Celisa Steele (00:00):

This learning science can help you generate revenue by making sure that you're providing those well-crafted experiences, and then it's absolutely essential for impact because those well-designed learning experiences are what's going to actually help you move the needle for individual learners and, again, more broadly.

Jeff Cobb (00:20):

I'm Jeff Cobb.

Celisa Steele (00:21):

I'm Celisa Steele, and this is the Leading Learning Podcast.

Jeff Cobb (00:30):

Welcome to episode 272, the first installment in a seven-part series focused on learning science and the practical implications of the science of learning for learning businesses.

Celisa Steele (00:41):

Saying we're focusing on learning science invites the obvious but important question "What is learning science?" So let's address that question right away. The science of learning is interdisciplinary. So it's coming from a range of different traditions and areas of study, but it's all focused on better understanding how learning happens and then applying that understanding to creating and improving instructional methods, curricula, formal and informal learning environments, and more.

Jeff Cobb (01:16):

And I'll point out that, in some ways, learning science is a new field—just in the sense that I think we've become much more conscious of the science of learning in the last decade, couple of decades or so, particularly with advances in neuroscience and even in psychology. But, of course, implicitly the whole science of learning has been there for a very long time. You can go back to the Greeks on it. You can certainly go back a hundred years or so to Ebbinghaus, who we'll talk about at some point during the show today. But it has the feel of something new, and we felt we really needed to dig into it because it is so important to modern learning and being a modern learning business.

Celisa Steele (01:53):

Well, I think in part, maybe because it is interdisciplinary, it is sometimes also called "learning sciences"—sometimes it gets used in that plural. There's even an association for this, the International Society of the Learning Sciences, that was founded in 2002. It uses the plural, *sciences*. One thing to emphasize, I think, is the field's foundation in evidence-based approaches.

So the science part of the science of learning is that it relies on experiments and studies of what actually works or doesn't, what actually improves learning or doesn't. So you have researchers running controlled experiments to find out if teaching with written text only changes test results compared to teaching with text and graphics, for example.

Jeff Cobb (02:44):

And I think that evidence-based approach is probably one of the reasons that we're so fascinated with it because that's really consistent with our own bias and how we like to approach learning, how we like to approach business, probably how we like to approach life in general. There's always just a lot of intuition out there. Intuition can be a good thing, but it often proves to not be our friend. You really do have to test things and figure out what's actually going to work. We see that in marketing all the time. Organizations will build a course and put it out there because they think that that's what their learners want and that's what's going to work in the marketplace. And they only find out later that they really hadn't validated to the degree that they needed to. And that backs all the way up into creating the product itself and making sure that you're taking an approach that's going to be impactful, that's really going to create value, really going to create outcomes that are desirable for the learner. And that's what learning science gets you, is being able to do that. So go with your intuitions, obviously trust them to a certain extent, but always verify; always go for that evidence-based approach.

Celisa Steele (03:52):

And I think the rigor of the science part of learning science does mean that it can be a bit slow. Structuring studies, writing them up, getting them peer-reviewed, getting them published—all of that takes time. And then even once a study is published about, say, the role of learning objectives in a learning experience, it can be dense what's available in the literature out there. And all of that has given rise to a cadre of folks who are really devoted to translating academic research for practitioners—the designers and teachers and facilitators who are the ones who actually need to know the stuff if learning science is going to actually result in more effective products and experiences. And that cadre of research-to-practice translators includes folks like Will Thalheimer, Patti Shank, Connie Malamed, the authors of *Make It Stick: The Science of Successful Learning*, and others that we've had on the podcast in the past. And it includes folks like Ruth Colvin Clark, whom we'll talk with for this series.

Jeff Cobb (04:59):

And I'm pretty excited about that one. You were the lucky one who got to do that interview, but we've both been big fans of Ruth and her work, especially *eLearning and the Science of Instruction*, for years. I think of her as almost kind of a personal hero of sorts, which I guess just shows what a learning geek I am. Even things like her distinction, the distinction she and Richard Mayer make between inform versus perform when you're offering a training or an educational experience, and very different levels of learning you're trying to achieve there. When you're informing somebody, you're just looking for comprehension, trying to increase our knowledge a little bit. But when you really want them to be able to change their behavior and do something differently, actually be able to complete a new task that they didn't have the skill for before, that's getting to perform, and you have to approach the learning experience differently, which, of course, comes back again to learning science.

Celisa Steele (05:52):

And another one of those translators is Megan Sumeracki, and you got to talk to her for this series.

Jeff Cobb (05:59):

Yeah. I was really thrilled to be able to connect with Megan. She's somebody whose work I've followed—her and the group that she co-founded, The Learning Scientists. They're cognitive psychologists that are interested in the science of learning, and their vision is "to make scientific research on learning more accessible to students, teachers, and other educators"—certainly a vision and a mission that we support.

Celisa Steele (06:25):

And learning science has clear implications for those providing learning. And that's why we have these translators like Megan, like Ruth and Will and Patti and Connie, and many others doing this work to bridge academic research with real-world application. So for any organization offering learning, learning science is important. But it's arguably even more important for learning businesses, which is why a series on learning science was kind of a no-brainer for the Leading Learning Podcast.

Jeff Cobb (06:58):

Yeah, I think it's critical these days. There's widespread recognition now that lifelong learning is so important. Providing education and learning experiences to adult lifelong learners is obviously at the core of being in a learning business. But, to thrive in that business, you have to have impact. You have to move the dial for the learners you're serving. I mean, you can get out there and be the best marketer in the world in terms of promoting your offerings, but if you haven't from the ground up designed offerings that deliver the goods to get the learners to where they're supposed to go, then those learners aren't going to come back; their employers aren't going to come back. So everything—I think we did an episode on this at one point that we called "One Word: Impact"—that's really what it comes back to. That's what learning science helps to guarantee, and it's just so critical for learning businesses.

Jeff Cobb (07:49):

If you're looking for a partner to help you create and deliver learning experiences using tools grounded in learning science, check out our sponsor for this series.

Celisa Steele (07:58):

SelfStudy is a learning optimization technology company. Grounded in effective learning science and fueled by artificial intelligence and natural language processing, the SelfStudy platform delivers personalized content to anyone who needs to learn either on the go or at their desk. Each user is at the center of their own unique experience, focusing on what they need to learn next. For organizations, SelfStudy is a complete enterprise solution offering tools to instantly auto-create highly personalized, adaptive learning programs, the ability to fully integrate with your existing LMS or CMS, and the analytics you need to see your members, users, and content in new ways with deeper insights. SelfStudy is your partner for longitudinal assessment, continuing education, professional development, and certification. Learn more and request a demo to see SelfStudy auto-create questions based on your content at selfstudy.com.

Jeff Cobb (09:00):

We're grateful to SelfStudy for sponsoring this series on learning science, and we do encourage you to check them out at selfstudy.com

Celisa Steele (09:10):

To help convey the potential impact of learning science on learning design and the success of learning businesses and their learners, I think it could be helpful if we talked about some of the practical insights that have come from the science of learning, Jeff.

Jeff Cobb (09:24):

Yeah, examples would be really helpful. We've alluded to the benefits of applying learning science but in kind of generic terms. So, Celisa, why don't you start? What's an insight from learning science that you'd like to share?

Celisa Steele (09:38):

Well, I'm very interested in memory in general, and memory is, of course, key to learning. If we can't remember something, we can't use it, and learning is about changing behavior. We all have a limited amount of cognitive space to use to engage with and to process new information and ideas. That space, which is typically referred to as working memory, can only hold a few items at any one time. We have to design to focus learners' working memory on what's relevant and necessary to learn so the learner isn't squandering finite cognitive resources on irrelevant stuff. Now that's kind of my version of it, but I'm going to say let's pull in a true expert here. So here's Dr. Patti Shank, author of the book *Manage Memory for Deeper Learning*, and this was a conversation that was part of Leading Learning Podcast episode 213.

Patti Shank (10:36):

Memory is what John Sweller, one of the leading researchers in this field, calls human cognitive architecture, and our human cognitive architecture is how we think, how we problem solve, how we learn. It all goes through memory structures. Our memory has different parts, and each part has attributes and limitations. And the major aha here is that we have to work within the constraints and attributes of our memory parts. If we don't, we make it harder to learn, not easier. So, for example, I'll just talk about, let's say, two of the biggest ones, and one is working memory. And working memory is the part of memory which does processing of new information. The most important thing to know about working memory is it has extraordinarily limited capacity. So that's how come we get overwhelmed so easily when people are going on and on and using firehose training methods. We simply can't learn that—we *can't* learn that way. It's not that our brain doesn't prefer to learn that way; we simply cannot.

Patti Shank (11:55):

So we have to design all instruction according to the attributes and limitations of working memory, and that has huge implications. One of them is known as cognitive load. It's the major implication, and we have to design with cognitive load in mind—what overloads us, and how do we prevent that? So the other one is long-term memory, and long-term memory is what's called in the research "prior knowledge." It's what you already know and how it's organized in your brain, in your mind. So we have to design so we don't overload working memory, and then we have to develop accurate and adequate organizational structures of our long-term memory so that we can use what we know to learn and apply.

Jeff Cobb (12:54):

I think Patti's comments echo what you were saying to set it up, Celisa—that, obviously, working memory is limited. We have a limited capacity for what we can take in, and, while we do know that that learning needs to be effortful to stick—and that's something we'll talk about along the way here too—that's not the kind of effort that you want people to make. You don't want them to have to deal with overload. You want to ease that path to moving that

information, the new knowledge that they're requiring, from short-term memory, from working memory, into long-term.

Celisa Steele (13:28):

Well, and I think that it's that combination of focus and effort, right? We know that effort has to be involved in learning, but effort needs to be focused on something related to the learning goals, the learning outcomes that we're after. So an understanding of working memory, cognitive load, long-term memory, all of that has come from learning science and studies of the brain, and there are these clear implications from that insight to how we design and deliver. It points to the need to cut content to the essential and to help learners connect new content to what they already know, for example. But what about you, Jeff? What other insight from the science of learning do you want to offer here?

Jeff Cobb (14:10):

Well, I'll come back to effort again. We just mentioned that, but then combining effort and spacing is so important. And spacing for my money—and this is the idea that you don't encounter content just once, you don't practice something just once, you do it repeatedly over time with some space in between those times that you engage with or practice the content—and for my money (and I think a lot of learning scientists, learning theorists would agree with this), it's one of the most powerful ways to actually make sure that learning sticks. So I think this is a great place to bring in Peter C. Brown, who's one of the authors of what I think of is just a classic book, *Make it Stick: The Science of Successful Learning*, and hear what he has to say.

Peter C. Brown (14:57):

When we encounter something new, it's encoded in the hippocampus part of the brain, and over hours, or perhaps even days, the brain rehearses that learning and fills in gaps and moves it into long-term storage by connecting it to things that we already know. And that when you practice something over and over again it's all in short-term memory, and you do see gains, but those gains melt away—you don't perceive that they melt away. You need to give learning time to be consolidated in long-term memory, and then you need to recall it later. And when you recall it later, and it's difficult to recall, that's the effort that causes the brain to reconsolidate that learning and make the key ideas more salient, strengthen the connections to other things you know, and help you sort out the important stuff from the stuff that...leave behind the stuff that's not that important. So that's the kind of mental effort spaced out over time that helps you build mastery.

Peter C. Brown (15:56):

And what we tend to be drawn to are things like underlining, highlighting, rereading as a study strategy. Or, on the golf course, hitting that 20-foot putt over and over and over again because we see, we get this fluency from rereading, we get a fluency with a text, which isn't the same as understanding the underlying ideas or being able to explain them in your own words. On the golf course with a 20-foot putt, you actually do see improvement through this blocked, over-and-over repetitive practice. But that's what melts away, and it's when you mix up the 20-foot putt with your other golf drives and do it on other golf courses and different kinds of holes, where you take your reading material, and you pull out the key ideas and ask yourself to enumerate on them, that's when you begin to build the kind of learning that doesn't feel like mastery. It doesn't feel as good as the fluency you would get from memorizing passages or that short-term gain from practicing your putt over and over again, but it actually is what begins to build the connections in the mastery that pay off long-term.

Celisa Steele (17:00):

One of the things that stands out to me in what Peter was saying there is this idea of fluency. Fluency sounds like a good thing, right, when it comes to learning. I'm thinking of foreign languages, and the goal is fluency. But I think it's really important what he's pointing out around sometimes the fluency, it's basically false, right? That it's a very narrow understanding of the content, and it's a fluency that comes from basically a shallow understanding of it. And when you really put in the effort and really begin to try to get a learner to do an activity on her own or to put a concept into her own words, the fluency can slow down, and it won't come quite as easily, but that effort is key to learning.

Jeff Cobb (17:45):

And I think that Brenda McLaughlin who's the CEO of SelfStudy, she kind of makes a similar point in our conversations with her. Now, SelfStudy has developed a platform grounded in effective learning science. The algorithms that the SelfStudy platform is based on, these were developed at MIT's McGovern Institute for Brain Research. So they're really drawing on how the brain works. And Brenda sees a growing understanding in the market among the organizations she's working with and talking to of the benefits of some of the science-based practices that we've started talking about here.

Brenda McLaughlin (18:21):

There's a real clarity now in terms of the benefit of personalization, the benefit of spaced repetition and recall practice, in terms of enhancing retention, confidence-based learning, in term of, again, increasing retention, figuring out the relevance of people, how you're really hitting the mark and relevance.

Celisa Steele (18:40):

The interesting thing is that a lot of the big takeaways from learning science aren't new discoveries. They're not breaking news. Personalization, spacing and repetition, effort, the role of memory, none of that's new. The Ebbinghaus forgetting curve, which shows that we forget a tremendous amount—in fact, the vast majority of what we "learn"—and we forget it quite quickly too, but that's not new. I mean, Ebbinghaus posited his curve in the 1880s.

Jeff Cobb (19:10):

Yeah, it's pretty remarkable. He was, I think sort of the ultimate *n* of one. He did all of this experimentation on himself, and I won't go through the ins and outs of how he did it, but it was clever, and he really came up with pretty solid if not absolute proof, very strong indication of how human memory works. And, really, what he showed back in the 1880s still holds true today. It varies from person to person, and people out there who will definitely dispute the accuracy of the curve overall, but the general concept that forgetting just happens so quickly, which means that learning really isn't sticking, that's quite old at this point. Now, our understanding, of course, is deepening now, and it's becoming more nuanced. And I think really that the pandemic was a sort of petri dish in this past year because we had to scramble so quickly to get online and figure out how to make learning effective in an environment that many organizations hadn't focused on as much as they should have before.

Celisa Steele (20:17):

Learning science plays a direct role in a learning business's portfolio of products.

Jeff Cobb (20:23):

And portfolio is one of the five domains that we identified in the Learning Business Maturity Model, which is really a tool for assessing your maturity as a learning business, focusing in on what stage of maturity you're in and then the five domains that you need to focus on and build your knowledge and skills in if you're going to be a fully mature learning business. And those domains were portfolio (which we just mentioned), capacity, marketing, strategy, and leadership. So having a good understanding of learning science obviously plays into portfolio overall; it also plays into a learning business's capacity. So having staff and technology that understands and makes use of learning science is just incredibly important. And good learning science will also help with marketing—you're really tuned into creating the right products that are going to serve your learners' needs and ensure that you're going to have customers for those products. And it can—and arguably should—factor into a learning business's strategy. And then, of course, having leadership tuned in is key as well. But still, the most direct role in that Learning Business Maturity Model for learning science is really in that domain of portfolio.

Celisa Steele (21:41):

In this series, we want to look at some of the key aspects of learning science. And we're going to pull in other experts and draw on conversations so we're making sure we have a broad perspective on these areas. But we're going to focus on five of them. First, behavioral and cognitive psychology. Second, needs assessment. Third, content. Fourth, feedback and practice. And fifth, evaluation.

Jeff Cobb (22:08):

So, if we give each of those a little bit of a gloss, the behavioral and cognitive psychology, those are really the underpinnings of learning science. You have to understand human behavior, human cognition, to really get at learning science and what's going to work with learning science. And, of course, this is the kind of thing that your staff does have to understand. We go back to the maturity model and capacity, making sure you've got a grip on that.

Celisa Steele (22:31):

And I think, just as an example, when we were talking about working memory, that's very clearly the kind of information and insight into how we learn that comes from cognitive psychology.

Jeff Cobb (22:43):

Definitely, definitely. And, of course, neuroscience is underlying all of that as well, combining with those behavioral and cognitive psychology elements. So that's the first one we're going to focus on. Second is needs assessment. And, when we're talking about needs assessment, we're definitely talking about learner needs. So what are the outcomes that you need to be able to create for your learners to serve the needs that they have and in work in life? We're also talking about the market too, though. And then those completely overlap. You need to make sure that you understand how your learners perceive their needs and therefore how they're going to perceive your products and make sure that you're developing the right products and positioning them in the right way in the market. And then, third, content. This is, of course, the sort of stuff of the learning experience. What is a learner going to engage with, what does that look like, how are they going to engage, and how does learning science need to inform that to, again, make sure that it's ultimately going to stick and have impact?

Celisa Steele (23:41):

And then, fourth, we want to talk about feedback and practice. And, in our experience, this is an area that can often get short shrift in terms of what a learning business is thinking about. It can be all too easy to really focus on content—what you were just talking about, Jeff—and sort of assume that the feedback and the practice is going to happen after the learning experience, once you're back on the job. But it can be really, really effective and valuable to make sure that feedback and practice are built into learning opportunities that you offer. So we want to spend some time talking about that. And then, fifth and finally, we want to look at evaluation because this is really where you can dig in and see what's the impact of the learning experiences that you're offering. What is it like for the individual learners? What's changing in their behavior or their life as a result? What's changing in their employers? And then what's the impact on the overall field or profession that you're serving? So really making sure that you're looking at evaluation both to see that impact in kind of a historical way, in terms of what have you achieved, but I think also with that forward-facing lens as well. Based on what you know about what has worked, what can you do in the future that's going to be even more effective and even better?

Jeff Cobb (25:05):

And, of course, all of this is important in general. But getting it right is really at the core of being an effective learning business, being a learning business that's going to be able to not just survive but thrive in the current world because people need help. I mean, everything we hear about upskilling, reskilling, employers looking to fill talent gaps—there is a need for what learning businesses offer. But if you haven't paid attention to these areas, it's just going to be luck if you end up creating the products, the experiences that are really going to resonate with your audience and really create the outcomes that are going to keep them coming back.

Celisa Steele (25:44):

And help you stand out in a crowded marketplace. We've talked about many times in the past, and it's still true, that the barriers to entry to this market in terms of providing professional development, lifelong learning, continuing education, those barriers have just gotten lower and easier. So a real focus on making a high-quality, highly effective, highly efficient learning offering, that's going to just help you stand out and make you, as you said, not just survive but thrive as a learning business in this space. And we've focused on impact and how important learning science is for impact. It also helps with a learning business's two other main thrusts. Usually, you're about improving reach, revenue, and impact, as we like to talk about. So having learning science back up what you're developing—so it's especially that needs assessment piece that we're talking about, that's about reaching the right people and providing what they need. This learning science can help you generate revenue by making sure that you're providing those well-crafted experiences. And then it's absolutely essential for impact because those well-designed learning experiences are what's going to actually help you move the needle for individual learners and, again, more broadly.

Jeff Cobb (26:59):

And we've been talking a lot recently about ecosystem and the idea of learning businesses really operating within an overall ecosystem. And learning science is really essential there too. We talk about ecosystem being made up of content, of people, and of technology and then the strategies and processes that surround those. And we've already talked a little bit about how important learning science is to content, obviously in getting the content right. It's also incredibly important to people, meaning your staff, meaning your subject matter experts, the people who are crafting the content. But we'll also emphasize that it's so important in technology because the platform providers that are serving learning businesses, they have to get

it. They also have to understand the learning science and make sure that they are creating platforms that are helping learning businesses, helping learners leverage learning science to the absolute highest extent possible. So every learning business should be paying attention to signals that their learning technology partners are also paying attention and implementing learning science in the software and the platforms that they're providing.

Celisa Steele (28:15):

A wealth of resources exist for keeping up with evidence-based practice. We're going to share some specific resources over the course of the series. But to avoid overwhelming you with the riches, we're going to highlight just two now. First, if you're looking for a more in-depth resource, we highly suggest *Make It Stick*. And, of course, we heard a snippet from one of the coauthors earlier in this episode, and, in fact, Peter Brown, who we heard from, he's one of three coauthors of that book, and he's really not the neuroscientist. He was brought in to really play that translation role very directly. So the other two coauthors are much more grounded in the science side of things and conducting the studies, and Peter's role really was helping to make that as easy for a lay person to understand as possible. But, in general, that is a great book that really covers a broad range of different approaches to learning, what's effective, gets a little bit into the science behind it, but really highlights what's effective and what's not. So it's a great resource, highly recommend that book.

Jeff Cobb (29:23):

And I thought that was just such a great move to have Peter involved with that book as a storyteller because, like you said, he made that book a lot more accessible than it probably would have been otherwise, probably made it a lot more popular than it would have been otherwise. And I don't know the data on it, but I suspect that that book has had more impact on people having some understanding of learning science than just about anything else out there at this point. It's certainly got to be up there in the top resources. So even if you've read it before, I plan to go back to it. It's one of my all-time classic favorites, and I'm definitely going to be rereading it again very soon.

Jeff Cobb (29:57):

For a quicker-hits resource, though, and one that's freely and immediately available and is very much in tune with keeping the learning science accessible—it's at the heart of their mission—and that's The Learning Scientists, who we've already mentioned before. Good materials on The Learning Scientists. You can check the show notes for this episode at leadinglearning.com/episode272 for a link to a page that outlines six strategies for effective learning on The Learning Scientists.

Celisa Steele (30:30):

So if nothing else, take a look at that page; find out what the six strategies are. But they also have resources if you want to dig deeper on one or more of those strategies. So you can decide if you want to dig in more on one, two, three, all six of them, but they have slides that explain those and other resources that you can then reuse yourself to the extent that you find them useful.

Jeff Cobb (30:54):

And, of course, we're going to be talking to Megan in the very next episode.

Celisa Steele (30:57):

And as you're looking at those six strategies, we encourage you to think about which one or ones your learning business might benefit from using more. So, again, you can find show notes at leadinglearning.com/episode272. There you'll find the link to those six strategies on The Learning Scientists site, along with a transcript of this episode and other resources.

Jeff Cobb (31:20):

At leadinglearning.com/episode272, you'll also see options for subscribing to the podcast, and, to make sure you don't miss the remaining episodes in this series, including that upcoming one with Megan from The Learning Scientists, we encourage you to subscribe. And subscribing also helps us get some data on the impact of the podcast and helps us evaluate how we're doing.

Celisa Steele (31:41):

That's right. Impact is as important for podcasting as it is for learning. We'd also be grateful if you would take a minute to rate us on Apple Podcasts. Jeff and I personally appreciate it, and reviews and ratings help the podcast show up when people search for content on leading a learning business. Go to leadinglearning.com/apple, to leave a review and rating.

Jeff Cobb (32:02):

Lastly, please spread the word about Leading Learning. In the show notes at leadinglearning.com/episode272, you'll find links to us on Twitter, LinkedIn, and Facebook.

Celisa Steele (32:13):

Thanks again, and see you next time on the Leading Learning Podcast.

[music for this episode by DanoSongs, www.danosongs.com]