



## “Unlocking the Keys to a 'Limitless Mind' with Jo Boaler,” as originally aired on June 10, 2020

**Chelsea Brasted:** Hi. I'm Chelsea Brasted, and I'm the content manager for Sidecar. And I'm really excited to introduce to you today our Surge Connect Keynote Conversation. Dr. Jo Boaler is a professor of education and equity at Stanford University and the faculty director of YouCubed, an education resource that's reached more than 230 million students. She was named one of eight educators changing the face of education by the BBC, and last year, she wrote *Limitless Mind: Learn, Lead, and Live Without Barriers*, which details her six keys to unlocking your mind and empowering others to do the same.

Today, we're going to talk about these six keys and how you can learn and grow from them, and what happens when you start to push boundaries and create change. Without further ado, here's our Surge Connect Keynote Conversation with Dr. Jo Boaler.

The first question I have is a softball for you, and that's just basically tell me a little bit about why you wrote *Limitless Mind* and what prompted you to tackle the six keys in this way?

**Jo Boaler:** Well, I had written books before that were written for educators. I have a lot of math teachers in particular. My own field is mathematics that I've been working with and writing for for many years. But when I wrote my last book called *Mathematical Mindset*, so many of the readers of it said, "You have to get this out to everyone, not just us math teachers but people in other subjects, parents, people in business, in industry." And it was really the push from people reading the ideas that made me think, "Oh, I should write a book for everybody. I think these ideas really are important."

**Chelsea Brasted:** When I was reading this book... I'm actually going to start in a slightly unorthodox way maybe, and that's when something that you mentioned at the very end of your book. So I'm going to be one of those annoying people and quote you back to you. You said, "We are all susceptible to this negative and fixed thinking, but we become particularly susceptible to it when we age and start to feel that we are not as physically or mentally strong as we once were." And you quote some work here from University of North Carolina, and you mention this research

study with adults over the age of 60 that showed that aging is in part a result of our minds.

The reason I wanted to start there is because our audience is adults, and I really want to set this tone from the top of this conversation that we're all capable of change. I would love for you to talk a little bit about that bit of research and if you have anything specific to add to that idea as we are starting this conversation.

**Jo Boaler:** Mm-hmm (affirmative). Yes. I mean, the evidence we have is pretty overwhelming that anybody can learn anything at any time, and our brains are in a constant state of flux and change, not just our brains, our bodies also. And we have a lot of evidence that says what you believe about yourself will change your life, it will change your learning, it will change your physical outcomes. It really changes everything. And people used to think that brains were fixed. Some people thought they were fixed at birth. Some people thought that by the time you became adults, they were fixed. But the evidence is showing that at any age people are capable of changing their brain and doing things differently. So the studies that are done with people who are older, including those in retirement homes, are really interesting because they show that when people take on something new, it causes all this brain activity and change. And that's true of people at any age of their life.

So one of the first studies that really shocked the scientific world on brain plasticity was the study of London black cab drivers, and they found that these black cab drivers have to learn these complex spatial routes and that changed their hippocampus in their brain. And up to that point, people have not thought adults could have this really significant change.

So yeah, it's really important for people as they age because if you start to think, "I can't do things," then actually that is what will happen.

**Chelsea Brasted:** So it's like that empowering idea of in fact, I can do this is a huge part of the battle.

**Jo Boaler:** Yeah, absolutely. And I love the work of somebody I quote in the book, Anders Ericsson because he's been studying his whole life people's limits. It's like where is the actual limit of what somebody can do, and every time he goes into these studies, he finds that there are no limits and then when people become limited, it's normally because they give up and they think, "I can't do this." So really understanding that we have no limits and we can do anything is really important.

**Chelsea Brasted:** So it is the title of your book, so explain to me a little bit what is the idea of the limitless idea? What does that actually mean for our conversation?

**Jo Boaler:** Oh. In the book I write about six key pieces of information, and I really believe or I know now that if people take on these keys, it changes how they go around in the world. It changes their lives. And all of the keys are important. But taking on all of them obviously has great impact.

So the first key that I share in the book is really about this evidence we've been talking about of our brains having endless capacity to grow and change and develop. Every day we wake up, our brain is different from the day before. So that really tells me I want to be doing things with my brain during the day, increasing the connections and the strength of what I can do.

Then the second key, which is extremely important also is about how struggle is really the best time for your brain and embracing struggle, embracing times when you don't know something is really important. And I think this is very important for industry and the business world because I think a lot of people go around or go into meetings at work thinking, "I've got to act like I know everything. I have to be right all the time. I have to know what anybody asks me." Whereas that's a damaging mindset, and it's much better to model for people that you can not have knowledge and you can say, "You know, I don't know the answer to that, but I'd love to find out." I have found that many adults when they've read the research about the importance of struggle have said, "It's changed me in my life. I feel differently now about times that are difficult."

So they actually had the brain evidence that shows when you're struggling, that is the very best time for your brain. And if you're finding something easy, that's not very good for your brain. So that particular key I find very passionate about getting that idea out. You can only imagine how people learning could be impacted by that if people are freeing them from the idea that it's bad to be wrong and it's bad to make a mistake.

**Chelsea Brasted:** Yeah, especially on that key, there were several moments when I was reading the book, you were discussing some of the ways in which we instill this idea that struggle is bad in kids. So can you talk a little bit about what some of those examples are just because I think for me at least that was the thing that clicked. Like, "Oh, you're right. I've heard that so many times."

**Jo Boaler:** Yeah. I mean, in our culture, we punish mistakes in all sorts of different ways. And our school system is definitely set up like that, and it's hard for teachers now who know this new evidence because they say to their students, "We really value mistakes and struggles. It's really a good place to be." But then these tests come in where you're punished for making a mistake. So that's a conflicting message for kids, and it's a hard one.

So there's many things inside of our education system that give the message, knowing everything's really important, and not knowing things is bad. It's a sign of weakness. We know that kids when they make mistakes in lessons, think, "Oh, I don't have the right brain." And then things really go downhill after that. And then in parenting too, after all parents have this style of being very negative about mistakes that are made, but a lot are. And we grow up thinking that mistakes are bad. Struggle is bad. When actually that's probably the best time for our brains and something we really want to embrace.

**Chelsea Brasted:** Yeah. And then especially I think it ties a lot to me. I think thinking about it, to the first key about plasticity, and just that idea of, "Oh, I'm just not good at math. So I'm just not a person who's good at math. So I'm just not going to get this very easily now." I remember having those struggles, especially with physics, that was my math in this experiment.

**Jo Boaler:** Yeah. Physics was mine too. Not because of the struggle per se, although I probably did struggle. But the physics teacher thought that all the boys were good at physics and all the girls were bad at physics. That was a pretty negative experience for me.

**Chelsea Brasted:** Yeah. And I definitely want to come back to that about how this can enforce stereotypes. But we started down the pathway of discussing each of the six keys, and we stopped at number two because we found a tangent, like I'm sure we'll want to do in this conversation. So let's get to the third key. Can you explain?

**Jo Boaler:** Yeah. Third key is amazing and it is the knowledge that we have now that what you believe about yourself, your mindset, as Carol Dweck has termed it, changes your reality, and it changes it really significantly. And we have a lot of evidence of that. We know that people with a growth mindset who believe that they can learn anything actually go further. We also know that when you change people's mindsets and they can change at any time, they go on a different pathway from that point onwards, a more successful pathway.

So there's so much evidence about mindset. Occasionally I see things come out, studies, that say, "Oh, mindset doesn't work because we gave this intervention to kids and then sent them back into school." But it's more complicated than that and it doesn't work just to give kids a little one hour intervention. And it involves thinking differently about yourself. So in a classroom, the teacher needs to be reinforcing that. It's not enough just to have a little one hour intervention.

But Carol Dweck herself has changed her mind a little bit about mindset in recent years, and one of the things I talk about in the book is how she used to believe that we all had a fixed or a growth mindset. But she's come to realize that everybody has times of fixed and growth mindset thinking, and what's really important is to identify for yourself the triggers that push you into fixed mindset thinking. She shares a great example of how she was presenting to a company and telling them, "You should identify your times of fixed mindset and give them a name." And the CEO of the company said he'd named his fixed mindset Dwayne, and he said, "I know these times when Dwayne comes out, it's when we're under pressure. And I become super critical, and that's what Dwayne is like." One of the young women in the company raised her hand and said, "Yes, when your Dwayne comes out, my Iona comes rushing out and I get submissive and feel really bad."

So these are great conversations, and this is... I mean, the mindset evidence, one of the things that I'm excited about, one of the studies I talked about in my book is how when we give mindset interventions to young people, they become less aggressive. It shows really the profound nature of change when you change your mindset, and for students, when they realize that their brains are changing all the time and that their realities can change, they start to think differently of other people and they don't think, "You're a bad person; you can't change." So that makes them much more open and feelings of aggression really go away.

So really it affects so much, learning, how you live your life, and aggression. So many things.

**Chelsea Brasted:** You mention mindset intervention just there. What is that exactly?

**Jo Boaler:** So there are mindset interventions where students learn, they get a whole program where they learn about the brain and how they learn the brain is flexible in changing all the time. I do lots of mindset work with my students at Stanford and with teachers I work with, and I find that sharing the brain evidence and showing them what happens and how it can be different when you have a growth mindset is usually enough for people to start thinking differently. I know we taught some middle school students a few years ago, and I showed them the evidence I usually show people, and they were so moved by it. And I remember them saying after the first lesson, "When I looked at the graph of the kids with the growth mindset going upwards and doing better, I started to understand how I need to think differently."

What I'm really passionate about, and we have a website called YouCubed that's really all about communicating this, is if you're an educator, I think those mindset messages are so important. But we also need to change the way we teach, which gets into some of the other keys. I think this is true for employers too that we have to give these different messages, but we also have to act differently in our interactions with other people.

**Chelsea Brasted:** Yeah. I want to dive further into some of these keys, but I think we'd be doing a disservice if we don't at least explain all of them. So let's jump to the fourth one and we'll circle back.

**Jo Boaler:** The fourth one, also very interesting, is about the way our brains work and how the most effective people in the world are those who have more communication going on between different pathways. So they've actually pulled people into laboratories to look at this, and they have looked at the brains of very effective people, the people who are leaders in their fields. And they've compared their brains with regular people. And what they find is there's more communication going on in the brains of these very effective people.

So one way you can get your brain communication to happen is when we interact with ideas differently. So if I give you a math example because I spend a lot of time thinking about math. In classrooms, kids are given lots and lots of numbers. They have a very one dimensional experience with math. But if you ask somebody to... They can look at something with numbers but also draw a picture that immediately starts these different brain connections. If you ask them to speak in words what the idea is, that causes another brain connection. Physically moving is a different kind. So what we actually want is to experience any content in this multidimensional way that builds these really effective brains. So that's the fourth key.

And then the fifth one is about... It's similar, but it's about how a flexible approach is much more important than a speedy approach. Many of us have got the idea, just like that myth that struggle is bad, is there's another myth, which is that quick thinkers are somehow better and thinking quickly is better. Of course, schools value that quick thinking all the time. But if you go out into the workplace or if you go and look at a professional mathematician, what you'll find is that deep, flexible thinking is what is really important. Actually mathematicians don't work particularly quickly nor do people in workplaces.

So thinking flexibly, being able to take a problem and bring different angles to it, look at it in different ways is really important.

Then the final key, the sixth key is about the importance of connections and collaboration. And I say in the book that this is a key in its own right, but if you change in the ways the other five keys talk about, you'll start to connect differently. So connections, connecting with other people is also very good for the brain. We have a 'connections' part of our brain that is about our social interactions with other people. Somebody who can take somebody else's idea and build on it has a much stronger part... That brain area is much stronger. So we want that connection. We want people communicating, collaborating, connecting.

And in the book I talk about how we can encourage that in better ways. So for example, when I'm sitting in a work meeting and I have a team of people I work with, I think it's really important to model for people that mistakes are okay. And I also think it's important to model for people that sometimes we don't know things, and that's okay too because we can find things out. And that opens up other people, and suddenly you find the discussion is much better because people are not afraid to speak. So there's a lot in there I think about the way we communicate, whether in a team or in a school.

**Chelsea Brasted:** Yeah. I think there's a lot there. So before we jump into things, how did you pull all of the data together to develop these keys because I think there's... Especially in the book, there's just study after study after study. So how did you actually come up with these six and figure out that these were the ones that could really help them?

**Jo Boaler:** That's a great question. I mean, really it's been a journey of a lifetime in coming up with these six keys because I've been working with different keys, different aspects of this in different ways, in different places. And all of these things are things that I've talked about for a while, but it wasn't until the writing of the book that it became clear to me that there are really these six really important domains. And each of them, they build on each other, and they all have this evidence base behind them. So it was an iterative process of life and teaching and doing lots of work with people around these ideas for a number of years.

**Chelsea Brasted:** So I think one of the things that I gather from all this, is that sometimes the most impactful thing is just knowing change is possible, right?

**Jo Boaler:** Right. I feel like there's two things that go side by side, and I think we're only just beginning to understand what happens when these two things interact. One of them is knowing about change. My brain can change. I'm growing and developing all the time. And the other is the valuing of difference, different ideas, different ways of seeing things, different ways of taking a perspective. And when those two things come together, it's very powerful. So I worry a bit about when we value growth and we say to kids... We think about kids in schools for a while. Growth, you can all grow your brains. Your brains are growing all the time. But then we teach in a fixed way of one solution, one method, value one way of thinking. Those growth messages fall flat.

So I really like a perspective, whether it's in employment or school, of saying growing and changing and struggle is good, and I value different ways of looking at problems. I value different ways of thinking about things because those two things just come together really powerfully

**Chelsea Brasted:** So you've mentioned mindset a few times in this, fixed and growth mindset. Can you explain the difference between the two and how to identify where you may be on that? Especially in the context of if you name your own fixed mindset Dwayne, how do you know you're having a Dwayne moment?

**Jo Boaler:** Yeah. I think of a fixed mindset as somebody who believes that they can't do things and that they're fixed in their potential to do things. So I might feel really great about math because I've learned lots of math, but if somebody says to me, "Will you learn to play the guitar with me?" I might immediately start having fixed ideas of, "I'm not good at music. I don't think I can do that." So I think of a fixed mindset of thinking, "I have limits. I'm not good at that." And a growth mindset is somebody that's like, "I'll try anything. I believe I can do it."

So how to identify your own fixed mindset. I mean, it's interesting because we can probably all of us identify things we feel that we're not very good at and we feel really fixed about. We let those fixed ideas control what we do. Whereas if we go into those situations that we don't feel good at, we will become good at them. The

trouble is we've all grown up with the idea that there are some things you're not good at. You're not a language person. You're not an artist. And we believe that and stayed away from things for a long time.

But it's an important change. I was giving a book presentation recently and somebody stood up and said... I had two interesting people speak actually. One person came up to me and said, "I am a professor in Stanford's School of Medicine, and I teach surgeons. And I've always believed that some of them just didn't have it and that my job was to figure out who it was." And he said, "You really changed what I think." This is in a one hour presentation. "Really I should realize they can all do it if they have the right circumstances." Fantastic insight.

But then the other thing that was interesting, this person stood up and said, "I work in business, and we have always gone with the approach of people have strengths and weaknesses. And we will give jobs to people with those strengths. But you're saying that maybe we should work in areas where we're weak and that it's possible that people can do that." I said, "Yes, I am."

**Chelsea Brasted:** It's like, "You got it."

**Jo Boaler:** That's what I'm saying, yes.

**Chelsea Brasted:** You mentioned that we can have this fluid relationship with being fixed and having a growth mindset. First question is, I want to put you on the spot. Since thinking through this yourself, has there been something that you've personally figured out or learned to do from having this? Did you learn to play the guitar?

**Jo Boaler:** I am doing hard things. I don't know that I've sat down and thought this is from my mindset training, but every year I get out on the ski slopes. And I'm pretty bad at skiing. I really don't think I'm very good at skiing. But every year I go and like to think I improve a little bit each year. So I take on things like that. And I think for me the mindset of awareness and the things I've read and learned in recent years has genuinely made me a more positive thinker. I'm less likely to say, "Oh, this is such a bad day," or right now the situation we're in, I'm less likely to be oriented towards doom and gloom as to think about all the benefits, all the positive things that we have going on.

So I think it has definitely, and it comes from this. As from other people I've interviewed, this realization that struggle is not a bad thing. It's something we should embrace and go forward with. So I definitely still have fixed mindset thinking. I'm surrounded by Stanford undergrads who will say, "Oh, let's do some coding together." And I can certainly think I'm not as good as they are at this. But I have something that stops that thinking now. I have a, "Hold on. I have to rethink this. I should go forward, and I should try this out because that's what it's all about."

**Chelsea Brasted:** You get the caution lights. Like, "Wait a second, wait a second."



**Jo Boaler:** Yeah. You can't do that. I can't teach it to people and then be fixed mindset myself. That's not good.

**Chelsea Brasted:** So I'm glad you alluded to the coronavirus because that's where I was going next with this, which is... can a moment like this, I think it is fair to say a moment of crisis that the country and the world is facing. How can that impact a fixed or growth mindset, and is that maybe the exact moment when we should be pushing ourselves into that growth mindset because everything's so uncertain?

**Jo Boaler:** Mm-hmm (affirmative). Yeah. I definitely think so. We see now that mindset changes so much about people and it makes them more resilient and more embracing of uncertainty. So we're really at a very uncertain time, and it would be very easy to fall into thinking that things cannot change and that everything is so negative around us. So I definitely think that if you have been trained to have a more growth mindset, you go into situations like this a lot more, as I said, resilient and a lot stronger and a lot more able to see the good things that are happening and the positive ways we may build out of this.

So yeah, I think that mindset prevails everything in your life. It prevails how you see things and what you believe about them and that is absolutely important for people right now.

**Chelsea Brasted:** So how can someone who maybe watches this session and then goes back to their workspace with a bunch of people who have not watched this session, how can someone be a positive influence and empower others to be thinking this way, especially about mindset?

**Jo Boaler:** Oh, I think the most important thing for a leader who understands these ideas is to communicate them to other people. Of course they can buy it from my book, that would be a great way of getting the ideas out to people. But it's very important not just to speak the words but to model them for other people and to share that it's important for us to take risks. It's important for us to embrace times of uncertainty and take on different perspectives that might not be the perspective you're thinking about, and then to do that as a leader. I think one of the things that are found in different businesses and industry is the more successful ones are the ones who are more willing to take some risk and more willing to embrace that time of uncertainty. So I think we have industry and businesses that are fixed in their thinking, and that's not helping them go forward.

So sharing the ideas. I think everybody needs to know about the brain evidence. I mean, why would it not help us to know how our brains are functioning and what helps our brains function well? So I think just some time of just sharing that evidence with people. They need to see how their brains work and know what's important. And then it's all about modeling that as a leader and interacting with people in those ways.

**Chelsea Brasted:** What's interesting you say to think of a company or an organization as being fixed.

**Jo Boaler:** Yeah.

**Chelsea Brasted:** Do you have examples of how that might look?

**Jo Boaler:** An example of fixed mindset at work in an industry is an industry that has developed something and sticks with that one thing that's been successful for them even though the world is developing and changing and going forward. And they don't adapt to go forward with that because they don't have that growth mindset. They don't understand the adaptation of flexibility is important. They stick with what they've done, and then get left behind.

So having the understanding that change and flexibility. If I were running a business, I don't know much about business as I've always been in education. But if I was running a business, I would always want to be asking the questions, how can we think differently about this. Okay, everybody agrees on this. Seems like there's 100% agreement, but what would be the opposite of the way we're thinking. And let's think about what the differences could be. How could we think about this differently? I think that would be really important.

**Chelsea Brasted:** Yeah. I love that you're coming at it from the education perspective because we always try to look for lessons outside of the association industry and bring them in and be like, "What can we learn from this other place?" So no issues there with me.

**Jo Boaler:** That's great.

**Chelsea Brasted:** So in the Limitless Mind, you use the language locked and unlocked to describe a kind of thinking. Can you explain what you mean a little bit by being locked or unlocked?

**Jo Boaler:** Yeah. That language of becoming unlocked seems important because I have seen many people become unlocked, and I write about them. We interviewed 62 adults in the run up to this book, and they were adults who've gone through this becoming unlocked themselves. They're such interesting people. It's amazing actually how many people have had really horrible ideas given to them about potential as learners, and because of the field I work in, a lot of people I interviewed have had these really horrible messages about math and that they couldn't learn math. When they learn, and the struggle piece is really important for people too, they've always felt struggle was wrong and bad. So I have a number of examples in the book of people who've gone from having anxiety about the content area to becoming a leader and in charge of 25 different schools because they just change their mindset. They became unlocked.

I have an example of a woman that I really like in the book called Kate, and she talked about how she grew up locked. She was a creative thinker, but she was rewarded for being compliant, which happens to lots of girls it seems. You must follow rules and be compliant. She talked about how she actually went on a course some years ago where she got some of these ideas, and she decided to try it out. So she just applied for an outrageously out of her realm job, and she got it. She talked about how then she thought, "Huh, that really worked." So she started to apply that thinking to relationships as well. She talks about her marriage, her route through different jobs is really changed because of it. And she's very clear about how she went through that period of unlocking as it were.

**Chelsea Brasted:** Yeah, which I think is a great transition-so thank you-into my next question about one of the things that came up for me a lot in reading, especially the first several chapters of Limitless Mind, was imposter syndrome and thinking that if you've gotten somewhere, that's all well and good. But if you haven't been trained to think about a growth mindset, you maybe think you don't deserve to be where you are because you're not a math person, because you're not a leader, because you're a woman, because whatever. So did that conversation ever come up for you or did that sort of thinking ever come up for you as you were working on this book?

**Jo Boaler:** I see a lot of that at Stanford. You would not believe how many people come to Stanford and then start to think, "It was a fluke. It was a mistake. I don't deserve to be here." A lot of that imposter syndrome comes from another really negative occasion that I would describe as social comparison. People start comparing themselves to each other and thinking, "I'm not as good as that person." So that process of comparing yourself to another person will send you down the wrong pathway, and it is something to be cut off as soon as we start being aware we're doing it.

And if you're in a place like Stanford, you're going to meet lots of people who are doing amazing things. And if you're going around the whole time comparing yourself to them, that is going to be a really negative situation for you. So that's a good thing to be aware of in your own mind. Don't do that. It doesn't matter. And if I see somebody who's achieved something, instead of thinking, "I'm not as good as them," you can think, "Huh, I can do that, and maybe I'm going to do that."

So yeah, imposter syndrome is something that is very widespread in all sorts of different places, and it's something we should get in touch with our own feelings and our mindset as well.

**Chelsea Brasted:** Maybe we see somebody who's having these feelings. Maybe we see someone who fits into a stereotype that maybe... To use the example for this conversation, the girls aren't good at math or women shouldn't be leaders in an organization or whatever that case may be. How can we say the right things to

empower somebody to be like, "Actually, you can do it. That's super possible for you."

**Jo Boaler:** I think it's really good to just call out people's elitist thinking. I hear it a lot, and I hear people's fixed thinking a lot. And they talk to me about how somebody can't do something. I think it's important all the time just to really say to people that word yet that Carol Dweck has talked a lot about is so important. You can't do it now. You can't do it yet. That doesn't mean you can't ever do it.

I do a lot of parent events, and I've had many parents who've said to me, "Oh, it can't be that anyone can learn anything. It must be that you're fixed because I have two children, and my son is really good at math. So my daughter is really weak. We've treated them the same." I question that always. It always seems to be that way around as well that the boy is so good and the girl is not. But you really have to question the millions of interactions people have in their lives, and when people get given the idea, "You're not good at this," it starts a different brain outcome for them. I mean, they see this inside people's brains that once people get given negative ideas and they believe them, their brains function less effectively. So important to not have those ideas, to not have fixed thinking about people.

**Chelsea Brasted:** How important is it to keep that positive thinking and the I can do it-ness, not only for yourself but for a team that you work with?

**Jo Boaler:** It's really important. When you praise people and keep up this attitude of we can do this, it's really important to ground it in some reality. I don't think you can just say to people, "Oh, it's going to be great. We can do this." If I can give a teaching example, it's not so great for teachers to say to kids, "Try harder. You can do it," without helping the strategies that will help the kids be successful. So I think it's really good to give those positive messages. It's really important. But they need to be occupied by examples and strategies. We can be really successful if we keep doing this or if we take that aspect of what we were doing and we develop that further. So yeah, that positive growth message along with how we can get there is a really important message.

**Chelsea Brasted:** So I'd love to dive a little bit into the keys a little bit more. The one that I would love to get some other examples on is the fourth key about multidimensional approach. So how would this look in maybe a leadership setting or a workplace? Is this something more like maybe instead of taking a meeting at a table, you're taking a walk outside to think about something? Is that sort of the vibe?

**Jo Boaler:** That's a great idea and interacting with things in different ways. Taking a walk is a really different way of stimulating your brain to sitting around a meeting table. But also just having different representations. So I'm working a lot now actually in a new movement that is working to bring data science to K-12 education. It was interesting to me, I got involved with this when I got a call from somebody

not in my usual realm, not in education, not in math called Steve Levitt called Freakonomics and is an economist. He said, "Will you help me try and change math in school?" I said, "Yes, absolutely. Sign me up."

So anyway, we were trying to get more data science into teaching, into schools. And if you look at data science, it gives the perfect example of what I'm talking about because if you want to solve a problem in a workplace, it's really good if you know what data you have and you think creatively about what questions might I ask that data. It's not about there is a question that's going to give me an answer. It's like what are the different questions. Let's think in different flexible ways about questions. And then you might investigate the data and look for patterns. And then there are many different ways you can represent it. Like a data visual communicates a lot differently from a table of numbers or a written report. So integrating these different ways we can present problems as visuals, as words, as tables. Let's connect between them because the most important thing comes from those connections.

In any workplace meetings that are held differently that we're not just assuming that we're just going to have verbal communication. Maybe we are going to share models or visuals or maybe we are going to get up and take a walk because any sort of physical enactment of an idea causes this great brain communication.

**Chelsea Brasted:** Yeah. So in the sixth key, I wanted to focus a bit on collaboration because the theme of our event is "connect". It's a natural spot for us. In the book, you discussed a bit about your own personal experience in understanding why collaboration is so important, and I wondered if you could share a little bit of that story and how you landed on this piece being such a big part of Limitless Mind.

**Jo Boaler:** Are you talking about the attacks I had on my work?

**Chelsea Brasted:** I am.

**Jo Boaler:** That bit of communication. Yeah. That was a really interesting event in my life. I work and have been conducting research for some years around equity and what it takes to bring about equitable achievement. There are some very old... Well, not very old. There were some very traditional mathematicians who didn't like it, and they didn't like evidence saying that we should teach differently. So they decided to come after me in a really unusual way, which was they wrote lies about me on websites, and they accused me of scientific misconduct, which is a really serious claim that Stanford had to take seriously. They took all of our data, they found that there was no claim to be answered. So they dropped it. But these men continued on and they put things on websites. It was like a personal targeted campaign to bring me down because I had this evidence.

So that was really rough for me, and I actually ended up moving away from Stanford back to England because I thought there was just less insanity. Anyway, a few years went by in England, and I decided to come back and fight it. I remember

the evening really well because I had decided just to write up on a website all the things I had done and just print the facts. So I put it onto websites, and I remember the night because the rest of my department were at a party. And I didn't go to it. I sat at home, and I just printed this website. I published. I remember hitting the publish button. I joined Twitter that night. I'd never been on Twitter. So I made an account and I put it on Twitter.

So anyway, this story then went viral over the weekend. I was contacted by news agencies, became the most tweeted story in education, and just blew up very quickly. But what was incredible was when I was going through this attack, I had the inclination, which I think a lot of people have when they're under attack, sort of turn inward and keep it to myself and not talk about it. And then when I came back to fight it and I published this on the website, one of the things that happened was I got about 100 letters or emails from women in science also talking about what I was talking about. I had described as academic bullying.

And these letters were really interesting. But over time, more and more people started to connect with me, and I felt myself change. It was almost like I became unlocked at that point and decided, you know what, I'm going to share these ideas even more widely. So we made a website. I made online classes, and right now probably ideas have gone out to millions of people. They have been affected by them and changed by them. So my friends say to me I should send flowers to these guys who are attacking me. In being public over their attacks, I was also contacted by people who said they had been attacked by the same people. And lots of people in education have been but nobody had really talked about it because they just turned inwards. So when they saw somebody standing up to these guys, that made them feel better.

So yeah, it taught me the power of connecting with people, particularly when something bad is happening. You don't want to keep it to yourself. You want to find people that you can connect with.

**Chelsea Brasted:** After you recount that story in the book, I'm going to quote you to you again. Sorry. I promise this is the last time. You said, "If you try to make productive change or suggest something new in learning or in the workplace and people become aggressive or ridicule you, try to view their criticism as a sign that you are making a difference." I love that attitude because I think that we really try to instill this idea with our audience that you can make change, you can make change in the workplace, you can make change at home. You can do this. How hard was it to learn that lesson for you, and do you have any advice for anyone who maybe does want to try and make some change happen?

**Jo Boaler:** I definitely learn that lesson myself from being under attack, not only that. I mean, the attacks on my ideas continue of course because I am visible on social media, and anybody who disagrees or wants the status quo to stay the same is going to come after. Very often they come after me pretty aggressively. So I started to think actually that if I put an idea out and I don't get aggressive pushback,

that maybe I'm not being disruptive enough because honestly there's so much wrong in education, in the way we think about people that when you get really aggressive pushback, that really shows you you've affected that person. You've threatened them. That your ideas are really causing them to feel bad in some way, that they come out after you aggressively.

So I do think it's a sign that you're making a difference. I do think it's a sign that you're going out into a place that maybe other people haven't gone out into. That helps. I think that many people feel really bad if they get criticism and if they put an idea out and people criticize it. And I think understanding that that criticism comes because you've made a difference is a really important thing to remember.

**Chelsea Brasted:** So do you have any advice for someone who is looking to create a positive space for collaboration, for discussion of different ideas in a workspace or any space?

**Jo Boaler:** I mean, I think it's really important to connect with some different people who are with you. I always advise teachers going into schools to go into schools where there are like-minded people who want to work on these ideas. It must be pretty tough if you're alone in a workplace with different ideas with nobody to connect to. So I think finding those people and finding those allies to connect with is really important.

And then I think you're going to make a space of different ideas. It's good to go into it knowing that there's going to be people who disagree with you and maybe people who come after you, as they did with me. And as I've said, that probably means it's an idea that really is making a difference or needs to be made. So I think going in with that thinking, and of course having a growth mindset and believing that you can do something different and you can achieve things. And to not be thrown off by setbacks. There will be setbacks, and we become stronger from those. If we overcome them, those will end up being probably good in retrospect, experiences for us. All of that embracing of struggle, setbacks, mistakes, and really knowing that people don't really make a difference unless they're doing something different. I mean, nobody makes a difference that's doing everything the same.

**Chelsea Brasted:** So you mentioned a little bit about some of the education opportunities that you've had online through YouCubed. Because I have monopolized your time for this conversation, I really wanted to make sure we talked a little bit about your experiences with YouCubed because for a lot of association professionals, they are offering this online education space for their industry, for their professionals. And I'd love if you could talk a little bit about how you've used the six keys to create that online education space and what you've learned from that experience.

**Jo Boaler:** Yeah. We made YouCubed not that many years ago, and it started when I made an online class. I had been asked to go and help out at an online course

company called Udacity, and I was helping them with some ideas. I got the idea, "Why don't I make an online class?" I remember the summer I put it out, I thought, "Will anybody take it? Who knows. It's an experiment that's just been out there." And 30,000 math teachers took it the first summer without any advertising. They were just all sending it to each other. At the end of that, people were communicating with me and saying, "Okay. The course is finished. Now what? I want more." So that was when we made YouCubed. At first, we were really thrilled when they were like 5000 people on the site. I think we've gone over 41 million now about four years, three years later. And we're just sharing these ideas and also putting them into usable things for people. So many things there for teachers, lessons, videos, things they can share with students. So we don't just say, "This is the message." We translate that message into things that are useful for people.

**Chelsea Brasted:** How did you use the six keys to... Did you use any of them to shape how you constructed those courses online specifically?

**Jo Boaler:** Well, I think that the keys are always in play. Once you have these ideas, once you've changed your thinking, it impacts everything you do. And of course, if you're, for example, designing an online class, having the mindset to think that you can even do that in the first place is what gets you started designing it. Then the ideas of neuroplasticity and connections are all the ideas that infuse those classes that are also at play, which I think is what you're talking about, in our website. It is very multidimensional, and it is about connecting people.

I should mention before I go that I've just finished a new online class. It's called 21st Century Teaching and Learning, and it's really for everybody. It's going to be released in July, and it's a free online class.

**Chelsea Brasted:** Well, thank you so much, Jo. Oh. Nope, that is it actually. I appreciate it. Thank you.

**Jo Boaler:** Yeah, thank you very much for having me. It's been fun.