

## Learning to Live with Complexity

MS: **[00:00]** I think at a theoretical level, a next step that is really challenging is to try to take these powerful knowledge activities and try to determine the extent to which we could come up with more powerful explanations for how classrooms might operate that would take some of the fear out of what has been I think forever the step-wise, linear progression of—of education. It's really a decomposition strategy that says we determine what's the top skill, then we decompose it down to its steps, and then we get students to—to go through those steps, be it the curriculum, we assess their ability. So it's a kind of linear, sequential model of—of skill development.

We've been starting to tackle the issue of beyond 21<sup>st</sup> century skills because this—this notion that everything is defined as a skill that can be sequenced and you can move through this linear series of steps, it's just not how knowledge creation or self-organizing systems work. Marvelous things come out of more opportunistic ways of working with ideas. Complexity is just in our lives. It's in our century and learning to live with complexity and understand and like complexity are really important. It's where you get the emergence of new competencies.

So I think the 21<sup>st</sup> century skills movement quite perceived the need for new kinds of work in education. I think the trouble is that it has tended to take the traditional course for how to do that by defining the skills, setting out the assessments, setting out the curriculum, so we have a curriculum of creativity, and brainstorming activities are part of that. Pedagogically, we've been saying let's get students to create knowledge by creating knowledge, you know, instead of the brainstorming tasks that are somehow going to be sequenced to something beyond brains—brainstorming.

So, conceptually, really trying to tackle this historically how education has been designed, and trying to use— trying to understand self-organizing systems, emergence, complexity theory; these are new tools we have, new theoretical tools.

At a pedagogical level, I believe our next big challenge is to create design communities on a scale where working—teacher-researcher communities have been recognized for a while. What—what we keep realizing is that the inventions go on in lots of places in society. We've got to link those internationally in order to get—it's a global issue. It's a global challenge and we've got to get more globally distributed communities. But teachers invent non-stop. We just haven't had a way to get those inventions up front.

For us, of course, we're very lucky. We happen to work with both teachers and engineers, and I think getting beyond teacher-researcher to teacher, researcher, engineer, policymakers. That is we're all a community and if a school fails, we have all failed. It's not a teacher who failed. Like, if we care about this, then—then we're just all in this together.

And so, I think the practicing, we need better ways of creating network communities where inventions can be studied. They—they themselves can be improved. We can bring our research tools. The data that we're creating is so rich. Education has never had data like this before. I mean, you know, students' discourse over the years, longitudinal data, it—it's amazing data, but we've got to use it in a way—learning analytics is all the rage now in education, but we tend to then say, "Oh, we can analyze where **[05:00]** this student is and we can tell them where to move next and where to move next."

So it's taking a powerful new tool and it's superimposing this sequential, linear, predetermined skills and marching you up the steps. Trying to figure out what are the knowledge practices that would turn the power of those tools over to students. So there are—there are agents, there are inventors, and so getting the power of our technology turned over to the students. Understand—so understanding the knowledge practices, and then I would say I think the next steps of designing the technology are really—they're exciting but they're really large.

If you think 30—I think—so 30 years ago, 1983, is when we put the first environment in a classroom, and we're really trying with the build on, the way we arrayed the notes, to get past the structure that's common in our discourse environments educationally, which is I say something, reply, reply, reply. It's the way email works. It's where, 30 years later, we still do that. It's—it's not powerful discourse. The data out there suggests that if you use these threaded chains of ideas, the most powerful idea tends to be the first. They tend to get weaker as the discourse goes on. It tends to be that down those chains of discourse, if you could take two ideas from those different chains and rise above, you'll get more powerful discourse. Our environments aren't built to allow that. They're all in one reply sequence, another reply sequence. They—they make it hard to do the powerful operations. There's technically no reason for this.

It's really—I think educators—well, I shouldn't say just educators: it's not clear what the alternative models would be. For us, if you stay true to a notion of, "So what do knowledge creators do? What's their discourse like?" You'll get the secrets and I think we have—I mean, we broke—we broke with the tradition of threaded discourse, but what gets me is that it's not so evident to people by just seeing different kinds of discourse how we get more powerful discourse.

So I think we ourselves have got to get more powerful. We have looser structures of ideas. We have ideas that can grow. But I think we have to show ideas rising in ways the kids can get excited, they can see their idea connected with somebody in Malaysia or somebody in Nairobi. Like, they—they get to see what's happening with their ideas. They get to see ideas rising to new heights, connecting and breaking off and—and finding. So I think we can use our environments much, much more effectively to make that process more exciting.

One of the things about the technology we've built is because it allows a more open structure with ideas, people say, "Ah, that gets too complex. It's messy." Well, you've got to learn to deal with messiness, but we could also make it easier for people to deal with messiness, and I think we need to do that. So I think we need more—I think we need to take these discourse models. I think we have to enliven them and bring them into a more—to have students be able to work with the tools embedded, the feedback tools embedded, more successfully, so that they can take charge of the messiness in a way that—that actually shows rising ideas. Because finally when you come to simplicity out of that messiness, then you're really powerful, so we've got to tackle that and that's—that's going to be a hard design challenge.

So I would say getting more powerful discourse, extending what we've been able to do in taking the high level discourse like the theory building and take that into model building, other kinds of disciplinary work. Um, we've got to get interfaces that make the technology more transparent. So those are the—the kinds of challenges on the theoretical, pedagogical, and technological front I see.

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