Redux: Designing Content Scientifically with Ruth Colvin Clark

Leading Learning Podcast Transcript for Episode 441

Ruth Colvin Clark: [00:00:00] I always would recommend you err on the side of having shorter amounts of content or slides or screens in a topic. I myself, even in my pleasure reading, I'm more and more drawn to books that have short chapters. I just find it a whole lot easier and more enjoyable to read and review it. I think in learning, when you have relatively short little topics, you feel a sense of achievement, and you don't feel so overwhelmed by long, lengthy lessons.

Celisa Steele: [00:00:33] I'm Celisa Steele.

Jeff Cobb: [00:00:34] I'm Jeff Cobb, and this is the Leading Learning Podcast.

Jeff Cobb: [00:00:43] Understanding learning theory and putting that theory into practice is fundamental if a learning business is to create courses and other offerings that result in positive change and impact. This episode, number 441, features a conversation with instructional psychologist Dr. Ruth Colvin Clark.

Jeff Cobb: [00:01:01] This is an encore airing of an interview from our archives. Ruth has spent her career translating academic research into practical guidelines and advocating for the use of evidence-backed approaches. She's the author of many articles and books, including *Evidence-Based Training Methods* and *E-learning and the Science of Instruction*, both of which we highly recommend.

Jeff Cobb: [00:01:25] Celisa and I had followed and appreciated Ruth's practical writing for years, so it was a true pleasure to have her on the Leading Learning Podcast. Celisa and Ruth originally spoke in May 2021, as part of a series we did on learning science for learning businesses. Their conversation starts with Ruth sharing about her background in science and how that shaped her approach to adult learning.

Ruth Colvin Clark: [00:01:57] As an undergraduate and master's, I was in the sciences—chemistry and biology—so science has always been a particular interest of mine. As I migrated into the learning domain, the role I gradually adopted was that of a translator. What I do is review research articles, research presentations, usually from an academic—professors and researchers—and then I translate those through books and through workshops into practical guidelines, particularly applicable for adult learning.

Celisa Steele: [00:02:33] That has been a big focus of you taking that research around learning and then making sure that it's translated and available to practitioners to apply. How do you explain or describe the value of evidence-based practice?

Ruth Colvin Clark: [00:02:51] In workforce learning, we're investing a lot of money in learning events. The largest part typically involves the staff time that they devote to learning events, and everybody's very busy. Whatever limited time you have to deliver training events, you want to maximize the value of that training. And I think one of the best guidelines then is to draw on instructional methods that have actually been empirically researched and proven. That, I think, is the main value—to get a return on investment.

Celisa Steele: [00:03:37] That return on investment really speaks to the organizational value, that they're spending these dollars, they're making staff available, they're allowing the learners this time to learn. Do you also see, or how would you describe the value for the learners themselves in being able to engage in something that is developed according to evidence-based practices?

Ruth Colvin Clark: [00:04:00] I agree. Learners can get a lot more value from a well-designed and empirically based set of instructional methods. They may or may not appreciate it at the time, but often, in traditional types of training, we have lots of long lectures, and the learners are very passive. I think learners will get much more engaged by using the appropriate instructional methods.

Celisa Steele: [00:04:27] Do you see more practitioners making sure that their decisions and their designs are backed up by solid research than, say, a decade or even two decades ago?

Ruth Colvin Clark: [00:04:38] Yes, I go back several decades, so it's a good question. The answer is yes and no. One of the things that happened in the '90s was the emergence of evidence-based medicine, and, as the off-spin of that, practitioners in the allied health sciences—in the training part of it and in medical schools—began to attend a lot more to evidence-based learning. I think that gave us a boost, at least in that professional arena. However, at the same time, in many

cases, training organizations have high turnover. And, in many cases, they have limited numbers of professional guidance. By professional, I mean people who have master's or doctorate degrees or extensive experience in instructional design and instructional psychology. In some ways we've moved forward, but we still, I think, have large gaps and probably an ongoing challenge with promoting and disseminating the concepts of evidence-based learning.

Celisa Steele: [00:05:44] How do you personally keep up with new research and developments in learning science and then the implications of that learning science and those new developments on learning design?

Ruth Colvin Clark: [00:05:55] This is one of the things that I really enjoy doing. I have a list of about 10 to 12 journals. These are mostly academic journals that publish fundamental research. I check through these journals every month, look at their table of contents, and I have maybe 20 themes that I particularly monitor—for example, the best use of graphics or evidence-based techniques for engagement. So I file those, and then, when I get ready to prepare a chapter or a book, I can draw on those. I will say this takes quite a bit of time, and I think most practitioners don't have time to look up and read original academic research. I'm hoping to fill a gap there by doing that reading for learners and summarizing that information.

Celisa Steele: [00:06:51] It is a great service. I know, from having spent time with some of your writing, just how useful it is to have you pull together from these various sources the evidence and then spell out the implications of that. Maybe you are already getting at this by saying that a lot of folks don't necessarily have the time to do what you're doing in terms of keeping tabs on these different journals and checking in monthly and reading and figuring out the implications of that—that can be hard—but do you have advice for learning businesses that are looking to stay on top of learning science and learning-related research? Any tips for how to do that effectively and efficiently?

Ruth Colvin Clark: [00:07:33] There are some organizations like yours that their business is about making these kinds of translations. Some of the professional societies, like ISPI [the International Society for Performance Improvement] and also one I'm involved in recently, Learning Development Accelerator, have publications, Web sites, conferences (online and in-person) that try to translate this research into practical guidelines and illustrations for practitioners. I would advise people to take a look at books and online conferences, Web sites, discussion forums on LinkedIn that are grounded with evidence-based practice.

Celisa Steele: [00:08:15] I'm most familiar with the book that you co-authored with Richard Mayer, *E-learning and the Science of Instruction*. As that title suggests, it really focuses on the mode of e-learning. How different is it to design effective learning for different modes? What are the salient differences when designing for e-learning versus classroom instruction, for example?

Ruth Colvin Clark: [00:08:40] That's a great question about how best to exploit the features, or what we call affordances, of different media. The good news is there is a common body of research that, whether you're in the classroom or whether you are designing for e-learning, you want to apply those guidelines. But, as far as differences, one of the main things in e-learning is the difference in learner control. If you are in asynchronous e-learning, you have the opportunity to go at your own pace, to go back and review something else compared to, in the classroom, typically, you're going along at the instructor's pace, not necessarily your own. That's a major thing to keep in mind with e-learning: the learner control aspect.

Ruth Colvin Clark: [00:09:34] Also, in technology, you have an opportunity. Perhaps it's a little easier to do things like simulations. One of the latest things now is immersive virtual reality and those kinds of things. So I think you have some opportunities in e-learning. But the classroom also has great opportunities as far as social presence. You have individual people there, and you can get them engaged both with one another and also with yourself. I think all media have strengths and weaknesses, and perhaps sometimes the best solution is a blended solution, where you combine some asynchronous e-learning with synchronous classroom-led training.

Celisa Steele: [00:10:20] To pick up on what you were just saying there, that all these media have different strengths and weaknesses, I'm going to ask a direct question. I'm pretty sure I know the answer too. Is there a gold standard in terms of mode? If you have the choice, always go with X, whether that's classroom or e-learning or some other mode.

Ruth Colvin Clark: [00:10:43] It's interesting, having tracked this. Some professional organizations have published for probably 20 or 30 years, more like 20, the proportion of use of e-learning versus classroom. I had some colleagues way back who said, "Oh, e-learning is going to overshadow everything, and classroom instruction is going to go away." Well, that has not turned out to be the case. Some of the more recent data I've seen shows, yes, e-learning has steadily grown in terms of the proportion of its use, but there are certainly also examples of classroom training. So what we try to do is blend the best of all worlds and involve classroom as well as e-learning. By the way, when we say classroom, it doesn't always have to be the physical classroom; we have technology now for the virtual classrooms too.

Celisa Steele: [00:11:39] Right. It's an excellent point that these modes begin to blur as well as potentially the intentional blending. But it is interesting as technology makes more possible—and we've certainly seen that over the last year or so as more people have been forced or had the opportunity to engage in doing more online.

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Celisa Steele: [00:12:39] I would love to dig into some of the research-based principles that you promote. Would you tell us about the coherence principle? And then, if you have them, I'd love to hear any suggestions for how to avoid the pitfall of adding extra material.

Ruth Colvin Clark: [00:12:57] Coherence is a really important guideline, well researched. Basically, a lot of times, the information, the skills, the knowledge that we are charged with is not the most stimulating or exciting, and yet we're all used to being immersed in high-intensity media, games, simulations of different kinds, and so it's tempting to try to spice up or elaborate on your content. A couple of often misused techniques might be graphics. Often a simpler graphic is better, easier to produce, and also more effective instructionally compared to a high-end graphical interface. Another one is stories. Stories are wonderful because they're very memorable. On the other hand, if they are not directly related to your learning outcomes, they can become distractions and actually disrupt learning. Another challenge can be with your subject matter experts, just because they know so much. Often, they want to provide everything there is to know about a certain topic, and I think one role we could play as instructional professionals is to narrow down "what do we really need to know?" versus "nice to know."

Celisa Steele: [00:14:13] You mentioned the subject matter experts, that they can have that tendency to share everything that they know, and so then the work as the instructional designer is to help focus that and figure out what is relevant. Do you have any suggestions for how to work with subject matter experts to really whittle away the nonessential and get to the core content?

Ruth Colvin Clark: [00:14:44] It's always a challenge, and it probably hasn't changed that much, but you can have a radar out. For example, a lot of times they love war stories. War stories can be great, but if you have hammered out a mutual understanding of "Here's the learning objective; here's what we want to achieve," then you can say, "Okay, is this story really relevant to that, or is it a tangent type of thing?" Also, you can have groups of people who review the material, and typically, you have a certain amount of time, and you yourself, as an editor, can go through and cut out extraneous materials, given the challenges of time, and given that most learners are going to want to accomplish what they need to accomplish in the most efficient way possible.

Celisa Steele: [00:15:29] I'd love to hear you talk about the redundancy principle. I feel like we hear often that repetition is the mother of all learning, and redundancy could be seen as a kind of repetition. So what's the danger in redundancy?

Ruth Colvin Clark: [00:15:48] Let me begin by being very specific about what the research has shown and what we mean when we say the redundancy principle. That principle actually refers to a situation where you have a screen or a slide that has a graphic of moderate to high complexity. And then you need to explain that graphic—you could use text on the slide or on the screen. You can have audio narration of that text. And redundancy, which is to be avoided, is a situation. You've probably all experienced it. I've seen it on TV, where there's a whole lot of text, and then the audio or the narrator narrates exactly those sentences—that's what's known as redundancy. I think that's a little different from redundancy in which you're trying to review and work in earlier threads into later portions of your course.

Ruth Colvin Clark: [00:16:46] So this is specifically redundancy in terms of the modes of audio, text, and visual. And the reason for it is, if you have a graphic of moderate or high complexity that's going into the visual center of your brain, and then you also are having on-screen text that's also competing with that limited visual resource, you can also be out of sync. I know, when people are reading things on a screen to me, I can read it myself a lot faster. And yet, often, as instructors, we feel, "Oh, I've got to say something, so I have to read this to people." It actually overloads the visual center of the brain, and it's a disruption, in that, it can be out of sync with what the person's natural reading rate is. So that's a more specific guideline about the redundancy principle.

Celisa Steele: [00:17:38] I think that's very helpful. Part of what you're talking about there is, if we have redundant content, at the same time this audio and the visual happening, it's a greater cognitive load, a higher cognitive load.

Ruth Colvin Clark: [00:17:55] Exactly.

Celisa Steele: [00:17:56] I feel like chunking—which I think fits with your segmenting principle here—gets a lot of lip service, but I'm also not sure that people really understand how to chunk. I would be interested to hear what advice you have for how to effectively segment learning.

Ruth Colvin Clark: [00:18:16] It's a really good question. As we talked earlier, the huge advantage to asynchronous e-learning is, if you keep each of your content points or slides or your topics relatively brief, then learners can control their own pace. In those situations, learners themselves can segment what you have provided. I think it's much more demanding and difficult in something that is more instructor-paced, such as a video, a classroom, or [a] virtual classroom environment. One thing to keep in mind is your target audience. If you have relatively experienced learners—by that I mean experienced in the content and the domain that you're talking about—then this whole chunking principle is not quite so crucial because they themselves can manage greater amounts of instructional content. But particularly, when you have novice learners, you want to employ a variety of techniques.

Ruth Colvin Clark: [00:19:20] For example, using a lot of white space. Even on a page or on a screen, you don't need to write sentences; maybe you can just put one or two words there and use your narration to elaborate on it. Your graphics—you could maybe do a build. If it's a complex graphic, you'll build it up gradually, either on the screen or on the slide. Those are the main things. In general, it's really hard to know is this exactly segmented correctly? And it probably isn't for each individual. But I always would recommend err on the side of having shorter amounts of content or slides or screens in a topic. I myself, even in my pleasure reading, I'm more and more drawn to books that have short chapters. I just find it a whole lot easier and more enjoyable to read and review it. I think in learning, when you have relatively short little topics, you feel a sense of achievement, and you don't feel so overwhelmed by long, lengthy lessons.

Celisa Steele: [00:20:19] Outlining and segmenting—are those related concepts getting clear on the content you're covering? And, if you organize it, is that going to help you as you segment it, or is it something different than that outlining process, in your mind?

Ruth Colvin Clark: [00:20:34] Outlining is one very powerful tool, and it's a good place to start because it's a relatively straightforward technique. You can do it mostly with text and then begin to get clear: "First, we have our learning objective. Now here's our content. Now let's

outline how we're going to break this down into modules and then modules into lessons." It's a useful tool. Another useful tool can be storyboarding. So maybe the outline first, and then you start to sketch out some storyboards where you're going to show your graphic and your content—high level first, and then breaking out more detail.

Celisa Steele: [00:21:12] One of the things I really appreciate about *E-learning and the Science of Instruction* is that you can look at the table of contents, and it serves as a review session. You're looking back at the topics and then the subtopics, and it's bringing it all back to mind. So I really appreciate that.

Ruth Colvin Clark: [00:21:27] And that was actually an evidence-based technique. So they've shown, if you start a lesson or a chapter quickly, with a quick little outline or "Here are some major topics," it serves as an advance organizer, and it helps with the reading or the learning process.

Celisa Steele: [00:21:44] We've touched on several different aspects of effective learning, but, if I asked you to pick just one, what aspect of effective learning do you wish was more broadly understood and supported by those designing and providing learning to adults?

Ruth Colvin Clark: [00:22:03] One of the major understandings that help us would be to appreciate the limits and the strengths of working memory. We have the two memories: the working memory, which is very limited in its capacity but very powerful in its processing ability, and we have the long-term memory, which is where we store a lot of the knowledge and skills that we've acquired. By leveraging these two memories effectively, that will lead us through a lot of the instructional techniques that we have discussed. For example, we talked about managing cognitive load through the coherence principle. We talked also about promoting engagement. With engagement, you're actually forcing the working memory to process that information in a job-relevant way and then getting the feedback on it so that you can then correct or improve your responses or say, "Hey, that's okay; I really got that information." So I think understanding the fundamentals of the mental processes involved in learning and how we accommodate those would be a useful design understanding.

Celisa Steele: [00:23:16] Is there anything else that comes to mind that you haven't had a chance to say, that you'd like to share?

Ruth Colvin Clark: [00:23:21] Thank you. I think that you're taking the time here to promote evidence-based practice. The more we can all do that and engage in that, the better off we, as a

profession, will be, and we will continue to grow. The other thing I will say, in general, research evolves. Some of the things you and I talked about today—for example, the redundancy principle or the coherence principle—those are going to change as we get additional research. We've all been through a very interesting year with the COVID virus, and seeing how research has changed—sometimes quite rapidly over time—recommendations and guidelines for people. And that's true in our field as well. So I think it's an evolving area, and hopefully we'll continue to have people like yourselves who will be disseminating that information for practitioners.

Jeff Cobb: [00:24:22] Dr. Ruth Colvin Clark is an instructional psychologist and author of many articles and books about evidence-based approaches to learning, including *Evidence-Based Training Methods* and *E-learning and the Science of Instruction*.

Celisa Steele: [00:24:35] In the show notes at leadinglearning.com/episode441, you'll see options for subscribing to the podcast. Jeff and I would be grateful if you would subscribe if you haven't yet, as subscriptions give us some insight into the impact of the podcast.

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Jeff Cobb: [00:25:20] Thanks again, and see you next time on the Leading Learning Podcast.

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