

## TOPcast Episode 56: “The Last Mile:” Getting STEM Online

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*(upbeat music)*

Kelvin Thompson: From the University of Central Florida’s Center for Distributed Learning, I’m Kelvin Thompson.

Tom Cavanagh: And I am Tom Cavanagh.

Kelvin: And you are listening to TOPcast: the Teaching Online Podcast. Hey, Tom.

Tom: Hey, Kelvin. We are once again in the bunker.

Kelvin: Yeah, no hurricanes.

Tom: No.

Kelvin: It’s nice outside, actually.

Tom: It is. You know, obviously we record these at a different date than they’re aired, so who knows what the weather will be like when this is actually released, but a huge cold front has just moved through the majority of the country. It’s nice to be in Florida.

Kelvin: That’s right, where the cold front is like, “Ooh, it’s below 60!” *(laughing)*

Tom: Yeah, it was. Yeah. Overnight it was in the 50s and so we’re all freaking out. It’s been very overcast and blustery—

Kelvin: Yeah, I like it.

Tom: —But I’ll take the temperature.

Kelvin: Yeah. It’s very pleasant.

Tom: Yeah.

Kelvin: So, we’ll see. Yes.

Tom: If only we had a hot beverage to help with this cold, cold day.

Kelvin: Where's that special effect that shows magic? "Ding!"

Tom: Yeah.

*(sparkle sound effect)*

Kelvin: Oh, what's that, Tom, right in front of you?

Tom: *(surprised)* What's this in front of me?

Kelvin: Yeah.

Tom: Ooh, a hot beverage.

Kelvin: *(laughing)*

Tom: What am I... What am I drinking in this hot beverage?

Kelvin: Well, Tom, we often joke about, you know, this episode and that one being a "very special TOPcast—"

Tom: *(laughing)* Yeah.

Kelvin: —But I think this description is gonna be very apropos to this episode because today's coffee's not coffee. It's tea.

Tom: I was wondering what this bag was in my coffee.

Kelvin: *(laughing)* "Who put stuff in my coffee?"

Tom: Yeah, nah. Yeah. It's good.

Kelvin: Yeah. So, this just a temporary departure, lest our listeners get all, you know, worried for thematic purposes and in honor of those sub-set of listeners who have identified as tea-drinkers to us along the way through the years, including our UCF colleague, I might point out, Dr. Jennifer Sumner, who pointedly called me out a month or two back and said, "How about you feature some tea?"

Tom: I have heard of some people who have sort of anecdotally told me that they are—

Kelvin: It does happen.

Tom: —they prefer the tea over the coffee while we're doing our episodes.

Kelvin: Yeah so, that's OK. You know, we're equal opportunity, embrace everybody, draw a wider circle. It's good. And, you know, full disclosure: we're not trying to step on the toes of our podcasting colleagues from SUNY Oswego over at the very fine "Tea for Teaching Podcast." John Kane and Rebeca Mushtare. And if you haven't listened, you really should. TeaforTeaching.com. But, you know, it's

a thematic choice. Now, it's not just that this is any old tea, though, Tom. Lest you think that my idiosyncrasies are limited only to coffee, today's tea is tea with a story. It's a tea innovation, you might even say.

Tom: My favorite kind of beverage.

Kelvin: This is Yaupon Brothers Lavender Coconut Tea grown and processed just up the road from our Orlando studios in Edgewater, Florida. And, turns out, two entrepreneurial brothers with a UCF connection each are re-popularizing a forgotten gem from Florida's past: allegedly, the only caffeinated plant native to North America. Now, it was once popular with the indigenous peoples of Florida and the early American colonists, but it fell out of favor—supposedly—due to the efforts by the British Empire who wanted to monopolize the trade of Asian teas.

Tom: Hmm.

Kelvin: Now, however, Yaupon Brothers American Tea Company is attempting to change things up by reintroducing to the world, commercial tea made from the Yaupon Holly. Look it up! It's a thing. So, check out the show notes for even more on the backstory. It really truly—I mean I know I'm a little geeky—but it really is fascinating.

Tom: I've never heard any of this before.

Kelvin: It is. Isn't this intriguing?

Tom: Yeah.

Kelvin: Fascinating. So, here's the co—I mean the tea. So, do you get the connection to today's episode and how do you like it?

Tom: I like it a lot, actually. I do like tea. And I kinda get the connection, I think.

Kelvin: Uh-huh. Well it's not as on-the-nose as you prefer.

Tom: I know. Well, because I'm, you know, not very deep and—

Kelvin: That's not true.

Tom: —I'm a bit shallow. So, I get it. We're going in a little different direction.

Kelvin: Yes.

Tom: So, we're doing things a little bit differently.

Kelvin: Doing differently.

Tom: We are not constrained by past conventions.

Kelvin: Mhmm, mhmmm.

Tom: And facts are more important than hype or tradition. I'm actually reading that one off the page there—

Kelvin: Yeah, well, you know. Yeah, that's right.

Tom: —that you're helping me with. But yeah, that makes sense. I get it.

Kelvin: *(whispering)* Here, say this, Tom.

Tom: Yeah, exactly. Yeah. I'm being spoon-fed the connection.

Kelvin: That's right. It's OK. We do what we can.

Tom: *(laughing)*

Kelvin: The tea is good, right?

Tom: It is actually very good, yeah. I do like it. It is different. You know, I don't know if it's the coconut or the lavender or the Yaupon. *(laughing)* It's good.

Kelvin: There's a bunch of—I almost got the Fire-Roasted Warrior to bring in, because I thought, you know, that might—

Tom: Wow.

Kelvin: —might be a little bit more like coffee. It's different. I think this is really good. Blue Lagoon is another really good one and there's, gosh, Florida Chai and they've got a green and they've got a black. There's all kinds of stuff. I talked to one of the co-founders, actually, when I bought this tea and he said, "Hey, come on over. We'll give you a tour."

Tom: Cool.

Kelvin: So, we ought to take a field trip or something.

Tom: Yeah. We'll do an audio log.

Kelvin: Yes. So, uh—OK, so you see some connection. So, what's that got to do with today's episode, Tom?

Tom: Well, we're gonna be talking about STEM education. Science, Technology, Engineering, Math. I have heard some people talk about STEAM—

Kelvin: Yeah.

Tom: —Where you add Arts in there.

Kelvin: Yeah, I like that.

Tom: But we're gonna stay focused on just the STEM.

Kelvin: Although, there is some steam rising from the cup.

Tom: There is, yeah. This has actually stayed warm, so it's actually quite good on a 58° day.

Kelvin: *(laughing)* Don't hate us—

Tom: Yeah, it's actually not even 58° out.

Kelvin: —We only get like two or three days a year where it's really nice outside.

Tom: It's probably 70° right now.

Kelvin: *(laughing)* That's right.

Tom: Brr.

Kelvin: So, why are we talking about STEM, Tom?

Tom: It's important, Kelvin, and don't they always say, "That's the future. We have to have more STEM education—"

Kelvin: They do say that.

Tom: "—We need to have more STEM graduates," and there is some truth in that. There's definitely a dearth of graduates to fill all the jobs that are out there in STEM—in science, tech, engineering, and math. But there...It has been in some cases, especially for us here, a bit of the last mile for online and digital education.

Kelvin: Yeah. Yeah, we talked about that in passing, I think, back in Episode 35: Blending our Way to a Whole New Level of Student Success. The last mile thing we talked about there. Yeah, I agree. We certainly hear that STEM has done well in digital contexts at some institutions, but I don't know about you, when I talk to colleagues far and wide, generally the vibe I hear is, "Oh yeah, right. STEM."

Tom: Yeah. I think it has its own unique set of challenges. I mean, just like any discipline, but it's particular, I think, in the world of STEM. And yeah, I do think that maybe some schools are ahead of us. In fact, I know they are. When I think of schools that have a particular, I don't know, technology or polytechnic sort of focus—

Kelvin: Right.

Tom: —and that's all they do. They tend to be more on the cutting-edge. But then there are other schools that I think are still struggling with it and know that they want

to get into the space. I had a great conversation with a former Florida colleague, Jennifer Veloff, who's now at the Colorado School of Mines—

Kelvin: Oh yeah, right.

Tom: —and she's working through these issues right now herself. And that's a very, you know, well-regarded, you know, technology-based school.

Kelvin: Yeah. So, we thought we might take a few minutes to explore—at least from our vantage point as online education people—why online and blended might not be as warmly embraced in the STEM discipline. So, that's a broad generalization, right?

Tom: It is.

Kelvin: And these are just our views. This is just a conversation. These are just our views, and they might reflect misperceptions from non-STEM folks. Neither of us has a—since the last time I checked—STEM background per se.

Tom: I definitely do not.

Kelvin: So, you know, what do we know? What do we know from STEM? And we might... Maybe it would be appropriate if we can find a good STEM colleague or two to come in and kind of reflect a counter-perspective. Maybe we'll do that. So, this is just us from kind of the online and blended world kind of talking about what we've perceived about why there might be a little bit of a disconnect and what we might be able to do about it. Does that sound alright?

Tom: Super-D-duper.

Kelvin: Yeah. So how do you want to kick this into gear?

Tom: Well, you've jotted down a couple of notes that maybe we can use as conversation points, and the first one is that, you know, maybe it's us, you know?

Kelvin: *(laughing)* That's right! Maybe it is.

Tom: It's not me, it's you. It's you, not me.

Kelvin: That's right.

Tom: So, as I mentioned, you know, this has been the last mile for us. We've had a long history of online learning in social sciences, in the arts, in humanities, but when you get to some of the natural sciences and engineering, while we do have some programs, they haven't been as systemic and as enterprise as some of those other areas. So, maybe that's just our issue. Maybe that's a particular cultural issue here. There have been departmental leaders in the past here—I would say it's much more in the past than it is now—who were under the impression that if you're not pouring chemicals on the bench or if you're not, you know,

whatever—you know, in like an engineering lab—screwing something into something else—

Kelvin: Right.

Tom: —Then it doesn't count.

Kelvin: Right.

Tom: And I think that's changed a lot, but we're still not all the way where I would like it to be—and maybe I should pause. I said this yesterday in a meeting—a committee meeting of the Board of Trustees—that I may have digital learning in my title, but I'll be the first one to say that not everything should be online.

Kelvin: Yeah, sure.

Tom: Yet having said that, a lot more can probably be online than most people think.

Kelvin: I think that's true.

Tom: Particularly our colleagues in the STEM disciplines.

Kelvin: And I don't know—I'll go out on a limb and say—I don't know that I've run across anything that couldn't benefit from a well-designed blended approach.

Tom: Yeah, I think that's true. Where we typically hear objections is, “Yeah, but there's a lab.”

Kelvin: *(laughing)* That's right.

Tom: And like, OK, I get it. There are solutions to that. Whether it's a virtual lab—if you're more concerned about concepts than you are about actual psychomotor skills, virtual labs can be very effective, and you don't have all the waste of chemicals, and you're not using up lab time for non-majors, where you would want to have the majors, you know, the ones spending the most time actually in the lab learning the skills you need to learn. There are virtual labs that are highly effective, and for those that are purely distance programs, there are like, kitchen countertop, you know, mail-order labs that can be customized to fit whatever you need. You can have a whole fetal pig sent home that you can...

Kelvin: I mean, those have existed in some form from like as long as I can remember in online education.

Tom: Yeah, yeah. That's not new. And I'll say it's not something we do—

Kelvin: No.

Tom: —because we currently don't have like an undergraduate program in biology online. So, that's just a choice that we've made.

Kelvin: I do hear from some colleagues—in fact, recently I was talking to some colleagues in the state—and they said that, “Well, one strategy is to sort of separate out the truly lab component, do that face-to-face, and do the rest of the content online. Kind of the—I guess you could—I guess depending on how you do it, you could say that’s kind of a blended approach? I don’t think it passes the distant student litmus test that we’ve talked about before, though.

Tom: No, I mean if you’re still requiring somebody to come into a lab at a certain time, then no, that’s more of a blended approach.

Kelvin: Yeah.

Tom: But, what you can do is significantly reduce the amount of time that they’re in the lab by preparing them online, by setting all of that knowledge, you know, kind of the knowledge prerequisites that you would have to have before you come into the lab, and then you can kind of focus on the things that can only be done in person. Whether that is teaching a psychomotor skill or if you did want to actually pour chemicals together—whatever it is. You can make your lab time much more efficient, which is typically a bottleneck. I know it is here. Lab time, lab space is a limiter for some of these programs.

Kelvin: Yeah. Yeah, for sure.

Tom: Alright. You wanna take the next one?

Kelvin: Uh, sure. I think I certainly have had this perspective maybe even going back to when I first got into online higher ed. 21 years ago—

Tom: Who’s counting?

Kelvin: —Yeah. Me. And I got this message—whether it was intended or not—the message I remember hearing when I started in this work was, “The STEM folks”—like *those* folks—“just like and privilege the talking head and the hairy hand—”

Tom: The document camera hairy hand, yeah.

Kelvin: —Yes, and zoom up, let me write on the chalkboard or the whiteboard, markerboard, whatever. And, you know, I don’t know. Sometimes maybe we’re too quick to believe our own press about the efficacy of online learning generally and not really thinking about the needs of STEM faculty on their own terms because it’s easy to write that off as just being “lecture-centric” or “lecture-privileging,” right? And we in online education—especially from the early days—you know, we talk about social constructivism and active learning and hearing from everybody, everybody gets a voice, and we kind of eschew that instructivist—some might say—reception-learning kinds of things. And so, we write them off, and that’s not fair.

Tom: Yeah.



Kelvin: Now, more recently we've got, you know, the ability to some pretty good things with lecture online—video lecture capture platforms and so forth—but maybe that's one of the reasons there's a disconnect.

Tom: Well, I would say that as long as the choice of doing a lecture online is informed and intentional, and not just because you can't think of anything else to do, then it's a different story. Because, some—like if you think about engineering or math—where you're building a formula for a problem set over multiple lines and part of what you're instructing is the process. Video is really effective for that. It could be really expensive to produce a bunch of custom animations for something like that where you could be really effective in just having somebody write it out and narrate it. Think about Khan Academy. Those are so simple, but they're very effective. What I would say is that don't just...Don't just default to what's always been done. What we've been seeing here—I'm thinking about in engineering and like in an accounting class, where some of the faculty have started recording those kinds of lectures in the lightboard studio.

Kelvin: Yeah, yeah, yeah.

Tom: So, if you're not familiar with what a lightboard is—most of you probably are who's listening to this—it's a way of writing on a piece of glass that's illuminated so that the marker shows up, and then we're able to flip the image—the camera—so that it looks like the faculty member is writing backwards through the whole thing. It's really quite clever, but—

Kelvin: Humanizing, in a sense, because you're looking forward instead of that “talking head and hairy hand.”

Tom: Right. You can see the faculty member's face. You can see their expression. They can point to things as they're writing them. And students love it, and the faculty sort of love it. So, that's a different way of doing the same kind of a STEM-based lecture that I think seems to be working really well for us right now.

Kelvin: Yeah. I think we could probably put up a few more of those lightboard studio rooms and keep them filled, I would imagine.

Tom: We have a proposal—if funded—to do just that, yeah.

Kelvin: There you go. We could just send this episode out to everybody on that committee and they can—

Tom: *(laughing)*

Kelvin: —choose to say yes. And we'll put a link, too. Some lightboard videos in the show notes just in case—odd chance somebody hasn't seen them. I'm sure you have, but they're beautiful.

Tom: I'm thinking also—not just of STEM, too—I know we're talking about STEM, but I'm thinking about our colleague Joyce Nutta in the College of Education,

and she does kind of phonetics in language instruction and she has effectively used lecture capture to teach phonetics to students. So, it's an intentional instructional choice, and if it's used like that, I think it's different than just, "Hey, set up your camera because I'm gonna do what I always have done," which is just lecture and write on this board.

Kelvin: I did like the way you set that up, though, because I think it's reflective of...I can recall a conversation that you and I both were part of with a colleague from our engineering college here where he said—much like you did—it's about the process of working problems. It's not about being didactic about presenting content. It's about, "Here let me model for you the process. Let me involve you in the process." So, I do wonder if we've done enough with alternative ways of understanding that kind of process work, whether that's simulation process or adaptive or AI or something. That might be additional innovations that might help folks get on board.

Tom: Yeah, and that's been a perennial sort of complaint from STEM faculty in adopting digital tools and I sympathize. When part of what they're grading is "show your work", as opposed to some machine-graded—is it A, B, C, or D?—

Kelvin: Right.

Tom: —That can be difficult. Whether it's, you know, using LaTeX or whatever to record your formulas. It's not quite the same as writing stuff down on a piece of paper and showing it to your professor, and he'll say, "Oh, here in step 3 you missed this and that's why it's wrong, but otherwise you got it." You know?

Kelvin: What else we got?

Tom: So, we talked about hands-on laboratories.

Kelvin: Yep, we did.

Tom: That was one that you had listed. This one, I think we're gonna tread into some dangerous waters.

Kelvin: *(laughing)*

Tom: But I think there is some element of truth to it, that the STEM disciplines can be by their very nature somewhat conservative in the way they approach change. And I think—you've characterized this in your notes as, "Due to the high-stakes nature of the fields." Which I think is fair. You know, they don't want to take, you know, risks...Let's just take engineering—

Kelvin: Yeah.

Tom: —Because that bridge is gonna fall down. You know? *(laughing)*

Kelvin: That's exactly right. You don't want that.

Tom: Yeah.

Kelvin: Bridges fall, people die, you know.

Tom: Yeah, yeah. Exactly, exactly.

Kelvin: You don't want that.

Tom: So, do you want to talk about, you know, some of the med school admissions discussions we've been having here in the state of Florida?

Kelvin: Yeah. I mean, we were both in the room for one of those just being spectators. It was fascinating. And I guess I would say from the outside looking in that there seems to be a belief—I think it's, there's several concepts intertwined—but there does seem to be a belief that there are important interpersonal skills—teamwork, empathy—and you think from like a med school perspective—bedside manner is still an idiom. And there's a belief that those are more easily *caught*, one might say, than *taught* in a face-to-face environment. You know, you're there and so you're just gonna somehow, by osmosis... They couldn't... Folks in the room couldn't really articulate exactly how the magic happened but seemed like because you were face-to-face, it was gonna happen and you as an instructor, you are observing whether student Tom really can connect with peers or not, but there's a belief that if you were technology-mediated that, you know, that wouldn't happen because you're interacting with a device and not a human, even though you're interacting with a human through a device.

Tom: I thought it was an interesting premise.

Kelvin: Yes, I agree. (*laughing*)

Tom: And, you know, the catalyst for this was just an examination across the state university system in Florida that has medical schools. Looking at admission requirements and, you know, how many of the different med schools limit the kinds of online courses that are taken at the undergraduate level in your med school application. And it was—you know, it wasn't unanimous across the board. There were variations—

Kelvin: Right.

Tom: —And most of the schools sort of came down and said it's a case by case basis.

Kelvin: It depends.

Tom: It depends, right? But I think the general sense, though, was that there are some kinds of courses that should be done face-to-face. Particularly those with a lab, and I guess I'm gonna have a hard time arguing with that for somebody who's gonna be a doctor, right?

Kelvin: Right.

Tom: A medical doctor.

Kelvin: Sure.

Tom: But, to the point you just made—

Kelvin: Yes.

Tom: —About the learning interpersonal skills from being in a face-to-face environment—

Kelvin: Yes.

Tom: —And if most of your classes are taught by some professor whose back is to you writing on the board and you're in a lecture hall somewhere, I don't get it.

Kelvin: Yeah.

Tom: You know, I have a hard time buying that piece.

Kelvin: Yeah, I agree. And then there was some like, you know, like a lot of programs have these kinds of key courses that—pick a term, right?—"weed out," "gateway," something. And that—oh, oh, oh, well you know, those courses especially need to be face-to-face because they've got to be—I swear words like this came out of somebody's mouth—"pure."

Tom: *(laughing)* I don't remember that one.

Kelvin: "Pristine." I wrote it down in my notes because I'm like, seriously?

Tom: Yeah.

Kelvin: So face-to-face, "pure face-to-face." Gotta keep that one pristine. And then there's a little bit of—we've talked about this before—a little bit of privileging of elite schools as the gold standard, right?

Tom: Yep.

Kelvin: And whatever they do, we all need to do. I swear, even in the room—I'm trying not to, you know, be inappropriate—but there was a little bit of shibbolethizing, right? With like, "Well, I remember doctor so-and-so at prestigious Ivy League school he—" "Oh yes! Well, then he went on to other prestigious Ivy League school there and that's where I—" You know, there's a little bit of that.

Tom: Yeah, there was a lot of credential flourishing in the room—

Kelvin: *(laughing)* Well said.

Tom: —And there were some well-credentialed people in there, yeah.

Kelvin: No kidding, right?

Tom: So, yeah. I get it. I think it's just a matter of time. As more and more students earn a degree through online coursework and are able to perform as well as students in those medical classes who did not earn a degree online, I think some of that stigma will start to wear off. Just like it kind of has started in just the general online education world, let alone applying to medical schools.

Kelvin: Well I think to your point, right? Zooming in on that for a second, that that experience you were just talking about should, hopefully, give rise to data.

Tom: Exactly, yeah. And, in fact, that's what the schools were sort of asked for at the Board of Governors meeting I attended that was shortly after the meeting that was on our campus. And so, I think they're gonna collect some of that data.

Kelvin: Yeah.

Tom: And just see. And you know, good for them. They're scientists.

Kelvin: But it does sort of also elicit the consideration of, "Well, hmm. What data would be valued or trusted if people are skeptical, right?"

Tom: Yeah.

Kelvin: Because I think you could... "Yeah, don't confuse me with the data because those aren't good data. That's not real research," or "Yeah, I know that's what that says, but I know what I've seen—" Even a scientist, some can be subject to that kind of folly, as well, I think.

Tom: Well, I think that's true. And I was mentioning to you before we hit record, here, that when I'm... When I encounter a skeptical faculty member, particularly somebody in the sciences—I'm thinking of an encounter I had maybe a year ago with a chemistry professor—who was questioning... who was a skeptic of online learning. Let's just put it that way. And I put him in touch with Chuck Dziuban and Patsy Moskal and had them share their data. You know, here's what we've learned and here are—

Kelvin: 20 plus years.

Tom: —20 plus years of data. And the good news is, scientists respond well to data.

Kelvin: Yeah.

Tom: They're scientists. They want empirical evidence. I don't know if that completely convinced him, though, because I don't know if it met his criteria for a, you know, double-blind—

Kelvin: Sure.

Tom: —study. Whatever he was hoping for, but he was very polite about it and said he appreciated the effort and I think it helped. I don't know if he's gonna be, you know, first in line to teach online—

Kelvin: Right.

Tom: —But, you know, every day we have a conversation like that and you sort of wear them down and you get a couple of champions in the department and they see, "Hey the world didn't stop rotating."

Kelvin: And offer to collect data that they're a part of.

Tom: Yeah, absolutely. Yeah, in fact, I presented some data yesterday to the Board of Trustees and in it, we were able to show that this course redesign initiative that we're doing. Some of the initial results coming out of our adaptive learning courses, the vast majority of our adaptive learning courses, all but one I think, showed an improvement.

Kelvin: That's good.

Tom: Since the last time it was taught. It was actually remarkable when you look at the adaptive courses versus the non-adaptive courses that had some intervention. It was almost 90% of the adaptive courses had an improvement, and it was like 60% of the non-adaptive courses that had an improvement.

Kelvin: Because sometimes you try new stuff and it doesn't work.

Tom: Right. Or even if it does work, it doesn't work for the first two semesters you try it, you know?

Kelvin: Right.

Tom: You gotta get good at it first.

Kelvin: So, I agree, remarkable. I'll give a plug here, too, also to our colleague Katie Linder's efficacy database. If you don't know that work at Oregon State, Google it. We'll put a link in the show notes. That can be useful in dealing with folks who are questioning the efficacy of online as well. I know our tea is dwindling, although, I will...Another shout out to our Yaupon Holly. So, I'm told that you can continue to refresh this tea with new hot water because it lacks tannins and so it doesn't get bitter or over-brewed.

Tom: Really?

Kelvin: Yeah.

Tom: Alright I'll take your word for it. I'm refreshing right now as we speak.

Kelvin: So I got a thermos full of hot water.

Tom: OK.

Kelvin: It's gonna taste a little bit like coffee, probably, because that's all I put in it usually.

Tom: *(laughing)*

Kelvin: Yeah. Well, you ready to kind of land this plane?

Tom: I think so. Maybe...maybe we'll just address one of the questions you kind of put here to kind of close this up, which is, can we really move the needle in higher-ed and use online learning to move that needle, without including STEM?

Kelvin: Yeah.

Tom: And I think the short answer is probably not.

Kelvin: Right.

Tom: You know—

Kelvin: Given the criticality of STEM.

Tom: —Yeah. Given the criticality. And maybe not everything is 100% online where you deliver it from 1000 miles away, but I think STEM has got to be part of the ecosystem here.

Kelvin: Yeah, yeah. Well said, well said.

Tom: So, let me see if I can summarize and put our proverbial “bow” on it.

Kelvin: Please do.

Tom: So, online and blended STEM courses aren't mainstream for all of us just quite yet. Thinking through common concerns from STEM disciplines may help us find new opportunities to work together and innovate in course and program design.

Kelvin: Mhmm. Well that sounds like a good thing to do.

Tom: Yes, I am in favor of innovation and working together and improvement.

Kelvin: Yes, I like that. Well, before we sign off, we'd like to self-servingly plug our own podcast periodically, but *(laughing)* we do it through the words of others. So, a cryptically screen-named listener not long ago posted the following review of TOPcast on Apple Podcasts. Said listener said, I quote: “A very informative podcast for anyone in any area of online education. Quick, informative, and delightful.” I like the delightful word. That was nice.

Tom: Delightful, I'll take that all day long.

Kelvin: So, screen-name listener SC1891, thank you so much.

Tom: Thank you, SC1891. Sounds like a George Lucas movie—THX1190—

Kelvin: *(laughing)* 1181—I don't know. Whatever it is.

Tom: I should know that.

Kelvin: Yeah, yeah. There it is. Well, I guess that's about it. We can finish off the tea once the recording's over. You won't be so jittery. It's less caffeine than coffee, so that's good.

Tom: *(laughing)* That is good.

Kelvin: So, until next time for TOPcast, I'm Kelvin.

Tom: And I'm Tom.

Kelvin: See ya.