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Derek Bruff: [00:00] Welcome to "Leading Lines", a podcast from Vanderbilt University. I'm your host, Derek Bruff, Director of the Vanderbilt Center for Teaching. In this podcast, we explore creative, intentional and effective uses of technology to enhance student learning — uses that point the way to the future of educational technology in college and university settings.

[00:22] In this episode, we feature an interview with Cassandra Horii, Director of the Center for Teaching, Learning and Outreach at the California Institute for Technology.

[00:28] Cassandra has been a friend and colleague of mine for years and I was excited to talk with her about a couple of the ed-tech projects her center is supporting at Caltech. Both projects involve making student learning visible in interesting ways.

[00:40] We spoke at the annual conference of the POD Network, a professional organization for people who work at teaching centers, like Cassandra and me.

[00:47] [music]

Derek: [00:50] Cassandra, it's nice to be with you here at the POD Conference in Louisville.

Cassandra Horii: [00:55] You too, Derek. It's great to see you.

Derek: [00:59] We're here with a bunch of teaching center folks, and folks who do educational development of all kinds. It's been a really great conference. I've enjoyed it. I hope you have too.

Cassandra: [01:07] I have. We're over 900 strong. It's great to see this community grow.

Derek: [01:11] Absolutely. You had a little bit of professional news, I think, two nights ago in relation to POD. What is your new title?

Cassandra: [01:18] I did. I am the president-elect elect, which means I will be president-elect in about March of 2017.

Derek: [01:26] Congratulations.

Cassandra: [01:27] Thank you.

Derek: [01:27] I was very excited to hear that news. [laughs]

Cassandra: [01:30] I am so excited. I think this is going to be, perhaps, a much better three years for POD than four years for the nation, but we shall see. In any case, we've got some really wonderful new directions to pursue.

Derek: [01:44] Tell me a little bit about your professional background and how you got to the position that you're in now at Caltech.

Cassandra: [01:50] I am a scientist by training. My undergraduate background is in physics and my graduate work is in environmental science. I did spectroscopic measurements of atmospheric trace gasses. I, along that academic route, had a strong interest in how the learning process was unfolding in the classes I was taking as an undergraduate and eventually teaching as a graduate student.

[02:13] Eventually, those questions about how we do higher education, the processes underlying learning and ultimately the processes that shape how our organizations function to support learning and how we think about teaching became very, very compelling to me. I decided to pursue that direction along the way.

[02:32] I taught expository writing, first-year writing for several years full-time to be able to learn more about other kinds of teaching domains and methods that we don't use so much in the sciences and then have worked in several administrative capacities, meeting and contributing to educational development efforts on different campuses.

Derek: [02:53] Then, a couple of years ago you got to go to Caltech.

Cassandra: [02:55] Yes. At Caltech, about four years ago now, we started a new center, the Center for Teaching, Learning and Outreach. We worked pretty broadly. We worked with the faculty. We're working on educational innovation. We're redesigning courses and working with the institution on the curriculum.

[03:14] We're training the future faculty who are coming out of our institution, who are also, often, our current teaching assistants. We do a lot with educational technology. We're a primary office supporting online courses and massive open online courses, and really helping the institution use educational technology well and think about its use and application.

[03:40] We partner a great deal with our IT-type Department and do that work hand-in-hand. Often, we're at the table, IT is at the table, instructors are at the table to design an approach from the ground up that is clear about learning objectives and big picture goals and integrates across the media, technology and instructional approaches.

Derek: [04:06] That sounds very exciting.

Cassandra: [04:07] Well that's the ideal. We try for it.

Derek: [04:10] Can you tell us about a few projects that you've been involved with in the ed tech realm?

Cassandra: [04:15] Sure. When you asked me this question of projects that we might want to talk about, I thought of a couple and then I was thinking about what unified the theme that made those the exciting ones to talk about for me.

[04:30] I think that underlying theme is really those places that we have used technology to make thinking visible in a different way, whether it's in the classroom frequently or in collaborative technology enabled types of space. No matter whether while we're in person or asynchronously or at distance.

[04:53] A couple of those, in particular, I'll start with a really concrete one, which is a problem that, maybe, some other campuses face. We have some classrooms that are not as conducive to collaborative or active learning as we would like them to be and increasingly, as our faculty or instructors would like them to be.

[05:13] Yet, we can't magically wave a wand and make those changes. In some cases, we've been able to pack those spaces using cheap, not super high tech, but a combination of technology to transform what happens even despite the barriers that we have.

[05:33] In particular, a recent example is a class that was about numerical methods in chemical engineering of all things. The frustration that the instructor came with was about how to bring the complexity of the coding that needed to happen into this classroom which was frustratingly fixed seats, and ultimately…

Derek: [06:00] Should I imagine that traditional college lecture hall here?

Cassandra: [06:02] Please do imagine a traditional college lecture hall, and like many others on our campus, plenty of blackboard space. We've got nine sliding chalkboards across…

Derek: [06:13] Actual chalkboards?

Cassandra: [06:13] the fronts of the room. Yes.

Derek: [06:15] Not whiteboard, chalkboard?

Cassandra: [06:16] In this case, yes. Chalkboards which are our favorite still on our campus and have their own wonderful affordances and I actually wouldn't want to get rid of them…

Derek: [06:23] [laughs]

Cassandra: [06:24] even if we took out all the fixed seats. It's the fixed seating that was making it really for students to work together.

[06:31] As we talked with the professor, the real challenge was that the instructor couldn't access how students were thinking, what they were doing. He just couldn't see their computer screens.

[06:43] He had tried having them bring their laptops into class, having some group problem solving, and it always devolved into each student alone on their laptop or a lecture. He was really having trouble finding this middle ground.

[07:01] We talked about it and defined that problem along with the learning objectives, which had to do with this nimble thinking that was able to transition between the chemical engineering and the coding and the numerical methods and the techniques, but be able to bounce back and forth and talk about those together.

[07:25] We came up with the solution. We were able to get a hold of a small set of very small micro projectors. You plug it to your VGA outlet or to your dongle if you're on a Mac. They're very small, handheld. It's about the size of what? A walkman if you're from the '90s.

[07:54] [laughter]

Derek: [07:54] I get the reference, yeah. A small paperback book.

Cassandra: [08:00] Thank you. That's a better reference, a small paperback book. They can clip onto the back of one of our beautiful fixed seats. In this space, we happen to have wall space that could be projected onto.

[08:15] We were able to cluster students around a wall with a mini projector, assign roles to the group work around problems so you have the one student with the computer that was the projector. We also used cling sheets that through static just stick to the wall and create a whiteboard surface in multiple spots around the room.

[08:37] We had then the student who was the whiteboard marker person who was charting the big ideas, the chemical engineering ideas underlying the coding exercise so that those were displayed alongside the actual code and the results of running the code, and then the students who were contributing to that conversation and helping with the problem solving.

[08:58] Now we have teams, we have roles and we've made the thinking visible. What the professor ended up saying about this experience, and did a brave thing to change course halfway through the class having tried a few things -- that's hard to do — but was just in super enthusiastic and amazed that it was being able to see and intervene in those dual thought processes in real time.

[09:30] That was the really exciting change that happened. To be able to see maybe an error or misconception in the chemistry or in the engineering concepts, maybe an error or a misconception in the coding.

[09:45] Or a misunderstanding of how a package routine, or some plugin that they were using was running which was leading to a magnification of error or something like that, and being able to stop and compare those ideas right in real time.

Derek: [10:02] Wow. I love that. [laughs]

Cassandra: [10:04] We loved it too.

Derek: [10:05] Part of it is that on my campus, we have a lot of these very traditional lecture rooms. I'm always trying to think creatively about how to make them more active learning spaces. I like the technology choice there.

[10:18] Some high-tech, some low-tech, but also the process change in the classroom. The group roles, the ability for the instructor to circulate and interact and see the student learning. That's really powerful.

Cassandra: [10:31] It was also fun to see what students did with this space. We had some ideas about where they would put these visible learning, low-tech, high-tech kits around the room.

[10:44] Some of them threw that out the window and ended up clustered on the floor, around a different spot in the room, using multiple cling whiteboard sheets, overlaying the whiteboard sheet with the projection so that they could annotate the projection or the code in a different way in real time.

Derek: [11:05] That's great.

Cassandra: [11:06] It gave the students some agency to be able to use the tools in different ways as well. Going forward, that's in place and we've now packaged this active learning, visible thinking kit into something that instructors during other terms can use or might choose to adopt in different ways.

Derek: [11:28] Other projects? You said there were several.

Cassandra: [11:30] That was one example. The other that we've done a little bit more rigorous assessment and study of is an online platform that was developed at Caltech. It's

called SKIES. It stands for Su-Kam Intelligent Educational System. I might have to go back and look up what that means. We might have to edit that out.

Derek: [11:52] [laughs] SKIES?

Cassandra: [11:52] SKIES, so skieslearn if you're looking for where that sits online. The platform is one thing, but what it does is put a course or a session or a little part of a lesson into a knowledge tree format, and one that is accessible to all students at the same time, with real-time updates.

[12:19] We've taken the thinking, which might be otherwise a linear set of slides or something like that, if someone's using technology to do presentation. Of course, there are lots of ways to make that non-linear and lay it out in different ways. There's Prezi, there's other methods like that.

[12:35] This one, though, because it has that real-time update and lets an entire class of students be either adding to the tree or responding to places in the knowledge tree…

Derek: [12:45] I'm imagining a family tree, where you have branches coming out?

Cassandra: [12:49] Yes, imagine a family tree. A little bit different than a family tree, you might imagine one primary spine of knowledge that threads through that helps the instructor be able to lend a structure and an outline, a scaffold, to what might happen in the class or to a sequence of learning that's intended for the students.

[13:12] Off of that, yes, imagine that family tree structure. At different places from that spine you'll see one branch, maybe a question that a student asks, maybe a question the instructor poses, that can then have multiple responses. Clicker-type questions can be embedded there.

Derek: [13:30] So not just content or visuals or slides, but questions, interactions, and discussions?

Cassandra: [13:35] Absolutely. What the platform does is pretty flexible. Like any technology, you've got to use it intentionally, but some of the places where we've seen that really help are where the class, in a way, uses this knowledge tree as a Wiki.

[13:52] At different points during an in-class session, the instructor might pause and ask a question and get students to…they might actually sketch something in their notebook in response, take a photo and post it.

Derek: [14:06] And put that in the knowledge tree.

Cassandra: [14:08] And put that in the knowledge tree for everyone to be able to see. We've had instances where it's being used in a lab or a demo-type environment and students can do a brief little experiment, desktop-type experiment, record the results and post that for everyone to see.

[14:26] They might have different cases that they're applying, different test conditions, and be able to pool that back knowledge together, or just a conceptual question that goes in. Again, it's with the instructor's scaffolding, being able to see multiple students think, ask, answer, and contribute to that.

[14:48] There's a motivation that we see in being able to contribute back to the class environment in real-time as well as just access to different points of view, and a peer teaching that can happen in answering other students' questions as well.

Derek: [15:07] It sounds also, this piece where whatever you're talking about now is connected to everything else. You can situate this topic or this question in the bigger picture of the course.

Cassandra: [15:20] Yes, and being able to actually see how that fits together is, we seem to find, a pretty helpful thing.

Derek: [15:29] Let me ask an educational development question. For something like SKIES, that sounds like, if I were to use that well as an instructor, I might have to make some big changes to my course. Have you found that to be the case and, if so, how do you help faculty navigate how they change their own teaching when they start to use technologies in intentional ways?

Cassandra: [15:57] Absolutely. Probably like many other educational developers, we always want to be driven by a pretty clear learning goal. In reality, that's not always where people start. Sometimes people do start with, "Hey, there's this cool new thing. I think it might be

useful. I want to try it out."

[16:17] Honestly, I think that's an authentic place to begin and we don't close the door on that beginning point, but I think we want to back up a step and try to clarify, "Why this? What attracted you about this widget piece of technology approach?" and offer some parallel potential solutions.

[16:39] Where we might have another tool with some similar functionality, but that might better meet the need, we'll put that in the mix as well and try to do some applicability testing. This is a little bit of maybe my personal manifesto about educational technology.

Derek: [16:58] I would love to hear your personal manifesto.

Cassandra: [17:01] I call it that in the graduate class that I teach about pedagogy, about teaching and learning in higher education, in particular in STEM fields. First, there's the goal, the learning goal. Maybe it doesn't come first, but eventually we want to be clear about that.

[17:16] There is matching the technology to the goal and that can mean nine chalkboards. There's a clear, sometimes, need we find especially in derivation-type problems, in very logical things like mathematical proofs.

[17:35] Where there's a thread of thinking that -- I'm going to say it again -- we need to have to be visible all at once to students that we can lose when we don't have the ability to spread that out over time and physically, in the room, over multiple chalkboards. [laughs] There's a use for that. Does the technology match the goals?

[17:59] These other pieces, I think, sometimes get lost, which is why it's part of my manifesto, but one is how are you going to integrate it? Once you've chosen a piece of technology, can you clearly explain why you're using it to students, make time for that explanation to happen in the class and build it in, weave it into the thread of everything that happens in the course.

[18:23] Where does it show up in assignments? Where does it show up in credit or in assessment, whether or not that's just assessment for feedback -- an informative kind of assessment -- or whether it's into the grade for the class? Sometimes, that's at a very low level if it's low stakes, and it doesn't matter exactly what students say or how they answer but that they're engaged.

[18:46] That piece is key and often gets skipped. We try to dwell on that piece as much as possible and provide people with some tools for integration. If I go back to our hacking of a classroom example, one of the tools for integration that we helped with was a little laminated guide to group work that goes with every little projector.

[19:09] It's a half sheet. It's on bright-colored paper, but when the student team gets that mini projector, they also get group or team roles on a piece of paper. On the other side is some tech support points for how to turn the projector on.

[19:23] The group work guide goes with the projector for them to look at. That's something the instructor said, "I would never have thought of that. It's really great that it's here." So, integration.

[19:37] There's a fourth point to my manifesto. I know we're only supposed to have three in anything, but I have four.

Derek: [19:43] [laughs]

Cassandra: [19:43] The fourth is that I strongly believe that teaching is a deeply personal act. It has to do with the self of the instructor with being comfortable and confident. There's a communication approach that has to do with it.

[20:01] I think if you or your listeners think back to any memorable instructor that they had, that person's authentic self is a part of the picture most likely, and a part of what makes them a memorable, human figure that stands out.

[20:20] We try to make this explicit with the folks that we're working with, that we're consulting with. If they have chosen a technology and have a goal and even have thought about integration, but the thing itself feels uncomfortable or just doesn't work for them or it takes one too many steps or they have to type in a way in front of students that they mess up and feel bad about, that's not going to be sustainable.

[20:48] We want to do some actual human testing in terms of usability and personal fit for any application of technology because when it just doesn't fit, it goes by the wayside almost immediately. Any kind of misfit gets amplified when we're in a classroom full of students or in front of people.

[21:16] Likewise, I think if it's a good fit, that good fit can get amplified because there's a comfort there and a confidence that students will feel and sense and pick up on and will be more open to adopting that as their own tool that they are feeling comfortable using as well.

Derek: [21:32] One follow-up question. I do wonder, you've been at a few different types of institutions over time. Is there anything about the research university context that shapes how you work with faculty or how you think about technology?

Cassandra: [21:47] Well, the research university environment, the environments that I've been in are strongly characterized by an independence and an individuality among, let's call them principle investigators.

[22:02] I think that is the ethos that drives research forward is that individual, or it's a group effort. It's a collective effort. It's also not an entire school or department effort. It's got a local environment to it. That really drives a lot.

[22:24] Perhaps, a little bit unlike some other environments where there can be a one-size, we're all going to use X. We have the one adopted technology for whatever the purpose is, and that's really institutionalized. At least in the environments I've been in that are characterized as high research, that just hasn't worked.

[22:45] As new solutions bubble up, people want to be able and have the freedom to try new things out. It means for educational development, I think, at tech support we have to stay nimble. We have to be willing to switch things around and try things out, be willing to up our expert game on any new things that are coming out pretty quickly, figure out their functionality.

[23:12] Test them out, see if we can break them from a learning perspective, and anticipate what some of the problems will be.

[23:21] It also means that we have to be pretty modular because there's not going to be one, central place that for every class, students will go to find the technology that they'll use. Sometimes, our campus systems can't keep up with that. Not all of them might be integrated to the single sign-in system.

[23:40] There might be some actual security concerns that arise from that. We'll have to have

those conversations about what to inform students if we're going to use a third-party platform about their passwords and their usernames. Making sure those are different from their university accounts.

[23:56] Thinking about what information they want to put there. Having instructors think about what information they need to be careful about putting on those outside platforms, but we don't want to stop them from using them or trying them out.

Derek: [24:09] There's a lot of creativity and an entrepreneurial spirit that comes there, right?

Cassandra: [24:13] Yes.

Derek: [24:14] You want to foster that, while also, providing the support that they need.

Cassandra: [24:18] Absolutely. It means it's pretty time-intensive to be driven by that individualistic entrepreneurial spirit and be able to keep up with it. We don't even try to pretend to get ahead of it. I thought about this early in our center's development. Were we going to have some dedicated time to scanning the environment and seeing what's out there, what's next?

[24:46] It's turned out that that's not something we can do in a comprehensive way. We don't set aside time in our calendars to scan the environment and test new pieces because they'll come to us when it's of interest. We're going to hear about it and that's when we kick into high gear and figure out what it's all about -- how to use it and how to support it.

Derek: [25:06] The name of our podcast is "Leading Lines," and we try to not predict the future of educational technology but, maybe, shape it a little or, at least, talk about what we'd like to see there. What are some things you'd like to see happening over the next two, three, four years in educational technology?

Cassandra: [25:22] Well, that's exciting to try to get to shape this. Let's see if it works. We can get back together in three, four years and check it out. I think you'll have a blog post about that, I'm pretty sure, at some point.

[25:35] [laughter]

Derek: [25:35] I might.

Cassandra: [25:37] We were just talking about that sense of being nimble and entrepreneurial, and being able to follow the nose of something interesting, follow the scent of a new possibility for learning.

[25:50] From an instructor side, and an instructor-focused support side, we can figure out how to do that. I think that still poses some real challenges for the student experience side. We're a small enough institution that people can figure out who to ask and talk to their housemates or their roommates and try to figure it out.

[26:18] In other environments, that might be more difficult for students who are less familiar with how the institutional and tech infrastructure works for some of the purposes. There will always be cases where there's a rogue implementation of a technology that we haven't touched and doesn't have the integration and the personal factor and the goals haven't been totally clarified.

[26:44] It would be a dream for me…I know for colleagues on my campus to keep that nimble ability to respond and try new things, but plug it in in a modular way to a more unified experience for students.

[27:03] Honestly, I don't know how that could be accomplished, but if our, for example, learning management systems themselves could be more nimble to be able to modularly plug things in.

[27:16] I think in some sense they're headed in that direction, but to make that a little easier from the instructor side, to plug it in and have it be more seamless for students. That goes both ways, for the student to access where they need to go to do their learning but immediately be able to see the tools that are at play in a particular learning environment.

[27:38] It also goes the other way, to be able to have the student learning data come back into the central place or dashboard or system that instructors can access and hold it all together. That's my dream.

Derek: [27:53] It's getting better, right?

Cassandra: [27:54] Yeah.

Derek: [27:54] There is the initial like, "Hey" that single sign on kind of thing. You can pass around dedication, but we're getting better tools for bringing the data back. I think what's a little bit challenging…in that respect I think some course management systems are starting to change in that they are becoming this connective tissue around other tools.

[28:15] We are heading in that direction. I do wonder about the student's experience about that though because they're still…Yes, I sign in here, and now I have, for this course, these are the tools that are being used. For this course, those are the tools.

[28:29] There's an organizational piece that's very helpful for students, but there's still, for every course I've got, different things that I'm trying to figure out and use and learn, right?

Cassandra: [28:40] Yes.

Derek: [28:41] I don't know if there's a technology solution to that, but I think of these students who come to college and…I'll have my students blog. Usually 1 out of 15 will have any actual blogging experience. Or I might have to use Twitter. I actually haven't done that yet, but I could have them use Twitter. Maybe a lot of them have Twitter experience, but it's not in any academic sense.

[29:05] I want them to do these very specific academic things with the platform and they're used to using it for pure social and entertainment purposes. In either case, whether they've never used it or they've used it in completely different ways, they've got to figure out cognitively, what are the moves we're making with this tool in this course?

[29:23] I think that's still a big challenge. I don't know how to address that, but I think there's a learning how to learn piece, learning how to learn with technology that, maybe, we haven't paid enough attention to.

Cassandra: [29:35] I think that comes back to the integration piece. Perhaps a more controversial idea is whether those -- and I loved that you called it connective tissue, if LMS is the connective tissue among these tools -- if that connective tissue might have the intelligence to help the faculty member build the scaffold.

[29:55] If that connective tissue is set up to really not just plug in the technology, but articulate the purpose of it. There still has to be a human articulating that purpose, but we can certainly structure the instructor experience potentially to prompt for that, to make it a clear part of the process.

[30:18] I say controversial because I think some of the MOOC platforms have moved in this direction from the course builder side. There are now more evident checkpoints for incorporating learning goals and outcomes and having a course structure that clarifies what the objectives are and how the pieces fit together.

[30:39] But they're working with a limited set of tools and at times, at least on our campus, that has felt a little bit heavy-handed as well. It has its own marketing purpose to it. It also has…

Derek: [30:51] Here, you can teach a course on a platform, but it has to look this," right?.

Cassandra: [30:54] Yes, it also has that a little bit of a cookie cutter feel to it. It also has a different motive, potentially, than just teaching the students who are in the room. It has a marketing reach.

[31:11] There's nothing wrong with that, but it raises these questions about motives and conformity, and freedom to do things differently. There's a fine line, I think, between intelligent scaffolding and heavy-handedness that has to be navigated.

Derek: [31:27] It also occurs to me that this idea that we can make the student experience a little more seamless, a little more coherent, a little more…I don't know that they'll get that when they leave us.

Cassandra: [31:39] Yeah, that's absolutely true.

Derek: [31:40] The ability to be in this new professional environment and pick up a tool that folks are already using and figure out how it's been used and how I can use it effectively, that's maybe a transferable set of skills that we could help our students develop.

[31:55] I'm torn between, again, standardizing and making things routine because that makes somethings a lot easier, but it also may inhibit a certain skill development, whether we're

talking about the students or the teachers.

Cassandra: [32:10] Absolutely. We think along a continuum of expertise. In an educational setting, we want to build a scaffold that's a little taller and sturdier for earlier experiences, and slowly dismantle that scaffolds so that less and less of it is needed over time. I don't think a technology can necessarily do that for us. We still need humans.

Derek: [32:34] I'm going end with a question we asked all of our guests. We spend a lot of time talking about digital educational technologies on this podcast. What's one of your favorite analog educational technologies? You've mentioned a couple already.

Cassandra: [32:48] I have. I do happen to really like chalkboards, a lot. I like whiteboards too. I think there is something about the largeness of a surface that lets us play in a different way, that lets us lay things out flexibly.

[33:07] The ability to erase, and reshape, and reform, and use color, and to move through the space while we're thinking about our ideas. I think those are all powerful pieces of non-digital technology. That said, we also have had fun with those cling sheets that stick to the wall and make it writable anywhere, and temporarily.

Derek: [33:29] In what I'm hearing though, in both of those examples, is when we think of chalkboards, we tend to think of the instructor using it, but there's no rule that says that has to be.

Cassandra: [33:39] Absolutely. Some of our most favored, flexible teaching spaces are ones with floor to ceiling chalkboards and couches. There are places where groups of students are doing active problem solving with facilitated help of teaching assistants or learning assistants. Those are just beloved.

Derek: [34:03] Thank you very much for talking with me today. I really enjoyed it.

[34:06] [background music]

Cassandra: [34:06] Thank you, Derek. I've enjoyed it too.

Derek: [34:08] That was Cassandra Horii, director of the Center for Teaching, Learning and

Outreach at Caltech. In the show notes, you'll find links to Cassandra's center, the SKIES tool she mentioned and a few other resources.

[34:20] You can find those show notes on our website leadinglinespod.com. We welcome your comments and questions there, and on Twitter, where our handle is @leadinglinespod. You can subscribe to our podcast or iTunes or your other favorite podcast app.

[34:32] If you like what you hear in the podcast, please leave us a rating and a review on iTunes. That helps other listeners find the show. Leading Lines is produced by the Center for Teaching, the Vanderbilt Institute for Digital Learning, the Office of Scholarly Communications and the Associate Provost for Digital Learning.

[34:47] Look for new episodes the first and third Monday of each month. I'm your host, Derek Bruff. Thanks for listening.