SANJAY SARMA: The person who invents a new sustainable energy source or figures out how to remove plastics from the ocean-- it doesn't matter whether they have a degree or certificate. What matters is can they actually achieve it. That, I think, is what we need to keep our eye on, which is, can they solve the problem?

SARAH HANSEN: Today on *Chalk Radio,* we're sitting down with Sanjay Sarma, the Vice President for Open Learning at MIT. Sanjay wears many hats. He's a professor of mechanical engineering, a developer, writer, a parent, and, perhaps most salient for us at MIT OpenCourseWare, Sanjay is a learner. In today's episode, Sanjay talks to us about learning, from the social systems behind how we learn to the biology of how we're wired to make sense of the world around us. I'm your host, Sarah Hansen.

In August of 2020, Sanjay released his book, *Grasp: The Science Transforming How We Learn,* which he co-authored with Luke Yoquinto.

SANJAY SARMA: It's about how we learn. It's an attempt to describe how we learn with a biographical aspect to it. Some ask me, why is it called *Grasp?* Why *Grasp?* Think about it. In English, when you really get something, you call it grasping something.

I think the German word is similar. Comprehension-- it has the word "apprehend." You apprehend someone. It's grabbing. In Hindi, which is one of the languages I grew up with, you also use a similar word, which is-- I really *got* the concept. You grab it.

So what does it really mean to learn? That's what this book is about. And what is the science behind it? How does curiosity drive it? What does it mean to memorize something? What does it mean to forget something? What does it mean when you actually remember something, but you can't access it? But when you get it, once you've accessed it, it all comes flowing out. So that's what this book is about. And it tries to map it from neurons all the way to a societal level.

SARAH HANSEN: So what prompted him to write the book? For Sanjay, it was about uncovering the history of schooling and rethinking the methods we use to teach.

SANJAY SARMA: I always wondered why we ended up doing things the way we do. And it turns out that a lot of it is happenstance, and perhaps a historical accident. The impact of what we were trying to educate people about, which initially was religious books-- and eventually, it was memorizing aspects of the book, and then it was the Greek thread that wove into that, and then the Industrial Revolution, and so on.

And so the question was, if you went back to the basics, how would you teach and what would you teach? I, too, am a product of Western education principles. And I did well. But I also struggled. And so I started wondering what the science tells us about how educational systems should be designed.

So once I started researching it, I thought, oh my god, the story needs to be told. So the book started writing itself. And then I found Luke. And he shaped it with me. And that's what led to *Grasp.*

SARAH HANSEN: So what's the difference between simply picking up concepts and actually grasping them? According to Sanjay, what it often comes down to is having an actionable component to learning, not just hearing and regurgitating information, but locking it in place by physically applying it.

SANJAY SARMA: We have this assumption that the learner's mind is a sheet of paper and the professor has a pen and all the professor has to do is write on the sheet of paper and declare victory. And after 10 minutes, 15 minutes, 20 minutes, if the learner isn't paying attention, that's the learner's fault, not a teacher's fault. And that is just fundamentally wrong. And every parent knows this, by the way.

When we go to the classroom, we just ignore that truth. The fact is the learner is forming a model of the world. It's like a plant growing. You can't give the plant a lifetime's worth of water on the first day and say, you're done, and all the potassium on day 2 and all the nitrogen on day 3-- can't do that.

The plant wants water or sunlight or a particular type of fertilizer when the plant wants it. By the way, that's called precision agriculture. It's a field. But yet we do that to human beings.

I want to teach you all the math you need in the first four months. You should be done. That's not how it works. It's when you use the math that it becomes valuable. And every classroom violates it. Every class violates it. Curricula violate that principle.

What marks something as something that needs to be remembered or as valuable? Well, when you process it. So if you have a nice conversation with your child or your spouse, you remember that. But the conversation you had, quotidian conversation about something-- don't forget to pay the bill or something-- yeah, you'll remember that. But the conversation itself isn't memorable.

So engagement and purpose flag learning for the brain as being valuable. And they put it in a sequence that makes it actionable.

SARAH HANSEN: I've been working with Sanjay for many years at MIT Open Learning. And the phrase that I hear him utter most is, how does your idea scale? I wanted to take this opportunity to ask him about his focus on scaling innovations in learning.

SANJAY SARMA: There's something about learning that is a human evolutionary aspect of our existence, which is children learn, parents teach. And we keep that. So as an adult, I learn in similar ways to how I learned as a baby from my parents, as a child, as a young person.

Parenting is not scalable. There's a reason we have fewer children, but we give them full attention. So I think our biggest challenge is there are lots of people, lots of young people, lots of adults in the world that need to learn. And the challenge is, can we scale what is very hard to scale? It's sort of of the most important question. And we can only do it if we understand how people learn and understand how technology could help and how humans could help and how coaching could help.

But the scale of demand is so vast. If you want to make an impact, you've got to figure out, how do we scale this thing that is so difficult to scale? So to me, that's the existential question.

SARAH HANSEN: One of the interesting things about Sanjay is that he's helping solve this question of scalability through online learning. As Sanjay will explain in a moment, online learning cuts out many of the characteristics of traditional classroom models, such as one-way lectures and an emphasis on memorization.

SANJAY SARMA: So imagine you're in the desert and you're thirsty. If I give you a glass of water which is only half-full, you're not going to say, oh my god, it's half-empty. You're going to say it's half-full.

So for those who don't have access to learning, online education is a glass half-full. But it's still water. For those who can have residential education, online learning is quite something else. It displaces lecture time and creates room for doing all the hands-on stuff that makes education doubly wonderful-- the curiosity, the coaching, the field trips and discussions and disputation, the fun, the joy of learning, the-- what I call the magic of MIT. And online learning gets rid of the thing we waste a lot of time on, which is one-way lectures.

So to me, online learning has two very different purposes. It's a glass half-full for those who are parched for water. It's still great water. So online learning-- it is something that makes in-person education much richer, as well, by leaving time to do the hands-on stuff that today is occupied by lectures. So that's the flipped classroom.

SARAH HANSEN: Something Sanjay has helped develop at MIT is the MicroMasters program, which makes it possible for people from all over the world to earn professional and academic credentials for MIT courses they take online, credentials that can be applied toward degrees at MIT and other institutions of higher learning.

SANJAY SARMA: The MicroMasters gets rid of the winnowing function. So let me explain. So how does a master's program work? You admit someone based on letters of recommendations and scores, letters from people you probably have never met, scores from universities you haven't visited or you don't know. Admissions-- it's a winnowing function. It's based on such sparse information.

What we do with the MicroMasters is there is no admissions. All comers are welcome. It's online. The incremental cost of adding a student is very low. Come on in. Take the courses. Finish up. Take the proctored exam. It's not easy. It's difficult.

When you finish, you have a MicroMasters. And oh, by the way, if you did really well and you get into school, we'll give you a credit for it. So we've reversed the funnel. So that's what the MicroMasters is.

SARAH HANSEN: Sanjay has been on this path of making educational materials more accessible on a large scale for over 20 years. So I asked him what advice he has for other educators about how to engage with *Grasp* and how to get involved with scaling education.

SANJAY SARMA: What I suggest educators do is, first of all, write down a wish list of what they would like to do, what they would like to see in the education system, how they do it differently, and how it maps to how they taught their own kids or how they learned and how a good teacher inspired them.

I was involved a little bit in the creation of OpenCourseWare 20 years ago. And when I was doing my dynamics lectures, a colleague said, hey, can I make recordings because I'm picking up your course and I want to see how-- the approach you take to teach it? And so when I made the recordings, I called up OpenCourseWare and I said, look, if it's useful to you, I'd like to put them up, for what it's worth, because I teach dynamics differently. And one thing led to another and it just went up there.

And I actually think that to un-self-consciously just share yourself is something-- there's something liberating about it, frankly. And I recommend that others try. Just make a YouTube video of yourself doing something you love. Put it up. And I'm sure it will be of value to others.

SARAH HANSEN: Making ourselves vulnerable can lead to something of great value for others. It's something we see every day here at MIT OpenCourseWare. So we'd like to say a huge thank you to Sanjay Sarma and all of the MIT faculty who not only share their teaching materials, but also share how they teach through interviews on our website and through podcast episodes like this one.

You can find Sanjay Sarma's teaching materials on our MIT OpenCourseWare website. You can also pick up a copy of *Grasp* at your local library or bookshop. Some other books he suggests educators pair with *Grasp* are *Make It Stick* and *Peak: The Science of Expertise.* And be sure to check out Sanjay's latest book, *Workforce Education: A New Roadmap,* from MIT Press.

Thank you so much for listening. Until next time, signing off from Cambridge, Massachusetts, I'm your host, Sarah Hansen, from MIT OpenCourseWare.

Chalk Radio's producers include myself, Brett Paci and Dave Lishansky. Scriptwriting assistance from Nidhi Shastri. Show notes for this episode were written by Peter Chipman. We're funded by MIT Open Learning and supporters like you.