Transcript

[0:01] (music)

Derek Bruff: [0:05] This is Leading Lines. I'm Derek Bruff. Way back in 2014, I went to a conference hosted by Rice University on teaching and learning in higher education. I heard a lot of great talks that weekend, but the one that really stuck with me, years later, was one by Stephen Kosslyn about this new startup university called Minerva.

[0:26] The idea behind Minerva was a little bit bonkers with students taking all of their courses online while living in cities around the world, moving to a new city every semester or year. I mean, that sounds awesome, but how do you build a university like that?

[0:42] One strategy Minerva took was building its own synchronous learning platform based on principles of cognitive science. As Stephen Kosslyn described these principles and this platform in his talk at Rice, I was blown away with how smart the implementation was. And at how Stephen could speak to the integration of learning science and teaching practice in such compelling ways.

[1:06] Fast-forward to 2020, and pretty much everyone in higher education was teaching online and often synchronously. In October of 2020, Stephen Kosslyn published a new book called *Active Learning Online: Five Principles that Make Online Courses Come Alive*. The book draws on Kosslyn's experiences at Minerva, but also his very long and impressive career in higher education.

[1:30] Kosslyn is the founder, president emeritus, and chief academic officer of Foundry College, which provides high-quality research informed online education for working adults. He's also the founder and president of Active Learning Sciences, a consulting group that helps institutions adopt active learning principles and online education. And prior to that, he was the founding dean and chief academic officer at the Minerva Schools, at the Keck

Graduate Institute. And all that came after an amazing career as a professor of psychology at Harvard University and Stanford University.

[2:05] We have a great interview with Stephen Kosslyn to share with you. He recently facilitated a virtual workshop here at Vanderbilt on his new book. And we took the opportunity to talk with him for the podcast. You'll hear a new voice in this interview, Julaine Fowlin. The Vanderbilt Center for Teaching's new assistant director for instructional design. Julaine helped organize Stephen's workshop and she had a lot of great questions to ask him about his book. Kosslyn goes through his five principles for active learning, offers practical strategies for implementing these principles in the virtual classroom, and speaks to the important role motivation plays in learning. (music)

[2:51] Well, thank you, Stephen, for being on Leading Lines. Juliane and I are very excited to chat with you today about your book and about related topics so thanks for being on our podcast.

Stephen Kosslyn: [3:00] My pleasure.

Derek: [3:03] And I'm going to ask you a question I've been asking our guests a lot lately as our first question. Can you tell us about a time you realized you wanted to be an educator?

Stephen: [3:13] Yeah, it was in high school. It was during the sixties. And, you know, we were all sitting around talking about the woes of the world and deals that we were confronted with on a daily basis, and how insurmountable they all seemed. And I remember it occurred to me, as if a grand insight at the time, that, hey, education, probably the root of a lot of this and that got me going. Actually, I never let go of it in a long time.

Derek: [3:46] Did that, I'm curious, what did that, did that lead to certain decisions at that time as you were thinking through the next steps in your education?

Stephen: [3:55] More than decisions. It led to a perspective, a way of framing things that I to this day still have, which is to think about what sort of knowledge and skills, this is the present me framing it, this is not how I would have framed it exactly at the time, would serve someone a good stead going forward? I mean, what do you need for an evolving world? And that's really sort of the hook that's directed me for a very long time.

Derek: [4:28] And this idea of using education as a lever for useful, important changes.

Stephen: [4:34] Yeah, and that would affect the individual. So it's, the thing that's nice about education is it has effects on multiple levels. That is, it not only helps individuals, which it surely does, but as a by-product, helps groups at multiple levels of scale, all the way up to the country and the world as a whole, to the extent that people see themselves as something bigger than they are. And see themselves as an actor who has agency in these different groups at different levels of skill, that's going to end up helping everybody, ultimately, at least, that's my belief.

Derek: [5:10] Yeah. Yeah. Well, there's a piece of that, a lot of that I can relate to, but it's that kind of, I don't know, the indirect effect. I think about this a lot in my work at the Center for Teaching. I'm teaching a first-year writing seminar right now, and I have 16 students. That's about all the students I'll interact with directly this academic year, but through the work in our center, we're working with a lot of educators who work with a lot of students. And so when you think about those downstream effects, they can be pretty significant actually.

Stephen: [5:39] It's almost like wholesale vs retail. I mean, it's actually good to have a toe in each just to keep you informed about what you're doing. But the wholesale scales.

Derek: [5:52] Yeah. Well, Stephen, I heard you, I think the first time I saw you in person was at Rice University back in 2014. Josh Eyler and the teaching center there was helping to organize the Delange Conference and you were one of the keynote speakers. I think I was one of the sidebar speakers at that event. But I got, I think this was right after the Minerva Schools had launched. And in your talk, you talked about the Minerva Schools and the ways that they were using lessons learned from cognitive science to shape both the curriculum and then the pedagogy to kind of what was being taught and how things were being taught.

[6:36] And I remember, I was, I've always been very interested in educational technology. That's kind of been my zone in the faculty development world. And I was amazed at the platform that Minerva had built for synchronous online learning. And now I would describe it as Zoom with some really intentionally designed tools to add on to make that kind of educational experience better for students and for teachers. And so I guess my question, I have two questions about this. One, am I right in remembering that Minerva was ahead of its time? And given your experience at Minerva and at Foundry College, what did you make of

higher education's shift to online teaching and learning last year?

Stephen: [7:21] What did I make of it?

Derek: [7:24] Yeah.

Stephen: [7:26] Well, it was driven by necessity. Neither this skill set of the instructors nor the expectations and skill sets, the students, nor the technology who is really in place to make it as successful as it could have been. And I do hope there isn't some kind of a backlash because of the initial stumbling blocks, because I think some good things have actually come out of it. People have started to realize, just like you don't want to treat, television is just the theater being filmed. And you don't want radio just be reading a book or something like that. These are different modalities. There's different strengths and weaknesses. Teaching online is its own modality and it has certain strengths and weaknesses. And I hope that part of this experience has let people realize there are some strengths. It's not all just a set of drawbacks.

Derek: [8:31] Yeah. And I do wonder, I mean, we had another moment in 2012 or so, where the Massive Open Online Courses hit higher education and got a lot of people's attention. And a lot of those courses were a bit more didactic, shall we say. And so I don't know if... We learned some useful lessons from that experience, but I don't, I'm hoping we learned different lessons from pandemic teaching.

Stephen: [9:00] So a big difference. MOOCs were asynchronous, are asynchronous. And what 79% of people who start them finish them? I mean, they're not exactly engaging, for the most part. Whereas the synchronous Zoom base say, could be other platforms. Synchronous modality really does open up avenues for engaging students in ways that just aren't possible with a standard kind of MOOC approach. And I think that is one of the main things that people have begun to learn, is in particular, the opportunity to use breakout rooms to have small group interaction. You can actually do better online than you can in live classrooms. So the question becomes, okay, what does it mean to do better?

[9:51] So how do you take advantage of this ability at the flip of a switch to have groups and they can be groups that have certain things in common or that complement each other in certain ways, you can pre-select who goes into what groups together. So how do we take advantage of that? And what do we have them do? That is in fact what I've spent a lot of time

thinking about, that one question. Take advantage of this one technological opportunity to further education.

Julaine Fowlin: [10:17] So that's a good segue into talking a little bit about your book, *Active Learning Online: Five Principles that Make Online Courses Come Alive.* Can you tell us what sparked your interest in writing this book and how did you go about selecting the five principles?

Stephen: [10:35] So the first part we've already been talking about, which I've been interested in education from a very early age. Then the pandemic and ensuing necessity to adapt online modalities. It was clear those weren't going so well. And it was also clear that even what we had with Zoom and Webex and BlueJeans, and all the rest, we had opportunity to do much much better. So that was a big motivator for the book.

[11:04] And the other motivator was I co-edited a book with the founder of Minerva, Ben Nelson, called *Building the Intentional University*. That was published in 2017. It was a four year, so retrospective, what we learned at Minerva that we thought others could use, that was the point of the book. And I wrote a chapter in there called The Science of Learning. And I had, I'm a coauthor of four textbooks in cognitive science and cognitive psychology, which has led me to read rather widely. So based on that, I had tried to distill the science of learning into a set of principles and I came up with sixteen.

[11:45] Now sixteen was bit of a mouthful. And even though what we were doing at Minerva did in fact reflect them and they're still using them there, I gather. It occurred to me that some of them were actually special cases of other ones. Some sort of overlapped. Some were actually accommodations. They weren't even distinct in their own right. So I sat down to work through it, it took a while to come up with those five and I think those five are as good as I'm going to be able to do. I think they really do organize the literature as concisely, at least as I could.

Julaine: [12:24] Yeah, I think you did a great job and it's a really good resource for somebody who wants to just get the cognitive science of it and not just strategies. I think that really is good.

Stephen: [12:36] Thank you. Yeah, the idea was to give them the reasoning behind strategies so they can become generative. So it's not just the tenth chapter of that book has a quite a

large catalog of different kinds of active learning exercises. But that's not the idea. I don't want to just hand them and say do these. The idea is to give them a set of principles and examples of how to use the principles that would allow people then to generate their own.

Derek: [13:04] Well, on that note, can you share what the five principles are briefly, maybe a couple of examples of how they play out in practice?

Stephen: [13:10] Sure. So probably the most fundamental is what I call the "principle of deep processing." So let me ask you a question. Both of you, if you don't mind, Derek and Julaine? At the end of the day, when you're getting ready to go to sleep, do you ever reflect back on the events of the day? Think about what you did, what happened?

Derek: [13:33] Pretty much a day, yes. (Julaine laughs)

Stephen: [13:36] Okay. My kind of people. Here's the question I'm mostly interested in. What percentage of what you recall at the end of the day, do you think at the time it was happening during the day, you intentionally tried to memorize it, so you'd be able to think about a later?

Derek: [13:55] Very little.

Stephen: [13:57] So I've done this with thousands.

Derek: [14:00] I rarely find myself in a situation where I'm thinking, oh, I have to remember all these details.

Stephen: [14:05] Julaine?

Julaine: [14:06] I more focus on the meaning and impressions that it has had on me.

Stephen: [14:10] Exactly. Great. I've asked this question too many times to count now. And when I do it in big groups, I'll ask people to raise their hand if they think they intentionally tried to memorize 50% or more, no one has ever raised their hand. And then go down to 25%. It's three people so far. I'm not sure what to make of that. But then I go down to five percentage increments. And it turns out the modal number quite consistently is about 5%, which implies that about 95% of what you're remembering at the end of the day, you didn't

try to memorize. So why do you remember it?

[14:47] Well, the answer is actually quite clear. It turns out, the more you pay attention to something and think it through, the more mental processing you expand on something, the more likely it is you're going to remember it as a byproduct. So a ton of what we learn is called incidental learning. It wasn't intentional. But the cool thing is, you can intentionally use this mechanism. You can direct people. You can set up situations that lead them to pay attention and think things through, to process deeply and in fact, to learn it.

[15:28] Now, a crucial thing I just said, by the way, was pronoun, learn *it*. It really depends on what you focus them on as to what they're going to learn. So it's not as if just meaning by itself is more memorable than surface properties like how something looks or how it sounds. It really depends on what you're paying attention to and processing deeply. So from the point of view of education, you really need to have clear learning objectives. You got to start knowing what the point is. You got to start anticipating the learning outcomes, what you want them to walk away with.

[16:11] So ideally the learning objectives and learning outcomes are the same thing, ideally. But it amazes me to this day how few faculty have really crisp learning objectives defined for every session. So you want them for the course as a whole. You want those to map into units. There's got to be some structure in the course. But you also want those units to unpack, so that for every single session, you know, at the beginning of the class, what you want them to walk away with. You tell them, no mystery here. Again, you want to focus their attention. You want to foreground what's going to be important that they should process deeply. That's principle one.

Derek: [16:55] So I have to say, so it sounds like one aspect of that might be what's known as retrieval practice.

Stephen: [17:00] Oh, yeah.

Derek: [17:04] But retrieval practice to me tends to be more at the kind of that first level of Bloom's Taxonomy, right? The kind of recall, do you remember these details? Do you remember these key terms? But what you're describing is, is maybe something that can kind of run up and down the whole scale.

Stephen: [17:18] So I'm not a gigantic fan of Bloom's Taxonomy, at least the original one. I don't think you can just remember something without understanding it, for example. I don't think that trying to apply things or synthesize or be creative with them are necessarily distinct from getting deeper understanding of them. And in fact, all those things interact. It's not as if you first memorize some fact, you don't know the words. You don't really understand them. Then you understand them and then it doesn't work like that.

[17:49] So with respect to retrieval practice, for me, that's a good example of a combination of these principles. Because you're both processing deeply, but you're also setting up associations. Every time you retrieve it, you've got new context, new things you're thinking about, new ways to integrating in to what you already know. So these associations, that's another one of these principles. Associations are useful in encoding. So you can use them to chunk, associate things, send to higher-level units.

[18:22] You then, this is a famous study done by your colleague, John Bransford, actually, and Marcia Johnson, where they showed, they gave people long descriptions which didn't make much sense just by themselves. But when you got a label, you realize it was washing clothes or something like that. What that label did was not only help you organize into chunks, but also, I think more importantly, tap into what you already know. So about washing clothes, for example, which can help you organize it, but also help you integrate all that material into what you already know. So associations are useful for encoding, for integrating and then of course, retrieval cues, getting them out later, the reminders to help you.

[19:03] So a lot of these techniques that I see recommended, like retrieval practice or I think of as combinations of these underlying principles. That's why they're so powerful by the way. They're powerful precisely, because they're not just one principle. You're drawing on multiple ones.

Julaine: [19:22] That's a good...

Stephen: [19:26] That's two principles. I don't know how many you want. Go ahead. (Julaine laughs)

Derek: [19:31] So deep processing, creating associations. Briefly, what are the other three?

Stephen: [19:36] So the other principles, so we've got deep processing. We've got

associations. We got deliberate practice where the idea is to figure out what the hardest patches are for you. Typically using feedback or a model where you focus in and concentrate on getting better at the things that are harder with being careful to keep those integrated in, by the way, with the other parts of the task.

[20:01] Another example of what's often talked about as a separate technique which I nest within these five principles, is interweaving, where it's shown, if you want to learn, for example, different art styles, you're much better off mixing them up, you know, impressionistic and hyper-realistic or whatever, then doing them in blocks. And the reason for that is by mixing them up, you start to pay attention to what their differences are. That leads you to what to focus on, which feeds into this idea of focus to practice, deliberate practice.

[20:33] So you got that and you got dual coding where you've got more than one kind of channel coming in, showing and telling. You can both perceptual and then verbal is the famous Allan Paivio stuff. Then you've got chucking. So organizing material into units, typically three is a good number, maybe four, but I recommend three. But the trick is every one of those units itself can have three or four units and every one of those units to be hierarchical. So you can pack an enormous amount of information in to well-organized presentation if you chunk it hierarchically.

[21:14] So we got deep processing, deliberate practice, dual coding. All those have in common, so I'm doing chunking now. All those three have in common that they're about thinking it through, paying attention and thinking it through. So focusing on what's hard, more than one modality and so forth. The second cluster is chunking and associations, where those are about making connections. And these five principles typically work together.

Derek: [21:47] So just so I'm clear, and that was very helpful because I felt like associations and chunking do seem more similar to each other. So chunking involves kind of how you're organizing the information, the knowledge, and associations is more about the kind of contextual piece of learning that your, is there a hierarchy to associations or is that more about kind of in the moment I see this connection here?

Stephen: [22:13] Yeah, so both. So chunking is interesting because it can be done both top-down and bottom-up. So bottom-up chunking, say if someone's giving a lecture, if they pause, they can induce a boundary of a chunk. If you're doing it visually, two typical principles are similarity and proximity. So if you group things, have in common color, people will group

them. If you put them next to each other, it will tend to group them. Those are bottom-up. They're based on the stimulus properties. But you also have chunking that's done top-down based on your knowledge and that's where associations come in. So you can use what you already know to help you organize things.

[22:53] So if you look at a string of letters, KGB, IBM, CBS, whatever. If you realize those are three-letter acronyms, which is via associations, you can chunk them and make it much easier to remember. So associations, as I said, they're useful in encoding, where chunking, they work together. You use associations to do chunking, but also integration, when you now find hooks on what you already know. Things that remind you of it or variants of it.

[23:30] So for example, when I learn the name of a person I just met, I do a bunch of different techniques. One of the things I do is I'll try to remember what other Dereks I know. I happen to know Derek Bok. So I visualize Derek Bok.

Derek: [23:46] Former president of Harvard?

Stephen: [23:50] Former president of Harvard, yeah. Then I would look at this Derek, look for some features that remind me of him. Your eyebrows are kind of similar to him actually your chin. (Derek laughs) Anyway, I go through, then what I'm gonna do is associate those with him and you. So next time I see you, I'm going to scan your face. And the idea is I got retrieval cues now because I've built in to the memories, these associations to certain characteristics that will remind me when I see you, remind me of him. And I'll pull the name up. This is a series of associations that I use them in encoding. I use them to integrate the new information into what I already knew. And then I'll use them for retrieval. Associations are very, very powerful.

Derek: [24:42] Yeah, yeah. I like that and I appreciate the comparison to Derek Bok. Thanks. Well-taken. (laughs) It's funny though, because my brain starts to do similar things, right. So I know Derek Bok primarily because his name is attached to the teaching center at Harvard College. And so and I'm a teaching center director, right. So like there's not maybe a visual resemblance, but a conceptual association that one could make there as well.

Stephen: [25:12] You can do it.

Derek: [25:15] And all these things play together to help us navigate the world and make

sense of new information.

Stephen: [25:20] The really cool thing about associations for me is the more you have them, the easier it gets. There's something called the paradox of the expert where people wondered, why is it that the more you learn about something, it gets easier to learn new things rather than harder? Why aren't you filling up the space or something? And the answer is you have more hooks to hang things on, where association is sort of inviting itself to be made. So it's interesting that the conceptually rich get conceptually richer.

Julaine: [25:55] So as you were talking about the principles, you said that your aim is to be more generative. And you also mentioned that combining the principals is a way to optimize learning. But as I'm thinking about a new faculty or somebody who's not used to these principles, what are some advice that you have for them to move from learning each of the five principles to really go into the highest level where they are synthesizing it in a way where they can make those decisions of how to blend it? What strategies do you have to move them from just knowing it to that mastery level of blending those principles of optimize learning?

Stephen: [26:34] Right. Great questions. So there's this expression in Silicon Valley, which I've never particularly liked, but the sentiment is worth considering, which is to eat your own dog food. So that little book I wrote, I tried to have a lot of demonstrations and example and so on, to try to deduce active learning of the part of the reader. There is no substitute for actually doing it. So those five principles, most of them seem intuitive once you read them and read the examples. Because they're at work all the time. What I did, was just organize things and make them explicit. So I don't think learning the five principles is a challenge.

[27:14] I think the challenge is going to be how to implement them. So what I suggest is what I call learning sandwiches. So I have two types. So what I mean by learning sandwich is you'd have a short little content delivery, could be a lecture or video clip or something like that, typically about 10, 12 minutes, where it's focused on a learning objective. Then you got active learning, typically at places that I'm involved with, we do break out groups which is quite easy to do on Zoom and other platforms, where you give them something to do, like prepare for debate, produce a work product of some kind, solve some problem, get ready for role-playing, rehearse the rules, things like that.

[28:07] And then there's gotta be something at the end of active learning that then in the

third part, so it's a sandwich, you break it up and you debrief. You find out what they did and you can use something like a rubric to be able to evaluate them, typically formatively, by the way, I don't think you want a grade everybody constantly, but you want to give them feedback, part of deliberate practice. You want to give them feedback so they get better. So if you design the middle part correctly, you engage them. So you got deep processing, et cetera, et cetera. You can see how I can unpack those five principles of this. So that's a forward loaded version. It's a kind of template for how to think about it.

[28:43] There's also a backward loaded version. The best example is that I know of is Eric Mazur's peer instruction, and that's what he named it. I mean, the way they did it originally was in big lecture halls where they would give a little, they'd pick a learning objective. So say for example, you want to learn about kinetics. He's a physicist. You give him a puzzle. So you might say, okay, you've got a yard-by-yard sheet of iron. And we're going to cut a round hole six inches of diameter out of it, the middle, and we pop it out. So now we got a sheet with a round hole. Now, we heat it up so it's red hot uniformly, so I'm melting, it's really hot, uniformly heated up. Here's the question. Is that hole gonna be bigger, smaller, or the same size as it was before the sheet was heated. What do you think, Derek?

Derek: [29:41] Um, I've heard him ask this question, so I think I remember the answer, but I'm worried that I'm wrong. I'm going to let Julaine go first.

Julaine: [29:50] Oh, no. (laughs) Probably bigger. I'm thinking that, my association is wrong. I'm not a scientist. I'm thinking like heat expands. That's what I'm thinking. I'm associating that. So that's why.

Stephen: [30:09] So that is the correct answer.

Julaine: [30:12] Oh, wow! My association made me win! (they laugh)

Stephen: [30:17] But here's what's interesting about it.

Derek: [30:18] I thought it got smaller.

Stephen: [30:20] Right. So that's it. So a lot of people have the intuition that Julaine had, which is you heat them up, they get more kinetic energy, they push against each other. But some people think, well if four corners are going to be pushing and push it in and compress

the hole. Okay. The key is the idea, it's uniformly heated because the molecules right around that center have exactly the same energy as everybody else. So in order to push them in, you'd need more energy. You have to overcome theirs to push them in, you don't have it because it was uniformly heated.

[30:54] So here's the idea, though, that you give a little puzzle at the beginning. This is a backward mode of learning established. You then have a struggle. Think about it. Then you do a reveal. So the debrief, now, he uses clickers. He has people voting and you'll actually see bar graphs before and after. They get better after, by the way, typically, just the act of discussing and working it through tends to get people deeper in it. And then in the reveal, he does like a five-minute lecture. He says, yeah, you may have had this intuition that they're pushing apart. But it's something called constraint satisfaction. So it, again, you can see how the learning principles work here. That is a deep processing. And now we got feedback at the end, the associations have been set up. And we're organizing the course in terms of learning objectives. So we're chunking. And then within the first part of the learning sandwich in both cases, you've zeroed in on a learning objective, which presumably you're gonna embed in a higher order group of them, et cetera.

[32:05] So this simple little template is a way for faculty to get started. And in fact, what they can do, here's something simple. Take your lecture, you've already given. If you had a transcript of it, which you probably don't, but imagine you did, take your exam questions here, say you have a midterm and a final and circle where in a lecture you gave them the material they needed to answer. Okay, you could do this in your head. You don't actually have to do all of this, but what you'll notice is they'll be clusters on a common chunk unit. And then there'll be a pause or a section before you switch on. And they'll maybe be some extraneous stuff in there, which really doesn't have to do with the learning objectives. Well, how do you know that? Because you didn't test it. If it was really important, you probably would have tested it. So take it out, put in some active learning there. Simple. Simple heuristic.

Julaine: [33:03] I am jumping inside at what you just said because I know sometimes there's a tendency to focus on the content and not necessarily the outcomes are those transferable skills that we desire. So I super like your learning sandwich and I like that idea about taking a transcript like and looking for that alignment, so that what we intend is really what we assess and having that alignment. I love that.

Stephen: [33:30] Thank you.

Julaine: [33:31] Another thing that I really love in your book is that you talk about the role of motivation. I actually really like this quote that you have. You said, "if students don't pay attention and participate, none of the science and artistry of course design will make a difference." Could you share how online teachers can conceptualize motivation and apply this in their teaching?

Stephen: [33:53] Yeah. I'm glad that you like that chapter because it's not one of the principles. So it was after that because it's true. So the chapter is about two kinds of motivation, extrinsic and intrinsic. So intrinsic, there's a large literature showing that people like feeling competent, they like feeling autonomous. They like interacting with other people. So three main intrinsic motivators, everyone's going to share them, how you flesh those out is going to depend more on the individual.

[34:28] So what I do in that chapter is I know that with extrinsic motivation, which are reinforcers. And I hate to use this word, but that's the technical word, punishments. So a reinforcer is where after you've done something, something good happens. Now the trick is with a positive reinforcer, you get something you wanted, and with a negative reinforcer, something you didn't want is taken away. So both negative and positive reinforcers are positive, are desirable, people get confused. They think negative reinforcement is punishment.

[35:10] Punishment is about when you do something, something bad happens, okay? Which is not recommended in general by the way, it's not a good learning technique. But it is a possibility and I want to delay it out there, so people understood partly to contrast it with negative reinforcement. Because there are many instances where removing something that people don't like is really desirable. But a key is to set up your lessons so that you have incentives, which are anticipations of what's going to happen if you do certain things, the kind of reinforcement you'll get, the end consequences, which is the reinforcement or punishment.

[35:50] You want to deliberately think about that when you're doing lesson design. So for example, one of my absolute favorite pedagogical techniques is something called the jigsaw classroom. The idea is to have sequences, breakout groups. So let me just give an example, a simple, simple example just to illustrate it. So let's say we're going to do debate, simple

debate. Is life as a farmer more or less better than life as a city dweller? Something neutral here, I hope.

[36:24] So you'd have two types of groups. Let's say four people on each, which are preparing for this debate. So one type of group is prepping for the farmer pro, yeah, here are the great things about being a farmer. You know, in touch with nature more control of your destiny, no pollution, a community, whatever, go through the list. The other group is doing, preparing for why city's better, culture or cafés, whatever. Okay? So you have that's the first phase.

[36:56] They know, this is the important part, one of the important parts. They know there's going to be a second phase. So you're going to build in incentives for them to pay attention to be engaged. Because in the second phase you break them up and reassemble. This is jigsaw component. So you now create new groups that have, you can have one from each group if you wanted. So one farmer proponent and one city proponent, or maybe two. It's up to you, but the idea is you now have a debate. And now what you do is you say, okay, each side pay attention to the strongest and weakest arguments of the other side. Because I'm going to be asking about those in the next phase during debrief.

[37:35] So you notice at every stage we've set up incentives, pay attention to these trade-offs when you're preparing is phase one. Phase two, we've done the jigsaw. Pay attention to the other side because in phase three you're going to have to report them and maybe write them down and use a rubric to grade them. So you can set up activities so there are incentives and consequences which are based very solidly on behavioral science. And you can take advantage of the intrinsic pieces, knowing that people are going to feel an opportunity to be autonomous, to make choices is going to be reinforcing. Everybody's gonna feel that way, that feeling competent is something really good. In fact, a form of punishment is being made to feel incompetent by the way.

Derek: [38:26] Right. In the second round of groups, I'm the expert on city life, right? Like it's up to me to represent that perspective because I'm the one who prepared for that.

Stephen: [38:37] And you knew it was coming. The incentive was there. You knew it was coming. So you can use a lot of this behavioral science about motivation and quite a lot is now known, to structure your lesson plans in a way that will really help the students learn. And for me that, that's really what it's all about.

Julaine: [38:58] Very, very interesting. As a follow-up to that, as I was reading, and you talk about like consequences. A lot of instructors feel like the only incentive for doing or engaging students is to grade and that is good in some cases and informative and all that feedback, but recently or probably has been going on for a while, but of late, with the pandemic and everything, we have inundation of faculty feeling like they have to grade everything they put online and students having some kind of grading fatigue. So could you share a little bit more of how just thinking about motivation holistically can help us engage students without the incentive being a grade?

Stephen: [39:42] Yeah. So students want to feel competent. I mean, I really do believe that is a basic human intrinsic motivation as has been claimed and demonstrated. So you can use formative feedback. This is part of deliberate practice, right? So one of my favorite founding fathers was Benjamin Franklin, who was amazing. I strongly recommend reading various biographies of him. But one of the things he did is when he taught himself how to write well. He would read, he'd read a lot. He'd read something he thought was particularly well-written and he remembers that was well written. And afterwards, maybe a couple days later, he would try to write it down in his own words. And then he would compare what he had written to the original and noticed what was different and what he needed to improve. So that's a kind of deliberate practice.

[40:38] You can do very similar things at scale with students where you have them do some work product, say in two different groups, and then bring the groups together. At Foundry College we call this "paraphying," weirdly, I didn't make up that term. I think Beth Callaghan did, but it works. We bring them together and we give them a rubric. And we say, okay, now evaluate each other's work products and give feedback. And oh, by the way, downstream, not today, maybe not tomorrow or even next week, there's going to be either an assignment or an exam that is going to be graded that relies on your knowing this stuff. So guess what? They take it seriously and they will pay attention and process it.

Julaine: [41:31] I like that. So you're focusing on paying attention and making sure that their relevance is made clear to the learners. And so I find that motivation is almost that blended ingredients of making the five principles work. Thanks for sharing.

Stephen: [41:45] Yeah. Relevance is an interesting concept because that does vary a lot across individuals. So you don't want to make it all just about jobs. But you also don't want it to just be learning for learning's sake. So a lot of students just tune out in that case. It helps a

lot if they can understand how something will enrich their lives so they can use it in some way, even if it's not on a job, just to open their horizons in ways that can be useful to them in life going forward. So you need to expand what you mean by relevant. I think at least I do. The way I've been thinking about this.

Derek: [42:25] I'll often talk about trying to connect with students, personal or professional interests.

Stephen: [42:30] There you go.

Derek: [42:31] And sometimes it's the one and sometimes it's the other, but if they can find that connection then often they bring so much more intrinsic motivation to the study. And that can, and that energy can turn into some really amazing work by students when they do find those connections.

Stephen: [42:45] You see we can divide personal in two subcategories, I think. There's personal in a sort of idiosyncratic sense. You know, I'm interested in woodworking or chess or something relevant for that, which is kind of hard to tailor. But there's also personal in the sense of affecting your personal life, that is appreciating why art is valued and what it has to do to enrich one's life. Music, understanding how to interact with other people in ways that are smooth. That's not about a job and it's not about the fact that I like backgammon or something. It's a different kind of personal.

Derek: [43:24] It's I'm going to see my uncle at Thanksgiving and he's going to want to talk politics. (they laugh) I would like to be able to have a relationship with him and navigate that conversation.

Stephen: [43:33] That is fantastic. Yeah, things like growth mindset, stuff like that are really important. You know, you're talking emotional intelligence related stuff. I mean, it's not hard to show to people why this is really useful for them. Even in spite of the fact it would be useful on the job. But it's useful in life so you could think about is sort of a job-related knowledge and skills, personal kind of things you're interested in jobs and job knowledge skills. And then this middle category of life related knowledge and skills that will help. Again, it goes back to the very beginning of this conversation, help not only you, but help the groups you're in growing larger and larger to be more functional, effective, more gratifying, satisfying.

Derek: [44:22] Yeah. Well, I want to take us back to something we did start talking about at the start of the conversation and that's kind of the year of the pandemic. And higher education's move to remote teaching, adaptive teaching, teaching online. I guess where I want to go is I feel like some of the conversations I've been having lately are very similar to ones that I've been having throughout my career. And I think about these calls for more learner focused instruction that's informed by cognitive science, that highlights active learning.

[44:53] I think the first one that caught my eye was the 1995 Change magazine article by Barr and Tagg "From Teaching to Learning." They talked about the instructor paradigm and learner paradigm. And you know, 1995 was a while ago now. And I'm wondering if you see anything different about higher education's experience over the last year that might help them some of these calls for more active learning instruction land differently.

Stephen: [45:20] That's a really good question. I think there may be a shift that has been accelerated by the necessity of going online from a focus on inputs to more of a focus on outputs, which is very tightly related to a focus on teaching. Where the teacher thinks they go through their lecture notes and that's all they have to do. They did their responsibility to a focus on learning where it's really what did they get from it. So I think because there was so much doubt surrounding how effective this was going to be both from instructors and students. That there has been more of a shift to outcomes and trying to really document whether students are in fact learning and by the way, they appear to be.

[46:15] There was a curious set of papers that came out, that go back to something Julaine said earlier, which is that active learning sounds really good when you first hear about it, but students typically don't like it initially. And the reasons seem to be that, A, it's more work. So you may have noticed when I start asking you about the where that hole is getting larger or smaller or not. You may have gotten a little uncomfortable there for a second. And a lot of active learning requires effort. And sometimes it's in a social context. So it can be a little uncomfortable. So people initially may have some trouble with that.

[47:03] And the other is that students often don't believe they're actually learning as much. They think that writing down lecture notes is learning. Well, it turns out it's not, that active learning does vastly better than, I mean, vastly better than traditional lecture style. But also, there have been studies that show if you track during the course of the semester, they get it. That is, the students start realizing they are in fact learning more. They get comfortable with

the active learning. And it kind of works out, but it takes a while.

[47:40] So what's been advised is at the outset to tell students this, to say look we're going to do active learning. You may find it a little uncomfortable. It's going to be more work. And also you'll be around other people. So there'll be social feedback and stuff that may be initially difficult, but we're all in this boat together and our goal is to learn. And a lot of studies have shown empirically that this really is a better way to learn and you will like it increasingly as we go on, as you get comfortable with it, familiar with it. And you'll realize in fact, you really are learning more. So setting them up with that in the beginning is important, which has not been happening typically on Zoom because the faculty weren't trained to do the kind of teaching we're doing.

Derek: [48:30] Yeah. Yeah. I do like this idea though, that there had been a lot of questions about are students learning as well under these new and different conditions, which forces you to think about how you can answer a question like that, which is a useful change because I think the assumption was students were learning well under the old conditions. And now maybe we have a better kind of toolkit for actually understanding the answer to that question in both conditions.

Stephen: [48:55] Yeah, but that assumption was documented beyond warranted over and over again. I mean, books were written decades ago.

Derek: [49:08] Yeah. But I also think there's this piece where faculty were often unsure how students were receiving their teaching last year, right? Like all the usual cues I rely on seem to be gone, right? I'm not looking at students' eye contact and body language in class and assignments are weird and different now and I can't give them, quizzing is harder and all this to say that I think that it's because of that some faculty have made more efforts to understand how their students are experiencing the course. And I think that's valuable, right? Because then you start to kind of see, oh, it was it was when we did the breakout rooms on Zoom that I could have ten minutes of really good conversation with my peers. And that's very valuable to me as a student. And so that's going to motivate more faculty to take advantage of that kind of tool in the future, whether it's on Zoom or in the classroom.

Stephen: [50:01] I think you're absolutely right. But I think there's a secondary benefit that might happened, happened, which is what you just did, which was really nice. You laid out the kinds of cues they had been using before to decide if the lecture was going, was bombing

and had to slow down or retrench a little bit or speed up or whatever, all that stuff that we know from non-verbal cues and verbal cues questions that they had to raise their hand and asked. What's interesting is that there's a whole range of cues that can be automated and delivered to a professor on a dashboard in real time online that you couldn't do live.

[50:43] To my knowledge, no one's doing this yet. Although, Engagedly, that company's barking up this tree, I believe, but there are things like you know, like how much are they actually looking at the materials that show up, if they have to engage in a poll, how many of them did? What was the response time? How long before they actually did good? There's all kinds of stuff you can measure that can be put together, synthesized into composite measures that will really help faculty in ways that might actually be better. I don't know if it's a pure question, it might be better, it might not be. But the point is it's opened up a whole new way of looking at the kind of feedback that can help faculty in real time teach better.

Derek: [51:29] Yeah. Well, thank you so much Stephen, for sharing your time with us today. And we appreciate this conversation and your experience, your wisdom, and your chunking. (laughs) I felt I learned a lot here today.

Julaine: [51:42] Me too.

Stephen: [51:43] Thank you very much for your interest. I enjoyed this very much, and wish you both very well. Take care. (music)

Derek: [51:53] That was Stephen Kosslyn, chief academic officer at Foundry College, president of Active Learning Sciences, and author of *Active Learning Online*, *Five Principles that Make Online Courses Come Alive*, published by a Alinea Learning in 2020. Here's something I just learned. An Alinea is that backwards P symbol used to indicate a new paragraph. Very cool.

[52:16] Thanks to Stephen for taking the time to speak with us and for sharing so many useful ideas for teaching and learning. As I mentioned in the intro, he has a gift for communicating the ways the learning sciences can and should inform our teaching practices. I found his comments about motivating students in ways other than grades particularly interesting. I liked how he divided what I called a personal interest into things that are fun, like hobbies, and things that enrich one's life, like appreciating art or navigating hard conversations. I can see myself using that distinction in the future, both in my own teaching and in the faculty development workshops I lead.

[52:53] Thanks also to Julaine Fowlin making her debut here on Leading Lines. Didn't she do great? She joined our team at Vanderbilt in October, and she's heading up our revised Online Course Design Institute for 2021, among other projects. And she's a natural at interviewing. If you think so too, reach out to her on Twitter at @julaine_fowlin and let her know.

[53:17] Leading Lines is produced by the Vanderbilt Center for Teaching and The Jean and Alexander Heard Libraries. You can find us on Twitter @leadinglinespod and on the web at leadinglinespod.com. This episode was edited by Rhett McDaniel. Look for new episodes the first and third Monday of each month and sometimes you will find them. I'm your host, Derek Bruff. Thanks for listening and be safe. (music)