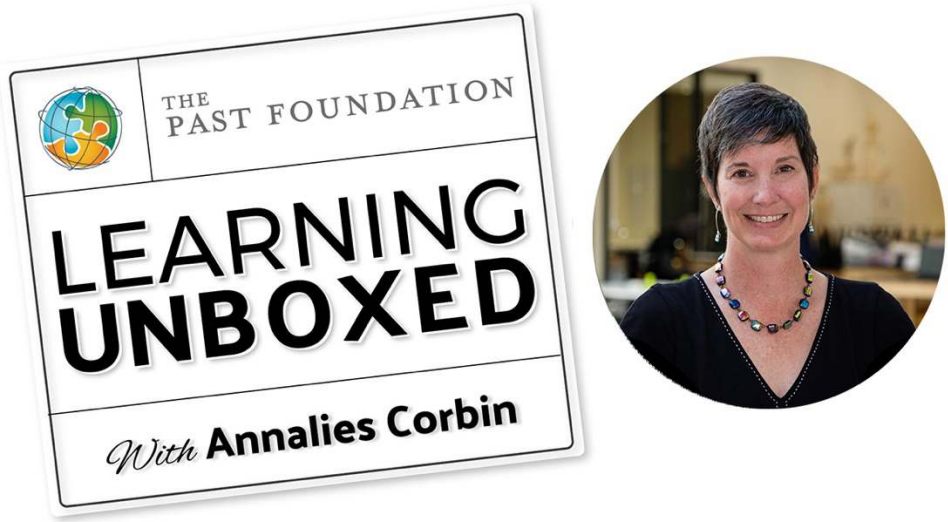

Mike Kunselman and Ian Stroop

Mike Kunselman: [00:00:00] It's a balance, I think, of not completely thwarting their ideas, but giving them some inspiration too.

Annalies Corbin: [00:00:10] Welcome to Learning Unboxed, a conversation about teaching, learning, and the future of work. This is Annalies Corbin, Chief Goddess of the PAST Foundation and your host. We hear frequently that the global education system is broken. In fact, we spend billions of dollars trying to fix something that's actually not broken at all, but rather irrelevant. It's obsolete. A hundred years ago, it functioned fine. So, let's talk about how we reimagine, rethink, and redesign our educational system.

Annalies Corbin: [00:00:45] Welcome to the next episode of Learning Unboxed. This is Annalies Corbin, your host. And I'm very excited, as always, today about my guests and the conversation that we are about to have. Today, we are going to talk about additive manufacturing and exactly what the heck that thing is. But more specifically, we're going to talk about an additive manufacturing summer institute, which was a project between the National Science Foundation ATE Grant Program and Columbus State Community College, the PAST Foundation, along with a lot of collaborators from industry and a variety of educational partners in and around the community.

Annalies Corbin: [00:01:20] And joining us today are two of the Summer Institute's participants, Mike Kunselman, who is a 9-12 Engineering Teacher at the Gahanna Lincoln High School, a 13-year veteran teacher of engineering. And although he won't necessarily share it with us, I will share it with us all, who is also the 2018 Colombus Parent Magazine High School Teacher of the Year. And the best part of that is that he was nominated by the students. So, I would say a beloved engineering teacher at that. So welcome, Mike.

Mike Kunselman: [00:01:55] Thank you.

Annalies Corbin: [00:01:56] And also joining us with Mike today is Ian Stroop. And Ian is a first-year student at The Ohio State University, studying Industrial and Systems Engineering. And what makes Ian so special in this conversation is that he actually participated in the Summer Institute twice, first as a student when he was in high school, and then as an assistant instructor as he finished up school, getting ready to go from high school into engineering at Ohio State. And so, we're very excited to have Ian with us as well. So, welcome.

Ian Stroop: [00:02:30] Thank you.

Annalies Corbin: [00:02:31] So, I want to spend a little bit of time today really, sort of, digging in a couple of different pieces. But first and foremost, Ian, I'm really hoping that you can explain to us what the heck is additive manufacturing.

Ian Stroop: [00:02:45] Yes. So, if you think about how products have been made for centuries or since the industrial revolution, the 1700s, it's been more of a subtractive method. So, you have an idea for a piece, and you take a block of something as if like, say, you're trying to scope something out of a block of granite or something, you would take it. Without an idea, you take a block, and then chisel away at the blocks. So, you're taking a material away from the block. But additive manufacturing, as the name implies, is where you have an idea for something, you can put it into a CAD model, and computer-aided design, and then essentially 3D print it out. So, you can print it layer by layer to make a different—start at the bottom and then print up. So, you don't have to take away material, but you add material to a surface, and then add it up on up.

Annalies Corbin: [00:03:36] And additive manufacturing, and 3D printing, and everything that sort of comes with that is really kind of the now thing.

Ian Stroop: [00:03:46] Right, yes. It's really where the future is going. So, you think of the Industrial Revolution in the 1700s, it started this whole manufacturing with the subtractive method. But then, now, with the advent of 3D printing, it pushes the boundaries of what you can make, more so than subtractive manufacturing because if you think about it—so, you—one, manufacture part with something inside it. By subtractive methods, you would have to carve those two pieces out, and then make it in two pieces, and then put them together; whereas, with additive manufacturing, you now can print it all as one piece.

Annalies Corbin: [00:04:21] Which is really, really amazing.

Ian Stroop: [00:04:22] It really is. It really is, yeah.

Annalies Corbin: [00:04:23] It's wicked and awesome. So, Mike, in the 13 years that you've been an engineering teacher, I mean, at what point in your career did you see additive manufacturing become a thing that was relevant and tangible to you in the K-12 setting? And we're going to circle back around to the industry piece, but I'm really trying to get at this notion of when was it something that, as a teacher, you suddenly needed to be very aware of?

Mike Kunselman: [00:04:54] So, I started bringing 3D printing into my classroom around 2008. And I remember quite a terrible 3D printer we had. And it was tough because, as a teacher, I brought it in but there was no tech support. I couldn't put in a help ticket to our district to come help me with my 3D printer. No one knew what the heck this thing was. And for the students, it still was such an abstract idea. It wasn't mainstream yet. So, it was pretty cool to see and show the kids a few examples of using this technology. But even at that point, I hadn't fully embraced what we could do with this. It wasn't like we use it now. We're 3D printing dozens of parts a day now, and it's no big deal. And that's really not that long ago.

Annalies Corbin: [00:05:42] No.

Mike Kunselman: [00:05:42] And the technologies improved so much, and the barrier of entry is so low now that we have middle school kids 3D printing on their own. So, I've seen quite a transformation in students really take all of this technology for granted. It's much easier just to 3D print a part and not really think about it. Kind of like I heard some of my photography teachers talk about how great it was to take photos on film

because you had to really think about your shot before you took it. Then, when digital cameras came out, you could just shoot away.

Mike Kunselman: [00:06:20] Kind of the same thing I'm starting to see with 3D printing. My students, now, are so used to having it from middle school up that they'll just print iteration, iteration, iteration, iteration. And I don't know. I feel like it's kind of taking a step back from making great designs, but I think we'll begin to find a perfect balance here soon.

Annalies Corbin: [00:06:39] You can always charge them a quarter every time they have to reprint something, right?

Mike Kunselman: [00:06:43] Oh, yeah.

Annalies Corbin: [00:06:43] For the filament.

Mike Kunselman: [00:06:43] I would be very rich, yeah.

Annalies Corbin: [00:06:45] Yeah, exactly, exactly. So, Mike, again, as a veteran teacher, this program comes along. You've clearly been utilizing 3D printing early on in your classroom. You're definitely not afraid of the technology by any stretch of the imagination. So, why does a teacher with that much engineering experience in the classroom want to participate and take a program in additive manufacturing? I means, it's four weeks. I want to be really clear with our listener. So, this was not a small endeavor. This program was four weeks in the summer, all day long.

Mike Kunselman: [00:07:22] Yes, definitely very involved. I think the biggest thing I was looking for was to work with some of the other manufacturing techniques and be able to harness some of the traditional manufacturing with additive manufacturing. So, when you think about a part, like, yeah, I could just 3D print this and let it go overnight or whatever and 3D print this whole part. But if I could use, say, this tool to like laser cut this part, that's maybe a really long span, and then plug it into my 3D printed part. And kind of combining technologies, I think is really where we start to see some of this advanced manufacturing.

Mike Kunselman: [00:08:01] Also, we use some of the 3D printing molds. So, we could print with a resin printer into a high-temp model, and cast molten pewter directly into that. So, it's kind of a completely different way of thinking about additive manufacturing, which, traditionally, to make a mold, to cast something, it's very time intensive, or you're pouring silicone and whatnot. So, to be able to print a mold and cast metal into it was like mind bending, and kids haven't seen that. So, I was really looking to kind of share some of that thought process and maybe learn a few new techniques.

Annalies Corbin: [00:08:40] And so, have you been able then to—because you participated in the first year of the program, I believe last year.

Mike Kunselman: [00:08:48] Yeah. This was my first summer.

Annalies Corbin: [00:08:49] This past summer, okay. Sorry. So, you did the Mission to Mars project?

Mike Kunselman: [00:08:53] Correct.

Annalies Corbin: [00:08:53] And so, we'll come back around to the project this year in a minute, but were you able or have you been able to take some of the things that you learned or the techniques and, now, utilize them in your own classroom? And if so, what does that look and feel like for your kiddos?

Mike Kunselman: [00:09:06] So, I actually just got a check from our Education Foundation on Friday to start a casting lab using 3D printed molds.

Annalies Corbin: [00:09:14] Wow!

Mike Kunselman: [00:09:16] So, it kind of inspired me. It was really cool. It was different. Not a whole lot of people or other schools I know are doing it. It's just like, "Hey, this is a unique experience I can bring back to my students." So, I haven't been able to do it yet, but I have the money now.

Annalies Corbin: [00:09:28] But that was a big win because you—

Mike Kunselman: [00:09:30] Oh, absolutely.

Annalies Corbin: [00:09:31] That's one of the things that we hear oftentimes when teachers go off and do these these programs, "It was great. Was fun. I learned a lot. But I may or may not really be able to apply it back into my school and my classroom." That's a constant trend that we hear a lot, a push back for. So, the fact that you got a grant, and you're now ready to roll, that's a huge win.

Mike Kunselman: [00:09:51] Yeah. You have to be willing to try to get it.

Annalies Corbin: [00:09:54] Yeah, yeah, absolutely. So, wow. I can't wait to sort of hear how it all goes once the kids dig in, We'll circle—

Mike Kunselman: [00:10:00] Me too.

Annalies Corbin: [00:10:00] ... back around on that in a few months to check in with you. So, Ian, let's talk a little bit about the first time you participated in the program because you were a student finishing up high school. And just for our listeners, because one of things that I think is really intriguing, sort of, about your journey, so you're a home-schooled kid?

Ian Stroop: [00:10:17] Yeah, I was.

Annalies Corbin: [00:10:18] And so, what prompted you, other than you obviously have a love for engineering, or you wouldn't have ended up in that space in college. So, what prompted you to sign up and come to this program, not just once, but twice?

Ian Stroop: [00:10:33] And so, before I did this program, I didn't really know what additive manufacturing was. I knew I wanted to do something with engineering. I wanted to get an engineering degree, but I didn't really know much about the industry and the real things that engineering does. So, I was taking class at Columbus State. I think, it's on the spring of 2017. I got an email inviting me to participate in this program, and I didn't really know what the program was, and I kind of pushed the other side. But then, my parents, my grandpa, in particular, are all three engineers. They said, "Hey, you should probably—you should look into this. This would be really good professional development type of things, so that you can learn about the industry and about the different types of manufacturing that are used today."

Annalies Corbin: [00:11:14] Yeah. And you did. You got to see a lot of different things. One of the things the program includes is getting to go and visit a variety of different places along the way through,sort of, the field trips, I guess, if you will, anything to get everybody out of the lab for a little while, like during the week because you were there a lot.

Ian Stroop: [00:11:33] Yeah.

Annalies Corbin: [00:11:34] And so, from an industry standpoint, then, as you're still just, sort of, crafting what your future is going to look like, what were some of the takeaways that you thought were meaningful enough to have you come back again but, also, sort of stay and stick with manufacturing when you were out in the industry world as part of those experiences?

Ian Stroop: [00:11:57] I think, like I said, before that, it's the cutting edge. It's the next big thing. Like I've been told that it's the next industrial revolution. And then, to come back the second year, I really wanted to take what I've learned in the first year and help out with the new travel students too in order to expose them to this great new innovation.

Annalies Corbin: [00:12:19] Yeah. And it's fun to watch the students. There is a real difference between the students in year one and the students in year two. Do you agree with that?

Ian Stroop: [00:12:27] I definitely agree with that.

Annalies Corbin: [00:12:28] Yeah.

Ian Stroop: [00:12:28] I feel like more of them were engaged and wanted to be there.

Annalies Corbin: [00:12:30] Yeah.

Ian Stroop: [00:12:30] And really enjoyed the subject matter. Yeah.

Annalies Corbin: [00:12:34] Yeah. And I think that part of the difference was, of course, anytime at PAST, when we do these sorts of programs because we're an R&D facility, we're learning right along with you, right? It would be awesome, I suppose, on some levels. But I know that we'd learn as much if we actually put out and crafted these fully baked things before we ran down the road with them. But that's just not our style at all. So, we definitely learned a lot ourselves between year one and year two. And I do think it was different sorts of students because the students understood what the program is about the second time around, right?

Ian Stroop: [00:13:10] Yeah, yeah.

Annalies Corbin: [00:13:10] Because there was information out on the street, so to speak. So, Mike, can you tell us a little bit about the the particular project this summer? So, the Mission to Mars piece. And I want to get into some of the, sort of, ins and outs of the way the program itself works, but I'm mainly interested in what do you think that the students were getting out of it at the end of the day, right? Because there was a real difference. And I'm biased and privileged in a lot of things in between, truth be told, because I get to sort of watch from the outside looking in, but truly watching through the glass all summer long. And the difference between, for example, the presentations that the students make at the end of the first week versus where you guys all ultimately end up is pretty much night and day. So, from the teacher perspective, where do you see the value add for the students who participate?

Mike Kunselman: [00:14:13] So, I think framing the entire camp around the Mars project just gives all of those skills some kind of relevance to the actual learning. Instead of just teaching those concepts with generic parts that they had to generate, they probably would still learn the same skills at the end, but there's no buy-in. There's no relevance to what they're building. There's no theme around it. And by kind of framing around that Mars, it adds a level of fun to it. Almost like gamifying the learning. And it just makes a more enjoyable scenario in classroom setting to kind of think so imaginatively into, "How are these habitats are going to look like? What are these hollers going to look like?" We talked a lot about Elon Musk and some of the fun, crazy ideas.

Mike Kunselman: [00:15:00] So, it was just nice to see student learn. I think, again, in the end, it was additive manufacturing camp. So, we were really trying to push additive manufacturing. And then, just in that lens off of Mars, and just kind of a little twist of fun. My main goal was kind of add additive manufacturing with some of those traditional manufacturing techniques still with that lens of Mars.

Annalies Corbin: [00:15:23] And so, Ian, just for the listeners who don't understand the context, tell us about the Mission to Mars Project. What were the ins and outs of that?

Ian Stroop: [00:15:31] So, basically, we were basing it off of Elon Musk's challenge to get to Mars. So, we split the students up in groups of about 4, and we challenged them to come up with their own plan to how to get to Mars, and how to establish a culture on Mars using additive manufacturing. So, they created different habitats. They would live in different tools, and then rovers to explore the surface, and they would use additive manufacturing to either make those, like take printers with them and print things there, or print pieces on the ship to get to Mars and stuff like that.

Annalies Corbin: [00:16:10] Yeah, and that was one of the common things I heard a lot in the presentations, lots of printing while in space.

Ian Stroop: [00:16:16] Yeah, because you have all the time.

Annalies Corbin: [00:16:17] Yeah, [crosstalk].

Ian Stroop: [00:16:17] You have all that time to get-

Annalies Corbin: [00:16:18] The downtime, right? Yeah.

Ian Stroop: [00:16:18] Yeah.

Annalies Corbin: [00:16:18] Yeah, exactly. So, Mike, how was it to have Ian as an instructor?

Mike Kunselman: [00:16:27] Ian is awesome.

Ian Stroop: [00:16:28] Thank you.

Mike Kunselman: [00:16:29] I would say he's way beyond his years. You have a college freshman working with some pretty heavy hitters in there. And he would come in and talk about professionalism. I mean, Ian was right there with everyone. I was like, "Man, you might be missing your calling here. And education might be where it's at for you." So, we'll see. It's not too late for him to change majors, but it was great to work beside him. And it was also cool to see him come back because he kind of knew the vibe of the camp.

Annalies Corbin: [00:16:57] Right.

Mike Kunselman: [00:16:58] And it was very exciting. It was different.

Annalies Corbin: [00:17:01] It wasn't weird as a teacher.

Mike Kunselman: [00:17:02] Oh, absolutely, yeah. But no, it worked. It worked fine. And I learned stuff from my kids. I mean, I teach 120 kids every year. And I have kids that are going to go off to Stanford and whatnot who are twice as intelligent as I am. So, I learn stuff from them all the time. You kind of have to just strip down any of that and just kind of open your mind.

Ian Stroop: [00:17:26] And I think I learned so much more from actually teaching the material than learning it myself because I had to know it all to be able to transmit it to the students.

Mike Kunselman: [00:17:34] Yeah.

Annalies Corbin: [00:17:34] And I'd like to point out to the two of you that both those comments are signs of great teachers, right. So, first and foremost, to recognize that you can learn as much from your kids as they will ever learn from you. And for you that you know something when you have to teach it. Yeah. And so, I will echo that. We need all kinds of engineering teachers out there. Yeah, you go off, do some engineering in the real world, come back, do some teaching—

Mike Kunselman: [00:18:00] Yeah, this can be.

Annalies Corbin: [00:18:01] ... on the side, or for real, or any combination thereof. Absolutely.

Mike Kunselman: [00:18:07] And even in that field, you almost can't know it all or all of the ways to do it. And we had a big issue with the camp using solid works.

Annalies Corbin: [00:18:16] Yeah.

Mike Kunselman: [00:18:16] And I was an autodesk guy. And I was like, "I know you can do this. I can't help you with it, but I know it's possible." So, it's just—and that's a good piece of advice too since you're going to be a teacher, Ian. Not even necessarily. Knowing the right answer, but having the resources to find that or the people to help you find that.

Annalies Corbin: [00:18:36] Right. And I that—and that's a big—for many teachers, not all, but for many teachers, that's sort of a—it's that mind shift to become that facilitator of learning and not to be that authority on any particular subject. And the reality is in almost all fields, but certainly in any field that has a high use or reliance on technology, that the rate of change, there's no way you could possibly keep up. And so, that is one of the things that I always love about the program as well.

Annalies Corbin: [00:19:03] So, Mike, I also want to dig in a little bit on the teacher PD side because you weren't there just to participate in the program and learn the things that kids were learning. There was another layer in this as well. So, talk a little bit about the professional development component that sort of came along with this.

Mike Kunselman: [00:19:24] So, a lot of the professional development, like with back mapping and some of the the teacher planning, just different ways of thinking about how to frame up large projects that we did

ahead of time, and some of the P3 programs through the PAST really helped us to think about how to take a massive project like this, four-week project, and break it down into components that we could deliver to our students in a feasible manner. So, that was kind of cool. And just working with some of the other teachers from other districts, which, typically, I never have anyone like me in my district was kind of nice. So, even still now, I communicate with two teachers through the camp.

Annalies Corbin: [00:20:02] Oh, great.

Mike Kunselman: [00:20:03] One at New Albany and one at Northridge, just because we're singletons in both of our districts. So, being able to network with them and having that same background has really been wonderful, and it will continue on. They've both come out to visit my school-

Annalies Corbin: [00:20:18] Oh, that's great.

Mike Kunselman: [00:20:19] ... and I'm planning to go out and visit their programs.

Annalies Corbin: [00:20:21] Yeah. That's wonderful. That's definitely what you want to hear. And it is really a tough space, right? Because most districts, if you're lucky, if you have an engineering teacher.

Ian Stroop: [00:20:28] Correct.

Annalies Corbin: [00:20:30] And the rare few that have more than one. But that's not unusual. Another nod to Ian for the reason to become an engineering teacher. We're pretty desperate across the country and around the world for folks who can do that. So, Ian, from the—as you spent your time this summer, in particular, sort of leading, so where did you see that the students and the teacher, where we're the struggle points in understanding the concepts tied to additive manufacturing?

Ian Stroop: [00:21:01] Additive manufacturing or the project, in general?

Annalies Corbin: [00:21:05] Well, we can take it from both directions. I'm really trying to drill in a little bit on the relationship or the relevancy back to industry. Part of the reason at PAST that we do these programs is we're trying to expose students primarily, but teachers as well, to the potential careers because folks don't have a clue how broad and how diverse engineering is, right, for example. So, where did you see some of those?

Ian Stroop: [00:21:31] I think for the struggles of the additive manufacturing in particular, it's like it's where to—we use it in an actual industry because we're coming up with ideas. Like they would come up with an idea of a design for a rover. They would print out this little plastic piece. Well, it's like, what do you do with the little plastic piece? So, I think it's just having them try to wrap their heads around what we would use this for in the real world.

Ian Stroop: [00:21:54] And I think for the project, in general, it was the lack of constraints at the beginning because they didn't really know what they were supposed to do, which the idea was that they would come up with the constraints and figure out what needed to happen. But I think at the beginning, they struggled with wrapping their heads around that. But then, as we kind of coached them through it, they were able to understand what they needed to do, and where they needed to get.

Annalies Corbin: [00:22:18] Yeah. Do you see the same thing, Mike, with your students when you're introducing new things for the kiddos in your classroom?

Mike Kunselman: [00:22:26] Yeah, they have troubles kind of sticking to, like you said, like the real-world constraints. And it's almost like they're just making toys. And getting them to kind of focus on strengths and building these things for like material testing purposes. Yeah, I definitely see that. And we really didn't take advantage of the structural stress analyzer you guys had. But really, things like that to where I need to design this part to hold X amount of weight, I think, would completely shift the mindset and their design.

Annalies Corbin: [00:22:59] Right. And so, when you do these types of projects in your classroom then, do your kids eventually get there, or do you have to prod them along, or does it kind of vary?

Mike Kunselman: [00:23:08] They don't quite get that. A few will, but they've never really worked on a project where they have to encounter budgets, and strengths of materials, availability of materials. And you really have to prod them along, or let them actually build something, and make them pay for it, or give them some kind of budget. There's no real world piece to it. And we could do that with the Mars rover. And we're allowing them to use some of the technology in the summer camp that doesn't exist.

Annalies Corbin: [00:23:39] All right.

Mike Kunselman: [00:23:40] So, again, you're on a fine line of allowing their thoughts to flow freely and let them come up with crazy ideas, which is awesome to see. Then, you also have to kind of bring it back down to the real room, like we actually can't make that.

Annalies Corbin: [00:23:55] Right.

Mike Kunselman: [00:23:56] So.

Annalies Corbin: [00:23:56] The technology doesn't exist yet, but it's a nice idea.

Mike Kunselman: [00:24:00] Yeah.

Annalies Corbin: [00:24:00] Right.

Mike Kunselman: [00:24:00] Yeah, yeah. So, it's a balance, I think, of not completely thwarting their ideas but giving them some inspiration too.

Annalies Corbin: [00:24:10] So, Ian, as you sort of take what you learned into the post-secondary experience, college right now, what was a big takeaway that you're actually being able to apply? Not so much process pieces but I mean, what were some of the things that you utilized in that experience that you think helped you as you try to get yourself through engineering school?

Ian Stroop: [00:24:33] I think just the mindset of the design cycle, the design thinking. If you're designing a part, you have to kind of have an idea first. And then, you design the idea, either draw it on paper, or put it in CAD software, and then you build the part, 3D printing, make it out of whatever you have, and then see if it solves the problem you're trying to solve. And if it doesn't, then going back and slightly modifying that to solve the problem better. So, as I go forward through engineering classes where we're building different types of things for projects, I think just having that knowledge of, this is the cycle of design to try to make this part or make this as a solution to a problem.

Annalies Corbin: [00:25:18] And I think that many of the kids that I saw in the program, they struggle with that a little bit, but I also saw on the flip side, the, sort of, awesome perseverance. We actually had one of the kiddos who showed up last week who didn't pass the Solidworks certification. So, for our listeners, in the first year, you guys set for the SME-

Mike Kunselman: [00:25:44] SME, yeah.

Annalies Corbin: [00:25:44] ... certification. And this year, you got to sit for a Solidworks certification.

Mike Kunselman: [00:25:49] Correct.

Annalies Corbin: [00:25:50] And so, yeah, this kid didn't pass the first time and was not happy. And not just for not passing, but really, really wanted to complete and earn that certification. And so, he came in last week and sat for it again, and he passed. And just like it was joy. This kid was joyous. Like I don't know what I'm going to do with this certification, but I have it.

Ian Stroop: [00:26:14] Yeah, yeah.

Annalies Corbin: [00:26:15] Yeah. So, yeah, I think just seeing kids struggle and modify. I'm sure he had to go back, and study, and whatnot, and then come back, and be able to do that. So, Mike, what's next for you in your classroom? So, what do you take from this program other than just like some of the things that you're exposed to? But as you actually think about or planning your next course of practice, what does that look like for you as a teacher?

Mike Kunselman: [00:26:41] I think I really need to focus on expanding our additive manufacturing abilities. Like we've just kind of become complacent with what we have. And we have a few standard FDM printers, and everything's fine and dandy, and we're comfortable. So, I think I need to get uncomfortable again and think about maybe designing some printers of our own using unique materials, some different extrude. As I was talking to a teacher in Marysville last week who's working on a clay extrusion printer, which has been done, but to do it yourself is pretty cool.

Mike Kunselman: [00:27:14] So, just trying to get out of our comfort zone a little more. I've been in it long enough. I'm comfortable enough. It's time to break some stuff and kind of change up what we're doing a little. So, I'd like to go there. I'd also like to get a little more involved in some of the resin printing, which we haven't had a ton of experience in. And I'd say that's probably one of the more popular current approaches to 3D printing. So, that's kind of our current focus, and I'm sure that will take plenty of our time.

Annalies Corbin: [00:27:43] Absolutely. And so, from the industry's standpoint then, especially as we think about the way that K-12 interfaces with industry, one of things that we talked about a lot at PAST is around the notion emerging workforce, right? So, K-12. back to that question that always gets me in trouble. I always get an email after I ask this question, but I'll ask it again anyway. What the heck are we preparing these kids for, right?

Annalies Corbin: [00:28:07] And so, if we we sort of start with that question in mind with an end goal that, at some point, folks are going to end up in industry of some description, then where the ties in the alignment between the K-12 experience and what you're doing, Mike, in your classroom and the experience that Ians of the world are having in post-secondary, and often to the to the world of work. So, how, then, is it possible for the local industry partners to meaningfully be involved with what you do? That's kind of a question, but it's also just sort of hanging out there. But, Mike, do you have an idea? I mean, for you, what would be

meaningful? Is it—is your school contemplating a pathway in manufacturing, or do you already have that, or going another direction, or is that just a giant unknown?

Mike Kunselman: [00:28:54] I have two answers for you.

Annalies Corbin: [00:28:55] Okay, awesome.

Mike Kunselman: [00:28:56] So, one is super generic. And I like to say we're preparing students to just be critical thinkers. So, even if a kid wants to go out and be a doctor after my program, well, he's going to be a better doctor. He'll be able to think on his feet and think creatively. So, that's the real generic open, like lala land kind of answer. But more specifically, I think the biggest need an industry around us are technicians. And I think that kind of blend between white collar, blue collar position is going to emerge. It already is. And there is going to be a huge need for these employees who know how to program a robot, troubleshoot it, solder a few joints, whatever, fix it from that end, but also turn a wrench, rebuild it, weld it, whatnot.

Mike Kunselman: [00:29:45] So, I think there's a new form of technician that we really need. And I think that will be really a pathway that I would be interested in pursuing. And I think it's a rewarding career for students, because a lot of kids I see that come through my program who love engineering come out at the end, and they're almost more leaning towards engineering technicians. They like to still get their hands dirty, a lot of them. And I don't know if it's just our demographic, where we are, but the students like to get their hands dirty. Like, well, maybe engineering is not quite for you. Maybe you want to be some kind of engineer technician. So, I think that's where we'll start to maybe push kids. We'll see what some of our industry partners say.

Annalies Corbin: [00:30:28] But helping kids understand that all that's possible.

Mike Kunselman: [00:30:30] Oh, yeah.

Annalies Corbin: [00:30:31] Right? It's the same thing in the medical field. You don't just have to be a doctor or nurse; that you could actually be an allied health technician. There are so many jobs across our field that we need every single one of these people. And in fact, in many ways. And I believe engineering is the same. We need more technicians than we need engineers, right?

Mike Kunselman: [00:30:50] Yeah, absolutely.

Annalies Corbin: [00:30:51] We need them all. But the reality of it is you need an awful lot of technicians for that to actually put in or implement the thing that one engineer has been responsible for. So, what about you, Ian, as you sort of think about that same question to you, where is the best and highest use of industry right now as it relates to influencing students' choices, their experiences, their understanding in that sort of K-12 space?

Ian Stroop: [00:31:18] I think just focusing on not everyone needs to go to college like Mike was saying and become an engineer, but there are other avenues to become a technician. Like at at Columbia State, it has a program where you can become a robotic technician, or there are a couple other ones I'm not sure right now, or Toll's manufacturer. I am not sure what the [crosstalk].

Annalies Corbin: [00:31:35] Career Deck.

Ian Stroop: [00:31:35] We went actually and toured that during the institute and learned about the robotics. So, I think those those types of schools showing students that those options are open. It's not, "Hey, you have to go to college. You have to do this," but there are other options open. I am not saying that you shouldn't go to college. I mean, that's what I'm doing right now. But there are other options. It's not the only only pathway.

Annalies Corbin: [00:32:01] Right. And so, from the industry side, let's sort of turn full circle here and ask the question. So, what can industry do, Mike, specifically in your classroom? So, industry just shows up there knocking on your door. They're saying, "Hey, pie in the sky, what do we need?" And I'm not talking about giving you money and giving you stuff because we all know industry is capable of doing that. But I want to get more tangible. What is it the industry can do for you that's truly useful for your students?

Mike Kunselman: [00:32:30] I think opening up the doors to their facilities, and letting our kids get a little early experience to see what it's like because, I mean, their work environments are better than ours in most cases. And kind of just shifting the mindset of what manufacturing is. So, I think for manufacturing facilities to bring our kids in, and some of its industry partners to actually sit down and let our kids see what there is available and what these jobs actually look like would be really helpful.

Mike Kunselman: [00:33:01] And sometimes, I'm not sure if the industry realizes what kind of caliber kids we see. I mean, these guys are ready to go out and work. Their skills are at what some of their 30-year veterans have because they learn so fast. And I know, like with Columbus State, that program through their work study of pairing some of these students early on in high-tech fields and getting real-world experience is unbelievable, but the kids have to make that jump to Columbus State first to experience that. But if they could see that earlier, it might help some of them. And especially some of the students who are set out for four-year degree. If they don't go there, then, sometimes, their guidance counselors don't know where else they can go.

Annalies Corbin: [00:33:44] Right, right.

Mike Kunselman: [00:33:45] So, this middle ground has kind of just been in the dark for a while. And I think it is the emerging kind of field really.

Annalies Corbin: [00:33:55] And industry can definitely help with that.

Mike Kunselman: [00:33:56] Yeah.

Annalies Corbin: [00:33:56] My son was in the program with you guys this summer, and he was telling me all about getting to go to Honda and see behind the curtain, so to speak. Now, I've been up to the Honda facility at Marysville many, many times, and I've never gotten to go to places where you guys get to go. And so, I'm insanely jealous of that. But I do think that that made it—it certainly made an impression on him because he was able to tell me not just the things that he saw, but what they meant and sort of what kind of job that would translate into. Not the job they were doing in the plant at the moment, but what he anticipated that job would become. And I don't think that was necessarily, I think, the gist. It was something that someone would express to you, but that was just - again, back to your point, Mike - on its own, realize, "Well, that might be a really cool thing, and you can do this with that." So, I thought that was very telling, to your point, these kids are pretty savvy. They're ready to go.

Mike Kunselman: [00:34:51] Yeah.

Annalies Corbin: [00:34:52] Yeah, ready to go. So, as we sort of wrap the program, I always like to to leave folks with some last passes. So, folks who are out there who don't have this program in their backyard or don't

have the opportunity for this program, but have been able to listen to us today and said, "I could do something similar. It might not be an additive manufacturing, it might be something else, but I think that I could pull together with the right partners and pull programming together." And so, Ian, having been a student, and then also leading instruction, and then moving into this field, so what kind of recommendation - two or three things - that you think that if somebody were going to start and do a summer institute, a very intensive sort of work/study-based program, what would you recommend to somebody to make sure that they have or include?

Ian Stroop: [00:35:45] I would recommend that you would make sure you have the students working together as a team, and have the instructor—I know at PAST, the instructor of the institute is more like a coach where they direct the kids in learning, but they don't necessarily—they don't stand up there and lecture for the whole time. But I think I know specifically for me in STEM sort of classes, I learned better when I get my hands dirty and work on the stuff instead of listening to a teacher or professor write stuff on the board. So, I think just making sure you have projects for them to work on, goals set for them, and then they have to go and figure it out. And if they stumble on the way, then the teacher can come in and say, "Here, why don't you try this, this, and this, and this?" But I think, yeah, just working as a team and figuring out yourself.

Annalies Corbin: [00:36:31] Yeah. So, no drill and kill.

Ian Stroop: [00:36:34] Exactly.

Annalies Corbin: [00:36:35] Yeah, yeah, yeah, absolutely. What about for you, Mike, what would you say to teachers out there contemplating doing such a thing?

Mike Kunselman: [00:36:41] I would recommend they try to expose our students to as many different forms of this technology as they can in different ways to go about this. In four weeks, you're not going to get someone who is a novice to be an expert. So, you get that out of your head and say, "All right. How many different things can I expose these students to, to at least plant that scene, and let them see that it exists?" Then, if they so choose to pursue some of these different topics in detail, they can. So, I would just say kind of let those instructors maybe not have to be experts in all of those different fields, but let them kind of showcase some of them or even take them out to a few different industries where some of these completely outrageous forms of manufacturing are being utilized. At least, see that it exists.

Annalies Corbin: [00:37:30] Yeah, absolutely, because there are some wild stuff happening in additive manufacturing.

Mike Kunselman: [00:37:35] And right here too in Columbus. There's so much to see.

Annalies Corbin: [00:37:41] Absolutely, absolutely. Well, it's a very interesting field. And it's certainly one that we know students are really, really interested in. We ran versions of the Additive Manufacturing Summer Institute for as young as fourth graders this year, right? Simple stuff, back to your point, Mike, right? They're making essentially a toy but we were making sure they understood that the primary basis of it. So, kids are really interested in it. So nothing to lose when you can engage your kids along the way.

Mike Kunselman: [00:38:17] Yeah, yeah.

Annalies Corbin: [00:38:17] Well, thank you very much, gentlemen. It was a pleasure to have you. I appreciate the time.

Mike Kunselman: [00:38:21] Thanks for having us.

Ian Stroop: [00:38:24] Thank you.

Annalies Corbin: [00:38:24] Thank you for joining us for Learning Unboxed, a conversation about teaching, learning, and the future of work. I want to thank my guests and encourage you all to be part of the conversation. Meet me on social media, @annaliescorbin. And join me next time as we stand up, step back, and lean in to reimagine education.