied teaching and learning experiences, very hands-on with students. And so, we've sent Andy to sea. We've sent him to the Everglades. We've sent him to the desert, I believe. All kinds of crazy places over the years. And so, that's some of the passion that he brings. A few years ago, PAST Foundation actually snagged Dr. B up. And he is now Director of Bridge Programs and All Student Programs at the PAST Foundation. So, we're excited to have Andy.

**Annalies Corbin:** [00:01:52] And joining him is Tyler Hertenstein. And Tyler is an engineering teacher in Metro Early College High School. And, actually, Tyler was part of the transition when Dr. B formally left Metro Early College and Design Learning Lab and has come in to make that program his

own. And so, one of the things that I love about Tyler, in particular, is he talking about that he's a teacher by trade but an engineer at heart. And I think that really gets to the power of this team that you guys have created in terms of the teaching and learning that you do.

**Annalies Corbin:** [00:02:29] So, we're going to jump right in and talk about, in particular, FIRST Robotics. So, Andy, you've been around FIRST Robotics for a number of years, started the original Metro bot team. And that program itself, not the Metro program, but, broadly, FIRST has evolved as it's matured to a product of Dean Kamen and all the amazing sort of innovations coming out. So, talk to us a little bit about, why should a school invest? Why robotics teams? Not just a club but, I mean, the full potential of FIRST is pretty stunning, but you have to really go all in. So, talk about that a little bit.

**Dr. Andy Bruening:** [00:03:08] Yeah. So, FIRST, it's an amazing program. This is my 10th year coaching the Metrobots. FIRST had a program that will encompass as many things as FIRST does. So, for FRC, FIRST Robotics Competition, we, our team, we break our team down into, for example, two sides of the team. We have a business administration side, and then we have the engineering side. And within that, we can bring in so many different content areas. We can bring in so many ways that the students can get engaged.

**Dr. Andy Bruening:** [00:03:42] We have a number of students that are not even interested in building or touching a robot. So, the fact that we have kids come in, and they're our fundraising manager, or they're going to be our finance manager, and they'll go through and help keep track of those sides of things; where, then, on the other side engineering project manager and making sure that the robot is built.

**Dr. Andy Bruening:** [00:04:02] And this is -- As you said, I love applied learning. And I know that for myself, I wish I'd had these types of programs. I'm not a book, sit down, and read, and lecture, and listen, and do that. I can't. I have to put my hands on and build. And even if it's math in the accounting side of things, I'm still applying it. And so, I want the students to be able to do that. And FIRST and robotics programs like that are amazing for that.

**Annalies Corbin:** [00:04:27] So, whether it's FIRST or any other, definitely, advocates for robotics programs.

**Dr. Andy Bruening:** [00:04:32] Yes, absolutely.

**Annalies Corbin:** [00:04:32] So, Tyler, what, eight years into this team existing, you come onto the scene. There's transitions that are happening both at the school with new programs evolving into an existing school. There's also some transitions and personnel with Dr. B moving over to the PAST Foundation. So, what interests you the most about picking up, and joining in, being in that space? You're a new teacher.

**Tyler Hertenstein:** [00:05:03] Right.

**Annalies Corbin:** [00:05:03] When you arrived here, you were fresh.

**Tyler Hertenstein:** [00:05:06] Yeah. So, yeah, I'm in my fourth year of teaching, on my third at Metro overall. And it's interesting, the biggest thing and, I think, the biggest drive that's helped the most is the students themselves. We have a very strong senior class and juniors that -- and there are a lot of independent leaders that have really been able to handle a lot of the transitions that happen at school. I think that's part of the nature of Metro too is things are fast-paced, things change, and they're able to adapt quickly.

**Annalies Corbin:** [00:05:31] So, as you think about coming in, and having put your own stamp on this program, so, for you, what did that mean? And what was the primary thing that you were constantly or you continued to think about as you look at long term, as it relates both to the team but, also, to the design program that you run with Metro, and thinking about sustainability? Schools don't do this well naturally. So, that's the reason we're talking about it.

**Tyler Hertenstein:** [00:06:01] Yes. So, I think, the program as a whole has already been successful, and you need to look at it from that lens of why change something that's already pretty successful but, also, things are changing. I have different experiences and backgrounds to what Andy has had. And so, being able to apply what I've learned throughout my college, and previous experiences, and kind of connect that to what's already been there is critical.

**Annalies Corbin:** [00:06:24] Yeah, absolutely. What about the challenges, Andy? So, as you sort of think about the opportunity that is at FIRST? And you have some pretty intriguing philosophical ideas as it relates to FIRST. And lots of teams that are out there at FIRST is all about the bar and how you perform. You're a world championship team but not because of your robot.

**Dr. Andy Bruening:** [00:06:52] Right. So, the Metrobots, four years in a row, have gone to world championships. And not one of those times has it been for a robot. I would like us to go forward, absolutely. But, FIRST, even one of their taglines is, "It's more than just robots." But I think some teams definitely get lost in that and think that it is all about the robot. You have to go win. You have to build the best. But not that the students build the best, but they work with mentors that help them build the best.

**Dr. Andy Bruening:** [00:07:23] And while I think that there's benefit, but I still think that our team, the way it's structured, is that it's more student-run, student-led. It's a mentor-guided. We help them along the way. And I think Tyler has brought huge help to that with his engineering background. And I think I see a big picture side of it of the beginning to the end, and Tyler brings the more engineering side that help focus that. But our team is definitely more student-run, and it's their robot, their designs, we guide them; where, other teams, you'll go out, and you'll compete that have building in NASA, for example, or other professional engineers are doing most of the work.

**Dr. Andy Bruening:** [00:08:04] We don't want our team to be that way. I've never wanted our team to be that way since I started it. And I knew that going into this competition, and when you say competition, competing with the robots, we would always be at a slight disadvantage because of that. And FIRST talks really -- Or talks a lot about students working alongside engineers, but there are some teams that it is students working alongside engineers where they've actually designed and built the robot. They're only allowed to go drive it. And I don't want -- I don't think we want our team to be that way.

**Dr. Andy Bruening:** [00:08:40] And so, the challenge is definitely that. It's getting those mentors to be able to, also, from their side of things, not go in to do all the work and not build the robot for the kids. We've had, over the last couple of years, some, I would say, conflict of interest between mentors and students. And some mentors want this, and some students want that. So, I think -- But we haven't given up on our core value of saying that it is students first. And so, that's definitely been one of the challenges that we've had, and we'll continue to have, I think.

**Tyler Hertenstein:** [00:09:11] And I think giving them that freedom too allows them -- they really take their own -- they take -- They're invested in it. I mean, they take ownership of it. Like we have our kickoff this Saturday, and the students are already talking on our communication channel, Slack, that the day after on Sunday, they're actually getting together at one of their houses to work on a first CAD

for the robot. No mentors are going to be there. They're just doing it themselves. We don't meet on Sundays. And so, they're going to come in on Monday with the plan saying, "Hey, this is what we made. What do you guys think of it?" and looking more for that feedback from mentors, not direct input of the mentors saying, "This is how you're going to do things."

**Annalies Corbin:** [00:09:45] And I think that's one of things that I love so much about the robotics program. So, I've had the privilege -- I guess, is the way I look at it now -- from the team perspective whom I get really tired of [??] constantly being around over the years, but it has truly been my privilege over the years to watch. And one of the reasons that PAST Foundation, when we start with new schools, new programs all over the country and around the world, we almost always talk about FIRST, and we talk about robotics.

**Annalies Corbin:** [00:10:13] And one of the reasons I feel so strongly about it is because I've watched this program take all kinds of kids with all kinds of backgrounds, experiences, philosophies, personalities, good, bad, And the ugly, and teach them how to be a team, how to think independently. So, the fact that you've got kids that are -- that does not surprise me that they're willing to take it upon themselves because, I think, the program architecture itself lends to that. But I think the dynamic of the coaching, the team, the ownership of an individual team as opposed to the the broader ethos is what's really instilled that. So, how do you make sure that that continues when this crop of seniors that you talked about, Tyler -- You start over every year to some extent. So, how do you keep that aspect alive?

**Tyler Hertenstein:** [00:11:09] Yes. There's definitely challenges with that. The biggest thing that -- One thing that FIRST is good about is that FIRST inspiration. You never know what kid is going to really catch that spark, and they're going to be all in on the forums and everything looking up games from 20 years ago because they're just that invested in it. And, I think, again, it always comes back to the students. I think, all of our success for the most part and what I see is we have individuals that are really inspired to do a lot, and they see those problems, and they take other freshmen under their wings to really turn them into the future leaders themselves.

**Dr. Andy Bruening:** [00:11:41] I think to that one thing that I, over the last couple of years, have kind of found is maybe more important in our coaching, it's coaching the soft skills than the engineering because we can get the engineering skills, whether it's during build season or a pre-season thing. But what I've seen over the years is when we have maybe fluctuated with the number of mentors we have, but we've always had a large -- almost always had a large number of students. It's how those students interact with each other, and how they're able to -- Their peers, they're working with their peers, right. How are they able to manage in a way their peers?

**Dr. Andy Bruening:** [00:12:17] And so, as an engineering project manager, knowing that you've got your best friend who didn't complete a task that was due yesterday, how do you handle that? And so, that's our job now is kind of coaching them through that. But at the same time, they have that passion for it. They want to do it. And so, it is easier in a way, but, still, that's the challenges that we have to coach them through that aspect of it. And I think, in the end, our students will be so much more successful because of us working with those challenges than just the engineering challenges.

**Tyler Hertenstein:** [00:12:48] And I think in terms of succession, a lot of the things that we talked about that we do aren't things that can be written down. It's a big experience type thing.

**Annalies Corbin:** [00:12:56] Absolutely.

**Tyler Hertenstein:** [00:12:57] And, I think, that's the hardest thing to handle. We're fortunate too that Andy used to teach design and everything, but I'm doing it now, but he is 100 yards away from my desk at all times. So, if I have a question, I can always find him and bug him.

**Annalies Corbin:** [00:13:09] Right. And also, just like, "Hey, I need some help."

**Tyler Hertenstein:** [00:13:11] Exactly, exactly.

**Annalies Corbin:** [00:13:11] "Let's do this thing together," or whatever. And so, that collaborative opportunity that comes from the Innovation Lab piece tied to all that makes a big difference. Let's talk a little bit about, as the program that originated was growing, and let's back away from Metro, and really sort of look at the community at large because Ohio and many of our surrounding states in this part of the country, we have a tremendous number of these FRC teams, and we have growing numbers of the other components of FIRST, whether it'd be FTC, FIRST Tech challenge, or FLL, the FIRST Lego League, and so on.

**Annalies Corbin:** [00:13:47] And so, we have this crop, this under-swell, I guess, if you will, of these programs coming, and more and more kids getting involved a lot earlier. And so, through part of the community work, then, Andy, early on, something called CORI was developed locally and regional. So, tell us about that, and why it's important as it relates to growing these sort of strong ecosystems.

**Dr. Andy Bruening:** [00:14:13] So, CORI started, I think, about 10 years ago also once around the same time that we started the Metrobots. And the original idea was that it was a resource for teams, for mentorship, a place for coaches to get together and talk about what was happening. At the same time we had funding for rookie teams. So, it was really that resource to help get teams started, keeping them going, the sustainability side of it.

**Dr. Andy Bruening:** [00:14:39] Over the years, it has evolved a little bit to, now, where it is here at PAST, the Center of Robotics Innovation, but it still has that resource at its core where we're working with some of PAST partners to bring in more mentors. We've actually started to get to the point where we have other teams working in-house. We have three other teams that work in our building. The longer-term thing is that CORI is there to help those teams, like you said, get started to be sustainable. But we, now, have more of that resource available.

**Annalies Corbin:** [00:15:15] So, you created an ecosystem out of all these sort of disparate parts and sort of pulled it all under a singular umbrella.

**Tyler Hertenstein:** [00:15:21] Absolutely.

**Annalies Corbin:** [00:15:22] So, regionally, the impact of students going through these programs could be better managed, better felt, have greater influence, and so on. So, that has been a pretty amazing opportunity. And as CORI developed, it took on more and more things for it to do. For example, off-season events happened through CORI, the management and putting on other pieces, FLL tournaments, and so on. So, Tyler, that provides. That ecosystem has built in a natural bridge for students on your team to actually engage, not just with others, but the volunteer piece.

**Annalies Corbin:** [00:16:00] And then, design and development because that's one of the things that these kids, as they've gotten better and better through their robotics, they're actually actively engaged in what happens at off-season events, and how it's laid out. And so, talk about that experience a little bit because that's part of the core of FIRST is you have to volunteer, you have to lead, you have to teach, you have to -- So, how does that translate into these opportunities that have been created?

**Tyler Hertenstein:** [00:16:23] Yeah. So, with only being on the team for a little over a year, I think, what happened with it is since Andy has really made it a student-oriented effort where we're kind of passing things on what we know, the students are doing the same thing where they take ownership of these community events. They have knowledge, they want to pass it on. It's not, "We're using this knowledge to better ourselves. We're using this knowledge to better the community itself as well." And going to those events as well, it's really interesting to see how the students interact with them. And they're really -- They give it their all always because they know they have resources and knowledge that others want and that they can inspire them as well.

**Annalies Corbin:** [00:17:00] And it's pretty awesome, actually, as it relates to the way the kids truly, truly invest. I mean, there are long days. When folks talk about robotics teams, I think, there's this disconnect between, "Well, that's just the geeky or the nerdy kid," and it's not all day, it's not long hours, it's not physically straining, it's not -- And there's, to some extent, some aspects of that are true, but the reality of it from a team perspective, it's a tremendous amount of time and effort, and they have to fund raise. They're just like any other team sport or event.

**Dr. Andy Bruening:** [00:17:37] It is. And to that, I have buddies that actually give me a hard time about being a robotics coach like, "You're the nerdy teacher that's going to be the robotics coach." And they give you a hard time all the time. But in the end, I'm like, "That might be the case but you really-" Like you said, you don't know how hard these kids are working, what effort, what time they're putting in to come in and help us either set up for a CORI Lego tournament or the CORI off-season FRC event, or kickoff that we're having this Saturday that they are involved and engaged as much as I am. In some cases, more. Like we've had to actually kick them out of the building.

**Annalies Corbin:** [00:18:14] I have midnight, many a time, had to send a text, "Are you guys going home?"

**Dr. Andy Bruening:** [00:18:20] And in the end, I'm like, "Yeah, you guys, you can give us a hard time, but I know what these kids are getting out of this is tremendous. And it will be -- They will be so much more successful whether they're an engineer or not." And I think that's the beauty of it too is, like I said, in my class I was just teaching that I could care less if you're going to be an engineer, but this type of activity, this type of thinking will pay off in any career, any job that you take in the future.

**Tyler Hertenstein:** [00:18:49] And I think that Dean Kamen of FIRST always calls it the sport of the mind.

**Annalies Corbin:** [00:18:52] Yeah

**Dr. Andy Bruening:** [00:18:53] Yes, absolutely.

**Tyler Hertenstein:** [00:18:53] And it gives the kids those -- They're not athletes for the most part that we get, but it gives them that sense of teamwork, and leadership, and responsibility that they can't get from a sports team because they're not athletic enough for anything. It's the same qualities that we try to give.

**Dr. Andy Bruening:** [00:19:08] And there are other robotics competitions out there that give kids similar experiences to what FIRST has. But if we're talking about FIRST, I think, that the way FIRST doesn't, it's the sport for the mind, it definitely makes you feel that you're a part of the team, that you have to compete, and work hard against, and with your opponent; where, some others are, "Okay, you go out and do your mission. You do your component," which is still a great thing, still design, it's still that collaboration, but it's not in that same way, where like we're saying, if kids aren't as athletic, they don't necessarily get that team spirit type of thing if they're sitting there they're programming

something. But, now, they're on FIRST, they still get that. They get that component, and it's awesome to see it in that respect.

**Annalies Corbin:** [00:19:57] It is awesome. Again, I have the benefit of being able to sit back and watch all these years, right. And I get that it makes me incredibly spoiled in a sense because the kids have been amazing. And quite frankly, I would take the kids that participate in robotics programs generally. Andy, you made reference that there are other programs that are out there, whether they'd be BES or MATE, which is the underwater version. There's drone competition starting to really sort of escalate. And so, there's opportunities for students in this space. I would take our kids, quite frankly, and put them up against any sets of designers, or product developers, or problem solvers out there because they're limitless. I think that's part of the awing component of what can happen in these types of inclusive environments.

**Tyler Hertenstein:** [00:20:51] Oh yeah. And I think a lot of what they get is beyond what they get within a college degree program as well.

**Annalies Corbin:** [00:20:57] Yes, absolutely.

**Tyler Hertenstein:** [00:20:57] I graduated with-

**Dr. Andy Bruening:** [00:20:58] I agree with that.

**Tyler Hertenstein:** [00:20:58] I graduated with an engineering degree and my capstone was a robotics thing. We made a robotic football team. And the design we had was minimal. It would get smoked by anything these kids are coming up with.

**Annalies Corbin:** [00:21:09] Yeah, yeah. That is awesome. That is an awesome thing to be able to reflect on, right?

**Tyler Hertenstein:** [00:21:13] Yeah.

**Annalies Corbin:** [00:21:14] So, one of the other things that I think that broadly both robotics programs, in general, but specifically your program has done and, again, by design, but, I think, definitely something that I want to talk a little bit about is changing the dynamic of who's participating. So, there's been a tremendous push on, especially in the last three years nationally and globally, to be more inclusive within STEM fields, more women, more people of color, a greater diversity of skill set, talent, and experience. So, talk a little bit about the effort that you guys have made to change the dynamic of this team.

**Dr. Andy Bruening:** [00:21:54] Well, I can speak of that a little bit. It's that last year, 2017, CORI, PAST received a STEM equity grant from FIRST. And as part of that, we were starting -- the whole thing was to start 21 FIRST robotics teams, whether it was FLL junior or all the way up to FRC. In the end, we started 14 teams. So, we were able to give additional support to the teams from the original 21. There was a huge increase, and it was all around girls in STEM. So, we were girls who lead robotics.

**Annalies Corbin:** [00:22:30] So, these 14 teams had to be predominantly female?

**Dr. Andy Bruening:** [00:22:33] Yes, more than 50% had to be female. In the end, the Metrobots came along, and all the FLL teams, and even the two FRC teams, they supported as best they could. They would go out either having the teams come here to PAST or going to their locations to help mentor. And it's been huge. And I know that one of the things that our team is winning the

engineering inspiration and winning chairmans has been because of those types -- Some of it is because of those types of outreach events where whether we're going to a library and going out into the community where the kids haven't had this kind of experience, but we're going to meet them where they are and being able to give that to them.

**Tyler Hertenstein:** [00:23:18] And I don't know what the magic sauce is to get more inclusion. I think that somehow -- Like our team is actually predominantly women as well. And I think some of that comes from having good role models. Most of our management team at our seniors are girls. And they're not the leaders on the team but leaders in their school too. And so, having just someone to look up to, even if it is a freshman looking up to a senior, is beneficial.

**Annalies Corbin:** [00:23:40] But I think the program itself fosters that. As long as the environment, which the program sits also fosters that. I do want a caution that because it takes more than just the foundational or structural pieces to say that we want to be inclusive for it to truly, truly happen. So, there are still a lot of FRC teams. When we go to competitions, I see them that there might be a girl, and you get the impression that she's the token female on the team. But that is not the case with the way that you have structured.

**Annalies Corbin:** [00:24:13] And I think, personally -- and, again, outside looking in, watching you guys over the years, I think, a huge piece of it is the fact that when young girls, freshmen, join the team, (A), there's a big push to get more girls and minorities of all descriptions onto the team, and to be inclusive, and be welcome, but because it's a safe environment even as as a freshman, they had the opportunity to grow those skills as a senior to truly be leaders. And I will say, your girls are fierce. A few of them in particular, holy moly, wow, awesome.

**Dr. Andy Bruening:** [00:24:47] Yeah. We have a couple of seniors right now that I know we will miss them tremendously knowing it's going to be a huge hole when they leave. But we're looking at them to see, "Okay, now, how can you train back to-

**Annalies Corbin:** [00:24:58] Exactly, exactly.

**Dr. Andy Bruening:** [00:24:59] ... to the underclassmen." And they're taking it on, and they know. In fact, we had a conversation with them right before we went on break and said, "Okay, kickoff's happening. This is your last kickoff. How can you help us for next year?" And so, they're looking at who and how they can help train up the next crew.

**Tyler Hertenstein:** [00:25:20] And they recognize too that what got them hooked was some other upperclassmen taking them under their wing. And so, they've done that with some of the other freshmen and freshman girls as well. And so, everyone has a role to play no matter how small it is. And once they find that role that they kind of get the first bug, and then they're into it.

**Annalies Corbin:** [00:25:37] Yeah. But, again, personality and environment, I think, does feed an awful lot-

**Tyler Hertenstein:** [00:25:42] Absolutely.

**Annalies Corbin:** [00:25:43] ... into it, no question whatsoever. Three of your very fierce girls that I know you're going to be missing next year, I have publicly said that if the three of you decide to start a company together, come see me on investing right now because there's no way the three of you will fail.

**Dr. Andy Bruening:** [00:25:57] Oh no. Absolutely.

**Annalies Corbin:** [00:25:58] So, pretty wickedly fierce. Let's talk a little bit about your advice, your recommendation. So I'm a school, a small school, very rural, in the middle of nowhere. There's none of these teams close by; yet, we have a culture because we're rural, in particular, rural education. I'm traveling great distances to participate in stuff. So, as a culture, a lot of rural schools, quite frankly, are very willing, able to go places to do stuff with kids, especially in team formats. But launching and FRC team, especially in a rural community can feel a bit daunting.

**Annalies Corbin:** [00:26:36] So, what's your your best recommendations for schools, whether they'd be rural or otherwise, but just really thinking about, "Hey, we want to do this too. We want to. And we don't want it to end up." And Andy, you and I had this conversation all the time is we don't want this to be another fad that we take on in our school like makerspaces. This is the one that always comes to mind. Great intentions, a fabulous teacher that's running that, and the teacher leaves. And, now, the thing or the club-

**Dr. Andy Bruening:** [00:27:05] It just sits.

**Annalies Corbin:** [00:27:05] ... sits. And it's tons of money because there was no plan to incorporate into the fabric of my community in my school. So, with that piece in mind, what's your advice to places that are saying, "Yeah, I want to take the plunge"?

**Dr. Andy Bruening:** [00:27:20] Well, I think that getting the parents and getting the teachers engaged and the rest of your school community engaged is a huge help. I think the one thing that some teams or teachers forget is that the community around them will help support them. Like, for example, your first or second year grants and funding will be relatively easy. First is expensive, but there are grants. There are ways to get and fund your team going. It's the third and fourth year. And then, by the time you're a fifth and sixth-year team, as long as things are going well, you should be in that kind of sustaining mode. But don't forget that the community is out there.

**Dr. Andy Bruening:** [00:28:02] And so, for example, if you are -- I was talking with a school that was -- it's not for FIRST specific, but it's up on Lake Erie, not an area that has a lot of industry or anything like that. But if I was saying you're starting an underwater robotics team, talk to the Marinas, for example. Go out and say you can build an ROV that will now go and inspect boats. And those companies, those communities will be able to sponsor you.

**Dr. Andy Bruening:** [00:28:26] If you are living in more rural areas that you can find bigger farms. You're, now, going to develop a drone that will go help them monitor their crops. So, as the team and knowing that, yes, you're building an FRC robot, or you're building a MATE underwater robot, it doesn't matter. It's what what you can pull out of that that you can get back to the community, and then the way the community can support you.

**Dr. Andy Bruening:** [00:28:50] And once you have buy-in from your your staff, your school, your community, your parents, get the parent organization started, it actually is a lot easier, I'll say, than trying to do it completely on your own.

**Tyler Hertenstein:** [00:29:05] And, yeah. So, I'm actually from a pretty rural area myself. And I know the biggest thing that drives that is just passion towards something. A lot of times, there's not a whole lot to do. You go to the football games on Friday night, but finding either an individual or group that's really passionate about that can really help drive it. So, if you get -- It really takes one staff member. Metro had Andy do it back in 2010. If you get one staff member that's really wanting to do it, they can gather a couple of their students as well, and those students can be the driving force.

**Annalies Corbin:** [00:29:33] Yeah, absolutely.

**Dr. Andy Bruening:** [00:29:34] And I think though that even we've seen in Columbus that there are teachers that want to be engaged, and want to do it, and they sometimes feel that they have to do it all by themselves, but you don't. You have to bring in that community whether it's parents who may be engineers, or scientists, or have just a tinkering background but bring them in, and that will help take some of the burden off of the teacher because they can feel stressed out. After one year, "I'm not doing this again," but you have to bring in the support staff, and you-

**Tyler Hertenstein:** [00:30:04] Absolutely.

**Dr. Andy Bruening:** [00:30:05] And you bring that, and everybody moves forward. And we've had struggling times here where I was the only mentor on the team. And I knew that if I didn't have support next year, I wouldn't do it again. But I had parents that would come in, or I had college students that -- Metro students who graduated are now over at OSU who have come back and, "Okay, Dr. B I'll help you out." And so, there, they're helping. And you just keep that community going and it helps.

**Annalies Corbin:** [00:30:33] Yeah, it's pretty awesome. What about if I had to do it again, I'd do it differently sort of things? Because it's one of the things that folks contemplating doing this really want to know. So, Tyler, you stepped into something that was already up and moving, but in the time that you've spent with a team, I mean, is there a moment, an event, a thought, a thing that you said, "You know what, if I had to do it differently, these are some of the things that I, as a new teacher in this space, what I would do differently," or an advantage, or something that you see an opportunity that you haven't really tapped into? Is there's something that just really comes to mind?

**Tyler Hertenstein:** [00:31:11] Not off the top of my head. I have to think about it a little bit. One thing I know because last year, I was -- Fake it until you make it was my mantra through the whole year.

**Annalies Corbin:** [00:31:20] Fake it until you make it?

**Tyler Hertenstein:** [00:31:22] Yes because there's such a steep learning curve because I have an engineering background but I don't have a FIRST Robotics background where knowing which motor do I want to pick. There's seven to choose from. And it's pretty tough to learn in that regard. Well, I'll think about that one. I don't know if you have anything.

**Annalies Corbin:** [00:31:39] Yeah, Andy?

**Dr. Andy Bruening:** [00:31:39] Yeah, I do, I do. I know that if the students are listening, they're going to jump on my case for this because one of the things I say is if you don't document, it didn't happen.

**Annalies Corbin:** [00:31:48] Really, Dr. B?

**Dr. Andy Bruening:** [00:31:49] Yeah, if you didn't document, it didn't happen.

**Annalies Corbin:** [00:31:51] For our listeners, I'm giving you a hard time because Dr. B is the last one to turn his reports in sometimes. He's getting better.

**Dr. Andy Bruening:** [00:31:59] I've been there, but I would say that I would have liked for my own self to have done a better job of keeping track of some of the things that I did my first year and second year. I have, obviously, a mental image of what I did, but it's not the same because you go back, "What did I do at this time of such and such season?" And I don't have a good record of it.

**Dr. Andy Bruening:** [00:32:21] But I would go back, and that was one thing that I -- It's definitely one thing I would do better because there's little gaps, or the organization, or just little things like that. And I know that it would make it easier to know that there's a pothole here, go around it because I've documented it from before. That was a pitfall. That was something that the team struggled with. And I would be able to not completely avoid it, but I'd be able to navigate it maybe a little bit better because it's a new team every year, it's a new challenge every year, things like that happen, but being able to be a little more, "Right, let's not go down that path," type of thing

**Annalies Corbin:** [00:33:00] Do you think that that team or the program really put it into that perspective? So, the program is to the point that as it morphs and shifts because it's going to everything, everything is changing so fast in our world today, is it sustainable? You've built the internal capacity obviously to your mentoring, and you're growing your team, and you feel confident that the program outlast even the two of you?

**Tyler Hertenstein:** [00:33:33] I think so. I mean -- And again I keep bringing back the students, but there's an expectation even at the middle school, some kids that "I want to be at Metrobot when I get older." And so, we know that we've got them hooked. And I think having FIRST, having it full from FFL junior all the way up, the kids are starting at a young age, and they're looking for that next step. And so, as long as we can keep supporting those early steps, we'll still have that pipeline.

**Annalies Corbin:** [00:33:55] What do you need? As sort of the parting shot, pie in the sky, if you could have something, and granted we're going to assume funding is always the thing that schools, communities, active clubs, and programs are always looking for funding. Set funding aside, what's the other thing, one thing, that would be incredibly meaningful and make a difference that if someone were to show up tomorrow and say, "Hey, we heard you on Learning Unboxed say you need this," what is the this?

**Tyler Hertenstein:** [00:34:28] I'm thinking industry mentors would probably be a big one.

**Dr. Andy Bruening:** [00:34:32] Yes, that's exactly.

**Tyler Hertenstein:** [00:34:32] We've had a couple of people that found us somehow online saying, "Hey, we saw your team that's won some awards but not for robot. How can we help?" It was fantastic that the two mentors that we had are great, but you can never have too many of them as well just to give different experiences. They all have different backgrounds.

**Dr. Andy Bruening:** [00:34:48] I would agree, exactly. Having mentors come in and be able to give their experiences, but, Tyler, you made a point though that engineering and FIRST. Yes, it is engineering, but true engineering background and being able to engineer or design in FIRST are different things. One of the things that I think we're facing is that we get mentors in, we kind of have to coach them on how FIRST works because what we're trying to build in a six-week time period -- I've had mentors that come in like, "Excuse me, you're doing what in how long?" And they freak out, and they don't come back.

**Dr. Andy Bruening:** [00:35:22] So, getting those mentors. And maybe that's something that CORI, we need to do is a better job of mentoring mentors to be able to come in, and step into a FIRST program, and have a better set of expectations of knowing where the kids are, what they need to be able to do, and what that outcome is at six weeks because if we're constantly coaching our mentors to be better mentors, then we're starting over every year. And so, I would say having solid mentors that understand where these kids are coming from and what it is that they're trying to do in such a short time frame. That would be huge.

**Annalies Corbin:** [00:36:00] And not just engineers, right?

**Dr. Andy Bruening:** [00:36:01] Yeah, absolutely.

**Dr. Andy Bruening:** [00:36:01] Absolutely, yeah.

**Annalies Corbin:** [00:36:01] I mean, that's the thing. We need folks to understand the beauty of this program is not only does it work for any kid, any kid's interest, but the same from a -- You need mentors of all descriptions, right?

**Tyler Hertenstein:** [00:36:12] Absolutely.

**Dr. Andy Bruening:** [00:36:12] That's, I think, one of the biggest gaps right now is we don't have many mentors that are on the business administration side. So, whether it's helping with the fundraising, or the finances, or even-

**Annalies Corbin:** [00:36:25] Marketing.

**Dr. Andy Bruening:** [00:36:26] ... marketing and the graphic design. So, we have some here at PAST that will help at times with that, and that's fantastic. But we need more than that. And being able to go out, and whether it's shooting video of the team for our reveal, or the robot review, or things like that, they're looking at me like, "Is this good Dr. B?" I'm like, "Looks good." But what do I know. I mean, I'm not in photography. I'm not -- So, I do my best but-

**Annalies Corbin:** [00:36:50] You're a geologist by training, Dr. B.

**Dr. Andy Bruening:** [00:36:52] I'm a geologist.

**Annalies Corbin:** [00:36:52] You're not even an engineer.

**Dr. Andy Bruening:** [00:36:55] Not even an engineer.

**Annalies Corbin:** [00:36:55] You're willing.

**Dr. Andy Bruening:** [00:36:56] Yeah, absolutely.

**Annalies Corbin:** [00:36:58] Well, I want to thank you both for taking time out of your very busy day as semester starts tomorrow. So, lots going on, and a big kickoff on Saturday, which is a rocking event. For our listeners, we'll be providing documentation at the website about the different FIRST programs, and information about this particular team, and the ability to reach out to Andy and Tyler, and ask questions if you're thinking about bringing robotics programs into part of the mainstream of what you do in your school and in your community. We certainly encourage you to do so. So, I thank you both very much for joining us today.

**Dr. Andy Bruening:** [00:37:39] Thank you.

**Tyler Hertenstein:** [00:37:39] Thanks for having us.

**Dr. Andy Bruening:** [00:37:39] Thank you.