

❖ **Dr. Ruth Streveler:** Today we're going to be doing something a little different, I'm calling it a flipped interview. And we are having a guest interviewer with Emily Dringenberg. And I will actually be the interviewee. I'm getting to learn a bit about how nerve-wracking it is to be interviewed and being the interviewee. And we'll begin today with Emily telling you a little bit about herself. I will say, though, she's one of my very, very favorite people, so I'm excited to be interviewed by her

➤ *Dr. Emily Dringenberg: Thanks, Ruth. Thank you so much for being willing to go along with this. We met in 2011 when I came to Purdue for my Ph.D. and I've had you as an instructor, you've served on my committee, and we've stayed in touch over the years. And so, I had this idea that I always enjoy listening to your podcast and the guests that you bring on from our community, but I thought you have so much wisdom and experience and that it would be worthwhile to flip the script and let us learn a little bit more about you. So, thank you for being willing to do that. That is our goal for today is to just get a little more insight into you as a researcher, and get the treat of hearing from you in addition to the other guests that you've posted over the course of this podcast.*

*So, you talk about this podcast that you are committed to providing to our community as a way to promote new or different approaches to research and you want to try to inspire others. So, can you tell us a little bit about how you came to that decision, how you decided to embark on this project?*

❖ Well there's kind of three parts to that answer. One is that I am always interested in helping people think a bit differently. And particularly people in the engineering education research community. That's an interest I've had now for I realize about 15 years. In 2004, along with Karl Smith, and Ron Miller, and Barbara Olds, I created a series of workshops that we called "The Rigorous Research in Engineering Education Workshops." The RREE for short.

And I should add, probably, that at the time we created the workshop we didn't realize how charged the word "rigorous" might be. We did it kind of for alliteration. And now we really kind of call it, "high quality research," to kind of take off that strangeness about "rigorous."

That was in 2004 and I have retained that interest in helping the community grow. And certainly in 2005, when I started thinking about going to Purdue and then 2006 when I did, that increased.

The other part of this is that I, myself, and I think you'll ask me more about this later, was really dissatisfied with the kind of research methods I was using and thinking more critically about the frameworks I was using. And so, I wanted to think about well let's do something new. How does one create a new framework? How does one create new methods? And I didn't know how to do that; I'm not sure I still know how to do that, but I thought I would ask people that had done it what they did.

And with regards to the podcast, I've just become a podcast fan. I love the

stories that I hear from the different podcasts. And so, a couple of summers ago I got the idea of why don't I have a podcast that talks to people that make new methods and new frameworks? And the people at Purdue in engineering education said that they would produce it. So, I didn't have to worry about the technical part, I just had to think about who I would ask to be on the podcasts. And so, that's how it started and we're in our third season now.

➤ *Yes, going strong. I'm wondering if you have, as a podcast fan, do you have any particular programs that you really enjoy or that serve as inspiration for the podcast you're hosting now?*

❖ Well my favorite podcasts change from time to time. But the one that I listen to most often I guess is the "New York Times Book Review" podcast. I just, oh every Friday it comes out and I'm just crazy to listen to it and then go run to the library and get the books that they talk about. And also, the podcast from The Daily it's called, again from the New York Times. The host there, Michael Barbaro, is one of my heroes. I love the series, "Invisibilia," and "Hidden Brain." There's a podcast called "Brain Science" with a neuroscientist called, Ginger Campbell, who again brings on people who have written books about the brain. So, those are some of my favorites.

➤ *And then I know you've mentioned that really enjoy doing this podcast and hosting it, can you tell us a little bit more about what it's been like now that you have some momentum with the project?*

❖ So, I get to talk to people that I admire and whose work I've admired for often a long time. And the podcast allows me to ask questions that I wouldn't necessarily ask perhaps. I think one of the most stark examples for me is when I had Karl Smith as a guest. And I have known Karl for since like 2000 and we've done so many things together. And I really consider him a good friend, and yet when I sat down and asked him some things about how his career began, and how he keeps going, there were a lot of things that he told me that I didn't know. And it's just a great excuse to ask people the really nosy questions that if you're just sitting down having coffee you might not ask them. That's what I really enjoy about it. It is one of the most fun things that I do right now. And I'll keep doing it until people won't let me.

➤ *Yes, we'll keep listening.*

❖ Good, good. Thank you.

➤ *So, as someone who's been involved, like you said, since the early 2000s and really has played a leadership role in this field developing, tell me about how you think, so this goal of having a podcast, create new ways of research, utilize new frameworks, tell me about how you've seen that play out? What are some of the ways that people who have done that, who have been able to accomplish that, what does that look like?*

❖ One thing I guess I would need to say is just broadly about watching the discipline, when we first did the RREE in 2004, there were no departments. JEE was just starting, "The Journal of Engineering Education" was just

starting to switch to be thinking more about serious kinds of research, high-quality research and what that would mean. And so, people who were in the field then, had to really be renegades and do it because they super-loved it and would do it almost at any cost.

And now that the field is much more accepted, and there's departments like your own at Ohio State and others growing and people can get positions as faculty in engineering education departments and there's numbers of graduates, Purdue has over 100 PhDs that we've graduated, things are becoming much more normalized and people don't have to think of this as risky as they used to have to think about it.

And so, I guess because I would consider myself a renegade, maybe I'm a little sad that you don't have to be as much of a renegade from that standpoint; although really, it's much nicer now that it's safer to do this. And one of the things that I really thought when I moved to Purdue from the wonderful Colorado School of Mines and beautiful Golden, Colorado, sobbing all the way to Indiana from Colorado, literally when we were going on I-70 and we passed the sign that says, "You Are Now Leaving Colorful Colorado," I mean I was just a mess. So, I loved living there, but one of the things that I thought was if you could find a place where people could truly kind of fall back into their interest in engineering education and not have to do it as a side thing, not have to do it as a hobby, that there would be something amazingly powerful about that. And there is. And working with folks like you, and other Purdue students and graduates who've been able to take your wonderful engineering mind and just use that to focus on this

**new discipline, it has been wildly inspiring.**

**So, I'm very glad that it's a thing now and that it's safer and that a lot more people can just really do it. But one of the things that I've noticed, Emily, in preparing for this interview and thinking about some of the questions that you've asked as preparation for this, is how much my ideas about like what's meaningful, or what's good, or what's important are shaped by my own values. And so, this is a place there like, you know, I like being a renegade, and I liked making my own path, so therefore it's cool when that happens and it's a little bit sadder when it's not there anymore.**

**But, to go back to the second part of your question about what is it about the people now that are pushing the field forward, I think what they have in common is they're really willing to ask themselves, "What is it that I want to know? What's the best way to answer that question?" And maybe they don't have to be renegades about the field or worry so much about going to into this discipline that didn't exist, but they don't revere frameworks and methods. They don't think like, "Oh, because this is Charmaz's idea of grounded theory that therefore this is something that is written in stone and it's the only way to do this." Or, you know, because Vygotsky said this that that's again the absolute truth. They're more willing to question those assumptions to think about the assumptions and really see if they match what they want to do and they also are willing to branch out and read widely and perhaps, you know, go to conferences of slightly different disciplines and pickup ideas and see how they can incorporate them.**

- *Yeah, I really like that imagery of a renegade and how that was a necessity in sort of your starting out in this engineering education as a formal discipline but maybe that's faded away a bit. So, I can understand now how your guests are really trying to highlight the people are choosing to still engage in that even though they might not have to; still willing to push the boundaries and still willing really synthesize things in a interdisciplinary way, or try to question assumptions. Yeah, that makes sense.*
  
- ❖ **I think there's one other point to it too, Emily, that maybe I hadn't really thought of before. When we were first really beginning engineering education there was talks of 'what does a new discipline need?' And one of the things that popped up is that a new discipline needs its own theories and its own methods. And we have, in this community, for a long time borrowed from education, and psychology, and sociology, and anthropology, which I think is fabulous. But I also think it's time that we can give back to those disciplines and begin to create new theories, new frameworks, new methods. So, I think it's time now after 10 years or more of being a discipline that we can begin to do that. So, again, hopefully the podcast will get people thinking about that and highlight folks that I think are doing that.**
  
- *Mm-hmm, yeah I know that has come up with some of my students as we have them read some of those earlier papers from Haghghi, from your work and that sort of thing and that question sort of starts to bubble out I think of our current PhD students. Like, okay well now it's*

*been a minute, so what are we contributing, what are we doing, what's our identity? So, that makes a lot of sense that the, you know, ground is fertile for that sort of thing as I hear students saying that when we talk about it.*

*So, I think another interesting thing, and I always enjoy learning more about you, is your career as a researcher. You've had a long and productive career with lots of different experiences, but I'd be interested to hear you talk more about your journey, this idea of being a renegade, and for yourself as a researcher. For a lot of us now, you're a mentor, you're a colleague, but tell me a little bit about how your research career unfolded as someone who was a renegade, or as someone who was, even by necessity, needing to push the boundaries.*

- ❖ **So, I guess I should say that I feel I was really lucky to be raised in a way that I could trust myself. My parents let me make decisions and if I felt I really needed to do something I did it. I guess I haven't second-guessed myself.**

**So, as preparing for this interview I was looking back at my career and I could say that there are different questions that popped up, and when they popped up they just beat on me so hard that I knew I had to try to answer them. And those questions have always revolved around learning, but there've been different flavors of it.**

**So, the very, very first question that just grabbed me like that was way back, I was living in Honolulu, I was working as an advisor for the College of Arts**



and Sciences at that point. I was 25 years old. And I was working as an instructor in a department of general science, which did service classes to non-science majors, and I was also an advisor. And people would come in to get ideas about, “What courses do I still need to take?” And you’d tell them you need this many upper-division, and this many science, and the whole spiel that everybody knows advisors tell them. And students would come in and say, “You know, I studied for this test for three days, but I failed it.” And when I heard people do that I would just like, “What?? How could you study for three days?” I didn’t say this of course but I would sit and think, “How could you study for three days and fail it?” And in my experience as a student if I studied something, I got it. You know, if applied myself I got an A. If I didn’t apply myself as much, I got a B. I never thought about, which I didn’t get too many Bs but every once in a while I would; and I did get one C in Chem II, it was like – beh! – my only C.

So, this just really puzzled me and now as I look back at it it’s like, “Oh, my God, you were so naïve,” but I thought and I thought, “Gee, are there good ways to study and not as good ways to study if somebody could do it for three days and still fail?” Now I look at it, three days? That’s all you studied? But then I thought that was a lot.

And so that was my first question, are there better ways to study? And this was like in 1980, or ’79 probably, I think I started being an advisor in ’78. So, it was around this time. And that is actually the question that led me back to get my PhD in Educational Psychology. Which is an hour-long story, so I won’t go more into that.

We're going to go fast forward to the 90s. And I was living in Colorado and working at Colorado School of Mines, which is as some of you know, an engineering school. And students there, it's a selective school, the students there are very bright and again I would see people that were learning or trying to learn but not doing it. And my question became then, why are some concepts so difficult? And I discovered, almost miraculously I think, the work of Micki Chi on ontologies. And in 1999 I went to the AERA, American Educational Research Association conference with a question of trying to answer why are some concepts so difficult to learn. And I sat down in the audience and Micki Chi was giving a presentation and the first thing out of her mouth was, "Today I'm going to talk about why some concepts are so difficult to learn." And I just freaked out. I had admired her work from the time I was getting my PhD, and my advisor even teased me and called her 'the goddess' because I just thought she was so brilliant. But I hadn't really kept up with her work and I didn't really know about this new work in ontology which actually in '99 it wasn't that new, she started publishing it in '92, but I hadn't kept up. And so that began my work in misconceptions, and concept inventories.

And then in 2013, I think, I took a sabbatical and started reading what I thought was going to be about social aspects of conceptual change but I actually started reading again more about the brain. And just got so fascinated and just obsessed with parts of the brain that don't speak, the parts that give us gut feelings and intuitions and ah-ha's that often tell us things that we can't put into words. And really wondering about that kind

of learning and how that impacts learning overall. And that's the question that I'm currently just captured by. And maybe I'll continue to be captured by it the rest of my career, we'll see. I mean every 10 or 20 years something pops up and just like shakes me, so we'll see.

➤ *I feel that's reassuring as someone towards the early part of my career as an academic is this idea of this order of decades, or you know, which you pursued these questions and tried to find new ways to investigate them. So, that's neat to hear you share that. At least I don't always realize that that we're supposed to figure it out and answer our research and move onto the next question.*

❖ **Right.** Like when you come into get your PhD, you should know what your question's going to be. And now as an assistant professor everybody says, "Oh, you've got to write your CAREER proposal," and in your CAREER proposal what do you want to be, what do you want to be known for, right? Figure it out now! Come on, do it! Occasionally people will be blessed with an early ah-ha. But that doesn't always happen and with anything that's more implicit kind of learning you can't force it.

➤ *Yeah, so over the years these different big questions that you've had, you said you haven't second guessed yourself. I know I've heard you use the expression, "follow your bliss." You've talked more about the role that that played or what means to you as a person as you've gone through these different iterations of big sticky questions.*

❖ Yes, so I think it goes back to that idea of trusting yourself. And maybe that's why the 'follow your bliss' and some of Joseph Campbell's ideas really resonate with me, again because it aligns with my values. But I - again, here just take this with a grain of salt, it's not necessarily *true*, it's just my own value - but I think that it's important that in some part of your life you are able to find something that really sings to you. Again, to go back to Joseph Campbell, he talked about some traditions that talk about people hearing their own individual song. And I think it's important to, when you're blessed with hearing your song, to follow that song. And not to say, "Oh, that's not practical," or, "Oh, what are you going to do with that?" or, "I couldn't do that." But just to see where it follows. If you're really lucky, as researchers are, we get to have that be our bread and butter. Not everybody can do that, but there are still parts of your life that as a hobby, or avocation, you can follow that curiosity.

➤ *And it seems to align with this overall goal, right? You're highlighting people in our community with your podcast who are able to find new ways to pursue the questions that maybe sing to them, so to speak. Do you see any challenges, all the students that you work with, all the folks that you know in the community, for people who are trying to maybe follow their bliss as a researcher, do you see challenges to it the way that might play out?*

❖ Well if you follow your bliss and do different things and cut a new path, you will have people tell you you are crazy. Absolutely. Well-intentioned people, well-meaning people, "Don't do that, don't do that, what are you

going to do with that? Oh, my goodness, don't do that." And they could be people near and dear to us, it could be your parents telling you that. Thank goodness my parents didn't say that, but it could be your parents, or siblings, or close friends, or your spouse saying, "Oh, my God, how are we going to pay the mortgage if you do that?" And again, I'm not recommending that people be frivolous and just drop everything to go off be a painter in Tahiti. But you have to be a little bit thick skinned and not listen to those folks.

One person that is another person that I really admire is Eric Kandel who won the Nobel Prize in 2000 for his research on memory. And he's written some very interesting books; he's about 80 years old now. And he says that there are kind of three major times in his career when he's made big switches. He started out as a psychiatrist, and then went into research and worked with invertebrates when everybody wasn't, and now he's working with mammals again after having won the Nobel Prize about invertebrates. And each time he did that people told him he was nuts and he said, "You have to just not listen." And he talks about an interesting concept that he calls "Day Science and Night Science," as you're transitioning. And he said, your day science is your bread and butter, the stuff you're known for, keep doing that and as you're doing that then at night, or on the weekends, or your other time you go pursue this other thing and you do that until that can become your day science.

So, at this point that you're transitioning you often have kind of two jobs. You have the job you're getting paid for and this other new thing you're

developing to put yourself in the position to get paid for it. And I think that's a really wise way to approach it; just not to throw everything over but to again have the courage to keep following that. And one question that I know I keep asking the podcast guests is how did they keep going in the face of, like with Karl Smith, for, again, decades people said, "Active learning? What's that? That's crazy." And he kept doing it for year after year after year after year. And how do you keep going? Because I think courage is really important.

➤ *And I'm thinking about some of your previous episodes and I know that that has explicitly come up multiple times. I remember when Nadia Kellam was talking about her advisor, whoever don't use "emotion," just don't do that but she did. And James Huff talking about he didn't want to reach out to the big person who had created IPA, but he did and had a working relationship. So, I think I've heard that coming up with some of your guests this idea that, not even implicitly, but explicitly being discouraged or told 'no' and still to pursue.*

*So, you touched on it, I did want to ask you that same question that you asked your guests, what is your advice for people who are interested in being research renegades and pushing the boundaries? What would you say to encourage them to have that courage?*

❖ So, I don't know where people's intestinal fortitude comes from. I remember asking Nadia Kellam that, you know, where does that come when your advisor said don't do it and you just did it. And, you know, she didn't

really know but said maybe it came from her mom. And I know earlier you were asking me and I think well it came from my parents. Actually, there are some people that have parents that discouraged them, and they get their fortitude from defying that. So, I don't know where that burning desire comes from quite frankly.

But one thing that I think is important is that in order to hear the song, you have to be quiet enough to listen to it. 'Cause if you're frantically buzzing around all the time and your mind is yammering, you're not going to hear the song. We have a sweet little Carolina Wren who's built a nest right in front of our front yard, and actually he's out there tweeting away right now hoping that some lady is going to find his nest. And we're rooting for him. You know, if it's too busy in here, if I've got the music on too loud, I don't hear him singing. So, I think in this frantic time people need to take the time to be quiet and to reflect and to write in your journals and to think about things.

And then the other thing is you have to expose yourself to different areas because to be creative you're linking things that aren't necessarily been linked before. So, you have to look outside of a particular narrow lane and allow yourself to have different kinds of experiences. Some people like Julia Cameron who wrote "The Artist's Way," actually talk about doing this very systematically. And she talked about something, I think she called it an artist's date, and I think it was once a week or once a maybe once a month you go somewhere where there's a lot of different things that you could look at, or see, or experience and there are things that you wouldn't

necessarily see just to let you have some different inputs. So, I think having different inputs, in our case as researchers, reading different kinds of things, listening to different podcasts, watching different science specials or things is important and just letting yourself reflect.

➤ *So, speaking of reflection, you have obviously more things we're still learning from you, you're still going strong, more podcasts to record, but if you reflect on your career and you think more about being more towards the end than the beginning, what sort of legacy are you hoping to leave?*

❖ Well right now I'm at a part of my life where what you folks, meaning the new assistant professors and people in new departments are doing, is more important to me than what I do. You have the future in front of you, you have the enthusiasm, you have the energy which I kind of feed off of quite frankly. I feel like a vampire sometimes. And so, my legacy, I hope would be you all, that again thinking about your wonderful minds and the things that you're going to create, and the good you want to do for the world by the things you create, that's my legacy. And I'm very blessed to have gotten to know you all and I know you know that I love you. And that's a really wonderful gift, so thank you for that.

➤ *Yes, and I think I speak on behalf of many of the folks in our community, that we owe you a big thank you as well for your leadership and your generosity and the wisdom. So, thank you for sharing just a little bit of that with us today and I hope that listeners appreciate, like I do, getting*



*to learn a little bit more about you. And we will continue to do so as we get to work along with you. Thank you, Ruth.*

- ❖ Well thank you and Emily, at some point, we're going to flip this and I'm going to interview; you will probably be a podcast guest.

➤ *That sounds good. I will be prepping my ideas. Thanks, Ruth.*

- ❖ Thank you.

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- *Thank you to Patrick Vogt for composing our theme music. The transcript of this podcast can be found by Googling "Purdue Engineering Education Podcast." And please check out my blog, [RuthStreveler.Wordpress.com](http://RuthStreveler.Wordpress.com).*