

## [Teaching Machines: The Dream of Automating the Teaching Profession Goes Way Back](#)

**Jennifer Berkshire:** Welcome to Have You Heard. I'm Jennifer Berkshire

**Jack Schneider:** And I'm Jack Schneider.

**Berkshire:** And Jack, you may not know this, but it has been a dream of mine for some time to...

**Schneider:** Do a podcast with me.

**Berkshire:** No, to replace you with a machine.

**Schneider:** I don't think it would be that hard.

**Berkshire:** It could be an algorithm. It could be some kind of, I don't know, virtual reality. It could be artificial intelligence. You can already tell that I'm rising above my pay grade. I'm running out of terms.

**Schneider:** It would be more social than I am, certainly.

**Berkshire:** Well, one of the big pros to this approach obviously is that replacing you with a machine would enable me to dominate the content of this podcast even more. "I'm Jennifer Berkshire. Welcome to part 10 of our series on neoliberalism."

**Schneider:** Well, you know, I think one of the things that you have underscored in introducing the topic is the importance of power and control and that's something that I hope comes up a little bit in our conversation with Audrey Watters who has studied the history of teaching machines and the use of educational technology. And one of the things that I think is so fascinating about this is that so often the presumed advantage of educational technology is that it yields more control for those who are in charge of it. It might put the state in a better position, for instance, to control what's going on inside classrooms. It'll make it more possible to ensure that students are being taught something that is in line with whatever curricular standards are. That the aims of education can be narrowed to something like workforce development rather than wasting time on things like history and poetry.

But that power, really interestingly, is rendered invisible because all of the decisions are made on the front end. In terms of decisions made about what gets included and how the programs run in terms of the elements of design, that all of that happens behind closed doors, which really is kind of a scary combination in terms of the power that turns over to folks and the way that it obfuscates that power.

**Berkshire:** I think you just made a really strong case for why I could never replace you with a machine. Well, I am so excited about our guest for this episode. Jack already let the cat out of the bag. It is none other than Audrey Watters who writes one of my favorite blogs, Hack Education, where she explores all things ed tech. Audrey is also writing a book about the history of teaching machines, telling the story of a very familiar dream that goes back a really long time.

Audrey—there was a story recently about two of your favorite people, Bill Gates and Mark Zuckerberg and how they are joining forces to revolutionize education. And I'm using that with air quotes around it. They don't know how exactly this is going to happen, but progress will be accelerated, there will be breakthroughs and it will go to scale. When I read that story, I immediately thought of you and wondered what kind of response you were having.

**Audrey Watters:** When I read this, I thought this is actually the perfect hook to convince reelection editors that my book is, although a book of history, a timely and relevant sadly. Because here are these two billionaires touting their quote, state of the art brand new novel, never done before ideas about education technology. And then they invoke ideas that in fact are about 100 years old. Or this idea of personalized learning and intelligent tutoring systems, which aren't 100 years old but are easily 50. So I laugh and I cry thinking that these tech billionaires in Silicon Valley—that's the shorthand I use to describe them—really pay so little attention to history and have such a poor understanding of what they're talking about for the future of education. Because I think that they really think that every idea that they have is brand new and no one has ever thought of this before because, you know, these two are geniuses.

**Schneider:** Their argument is that nothing has changed, that technology has not transformed teaching for the past hundred years and therefore, whatever they're pitching is an obvious kind of solution. When in fact one could look at this story and say, 'gosh, we have 100 years of failed efforts here.' Therefore instead of these solutions being completely obvious and self evident, they actually seem very unlikely to succeed. Why is it that they are so successful in flipping this story on its head?

**Watters:** I think that there are a couple of reasons. One of the most important ones I think is that in particular Americans and American culture, we really do believe wholeheartedly that the future is going to be more scientific and more technological. I think we've believed that for a very long time. I think it's really a core part of how we imagine the world around us and the steps that we take in order to quote unquote fix problems. We're just going to science the hell out of it, right? That's sort of the American imagination of how things get fixed. You throw, you throw technology at a problem, you throw math and science at a problem, and that's where solutions come from. So I think that there's that piece of it. We, I think that we are, as Americans, unlikely to question the argument that the future will be more scientific, the future will be more technological.

It's somehow inevitable that children will be using computers in the classroom, for example, because that's just the future as it's been written. That's the future that, you know, Edison

famously predicted over 100 years ago, that textbooks were soon to be obsolete. Of course he, much like Gates and Zuckerberg, was promoting his own technological innovations to take their place. He wasn't promoting the computer, he was promoting the film. But I think that we really do think that that's what the future's going to look like, that the school of tomorrow is always going to involve more gadgets. As Americans, and particularly I think the tech industry, doesn't actually know a lot about its own history and doesn't know a lot about the history of education or even the history of education technology. So I think that folks come into education, folks come into ed tech and they are convinced that they are innovators. They are convinced that no one has been able to address this problem before, but as engineers they're going to be able to solve things.

**Berkshire:** You're writing a book about the history of teaching machines. It's a topic that you've devoted countless words to on your blog, Hack Education, and over and over again you dig up these historical excerpts that show just how far back the push to basically automate the teaching profession goes in the name of efficiency. The role of the teacher is always being scaled back, for her convenience, of course. She won't have to, say, grade those pesky essays anymore and this seems to go back to the 1950's, right?

**Watters:** It's been a case that's been made even farther farther back than that. And I find it really fascinating to think about the ways in which education technology sort of developed side side with the field of education psychology, which isn't surprising. We think about this, you know, the study of the human mind and the study of the human mind in an educational setting that there were lots of experiments being designed around the turn of the century on how one would be able to sort of monitor and then optimize what what students were doing.

This was also, of course, the era of standardized testing, which was very quickly mechanized as well. So the arguments that get made is that once we automate education, then teachers will have a lot more time to do the things that teachers should be doing, but it's never quite clear what that is. Nor is it clear that there's a recognition that the reason that teachers are spending so much time doing this menial work is that the field of education psychology really sold the education system on spending more and more time doing menial work. So the menial work never seems to be a problem. The fact that students are spending their time taking multiple choice tests, if we can just grade it more efficiently, then teachers will get to be the caretakers of students' hearts and souls.

Schneider: It seems to me, Audrey, that the logical extension of this is to seek efficiency across the system. How can we make teachers' work more efficient? So to make education as streamlined and fat free as possible in that of course is an aim of a kind of hard line set of conservatives and libertarians who view the entire experiment of public education as being frivolous and wasteful. And it strikes me as interesting and I would just like your thoughts on this, that what historically has been a bug in terms of using teaching machines to replace some aspect of teachers' work and using ed tech to make education more efficient has been the fact that you then have to narrow the aims of education.

You have to narrow the aims of instruction because machines simply can't be as responsive as human beings and can't have relationships like human beings can and can't respond to every kind of unique situation, the way a human being can. But that actually becomes a feature if your core mission is to really strip down education to workforce development or whatever the core aim in mind is for who don't think plumbers should be reading poetry and don't think that carpenters should be, you know, reading about geology. I'm wondering how much you think that has accelerated the push behind ed tech.

**Watters:** Almost counterintuitively, for a long time the push for more technology has been to automate the system and to make students move more rapidly and to make the classroom more efficient. So this idea of standardization through technology has also been in some ways the response to mass education. And the argument is that by using technology we'll be able to—this is the phrase we use now—personalize education. But even in the 1920's, I think, and even with the rise of standardized testing and the earliest teaching machines, there was a belief that using machines was actually going to individualize instruction in the face of mass education project.

So I think that the appeal to the individual is also an appeal to precisely those libertarian forces that you were talking about. This is a way to get out of a mass education system and an education system that is a problem, not because it's many children, but because it's a sort of government-focused, government-oriented decision of what that standardization looks like.

**Berkshire:** You gave a talk recently in New York about how the automation of teaching has transformed over time into personalized learning, which we're hearing so much about today. And you talked about how on the one hand the quest to turn teaching over to machines goes way, way back, and yet it's constantly evolving, even as people use similar language. For example, when today's ed tech visionaries talk about efficiency, I'm guessing that they're probably using the word and the goal differently than when, say, B.F. Skinner talked about it.

**Watters:** The inspiration for thinking about this book initially, and it's been a few years now, but it was in the middle of the MOOC thing. I was meeting with Sebastian Thrun, who was the founder of the MOOC startup, Udacity. Well, I guess now it's a job training startup. He was also the inventor of one of the self-driving cars and worked at Google on their self-driving car project. And he gave a group of us a ride in a Google self-driving car and he was sort of driving us, or rather the car was driving us around Palo Alto, just kind of explaining how the car works and, and he was talking about all of the massive amounts of data collection that Google did, you know, there were cameras on the top of the car, cameras all over the outside of the vehicle. There were sensors inside and outside the car.

There were cameras inside the car. He talked about the years of data that they had with the Google mapping project, and he was talking about the ways in which with all this data that Google was going to be able to understand how to get people from here to there in the most efficient way as possible, by people driving themselves. 'They aren't using the roads to full

efficiency.' And as I was listening to him sort of wax philosophically about the power of data and this mapping project that he'd undertaken with the self-driving car. I thought, my God, that's precisely how he envisions education. I think that that's how the tech world envisions education—that if you can just gather enough data and somehow understand where people should be going, that you're going to be able to design the maps, right?, or the algorithms. And you're going to get them on that path more efficiently than under their own free will. And so I think this idea of an automated teaching machine is both a very old one and constantly reinvented by people who come to education. Again, with this deep faith in data and science.

**Schneider:** I would just add on there that I'm imagining that I'm sitting down to lunch with one of the Koch brothers and say that to them, I think they would add on a that actually there's another piece here which is not only can you replace a teacher by, you know, collecting all the inputs the teachers would through their senses, but actually you could, by programming the machine, control the automatic teacher better than you could control the human being. And you could actually keep it focused on preparing students for future work.

**Watters:** Robots tend to not be interested in collective bargaining at this point in robot development. But what's interesting though is, you know, historically some of the pushback against teaching machines particularly in the post-sputnik era, some of the stuff that BF Skinner was doing—people were actually a little concerned that the development of these kinds of machines that would automate teaching would be something that the Soviets could control. And so I think that there were fears that 'great, we build teaching machines and maybe they are, maybe they are teaching, seeing that work in the service of the Koch brother ideology. But what if they work in the service of Stalin?' And so it's, you know, it's fascinating to look at this really rich history of education technology and see some of these arguments that we never seem to, get out of. I think partially because, like I said, we just don't pay attention to history.

**Berkshire:** Audrey: you also keep a very close watch on all the money behind the ed tech industry. Now, BF Skinner didn't have a venture capital firm backing him as far as I know, where as there is so much money behind the guys who are behind the present day push to automate education.

**Watters:** There is so much money behind them. And what's been fascinating to me, and one of the things that I focused on this year with my Spencer Fellowship that I was really interested in initially is how venture capitalists in Silicon Valley venture capitalists are really driving the conversation around a lot of education technology ideas and policy ideas as well. When I looked closely, I still feel as though the main force who's really outlining policy around education technology is less the venture capitalists and it still remains Bill Gates, now with his little buddy, Mark Zuckerberg, who is, of course, not a venture capitalist, he's a venture philanthropist. But I think that we are still seeing the power of Silicon Valley ideology, but the venture capitalists tend to follow on with some of the other stories I think that they still largely hear from the main education reform groups. So they're still very much focused on charter schools. And again, this

idea of personalized learning is really fascinating to them. But this is something that Gates has been funding since the outset of Gates funding education projects.

**Schneider:** It seems to me like there are a number of factors that make the present push for the use of educational technology in the classroom more powerful and in many ways more threatening than previous pushes. And I want to add on one more, which is a shift in the way that reformers have begun to talk about jobs and specifically the emphasis on the jobs of tomorrow. Historically it's been a problem for schools to prepare students for the workforce because the best way to learn work is by actually doing it. And by doing it in context and by doing it alongside active professionals, none of which is really possible in a traditional school setting. And it's particularly impossible when you are then going to need to swap out all of the teachers who knew how to operate in a Mac LC2 and bring in a whole new crew of teachers who know how to use the Internet.

But technology seems to solve the problem there. And as the conversation has shifted to preparing students for the jobs of the future, it seems that if schools were automated, that if teachers were algorithms that it would be possible to instantaneously upgrade the teaching force and transform the curriculum. That it would be just a matter of tinkering with the software. I'm just wondering about your thoughts on this relationship between the concern of workforce development and the powerful effect that has on education policy and the links that folks have made to ed tech.

**Watters:** I think that we've really seen this with the 'everyone should learn to code' mantra, which has somehow managed to infiltrate all the way into preschool and kindergarten where you get updates that kindergartners have to learn to code because of job job readiness as though job readiness should be the focus of what what we're thinking about with five year olds. Also, as though anything that you would do that's highly technological and specific is actually going to be perhaps relevant to a five year old when they're ready to enter the job force.

But I think that Code.org, which is absolutely an industry-funded entity, has really reshaped the conversation, has made it clear that learning computer science, learning these skills is about job readiness and not about the kind of intellectual exploration that I think previous generations of computer science advocates might have framed it previously. And so I think that certainly code.org is a great example of how Silicon Valley has managed to really change the narrative about what students should be doing in the classroom and why they should be.

**Berkshire:** One of my favorite things about you, Audrey, is that you write about technology as a non tech person. You actually have a background in comparative literature and is Jack Knows, I'm constantly trying to figure out ways to work my own literature background into this podcast. Somehow. It always seems to end up getting edited out. I think about the work you do is sort of listening for the stories that we tell ourselves about the past and the endless promise of the future and how those stories intersect with products that are available to be purchased, downloaded and brought into the classroom. Right now.

**Watters:** I dropped out of my comparative literature program, but I do have a master's degree in folklore and I love telling people that because I think folklore clearly lives in the set of degrees that one should never get according to some stories, right? One should never get certain degrees because they're useless professionally. I like to remind people that the things that you do with your degree, and what you end up doing professionally, are not necessarily directly connected. Paying attention to stories and paying attention to the way in which culture gets shaped, and thinking about history and thinking about group practices and group lore, right? Like I'm, I'm fascinated by this sort of in-group stories—I would call them sort of legends or myths even—that education reformers and silicon valley investors in technology, entrepreneurs tell each other. They have these little stories that they repeat, that is their folklore. They repeat these stories—that school hasn't changed in hundreds of years—that are not grounded in truth or in much accuracy, but that have been elevated to this level of sacred truth.

And it's very hard for them to sort of see outside of their culture and their their cultural values. So I think approaching these things as an, as an anthropologist, approaching the study of technology as an ethnography, it certainly makes me a better journalist. I think it helps make me a better writer and it makes me very sympathetic when I hear students say, 'I plan to major in art history.' I'm like, 'you do that!'

**Berkshire:** That was Audrey Watters. She writes the blog Hack Education, and is also the cohost of her own podcast, the Contrafabulists, where she dissects technological mythmaking. Jack and I will be right back with a few final thoughts and based on the furious scribbling that my co-host is doing right now, I'm guessing they will be profound thoughts.

[Music]

**Schneider:** A theme that emerged a bit in that conversation, but that I think is worth underscoring is the increasing weight that people have placed on ed tech as not only a cost saving device, but also as something that will make the delivery of education more streamlined and more efficient and therefore will both a lower costs in terms of inputs and produce more measurable returns, to the economy, to the state treasury. And to, you know, the pockets of shareholders. This often gets talked about as return on investment. And certainly there is return on investment to be made on investing in these ed tech products. But there's also a great deal of confidence that education can be turned over to machines. And in doing so, you can eliminate all of the costs associated with teachers. And that's about 80 percent of the cost of education and you can really then focus what students are doing in schools that, you know, no longer will we have these extended one-offs about something that students are interested in.

No longer will we have teachers going rogue and doing month-long projects on things that are related to current events. Instead, you know, we'll just control what's going on in the classroom through an algorithm and we'll be able to update that at will, which is again related to another conversation that people are perpetually engaged in, which is this endless chatter about the

jobs of the future. And of course, the teachers of the present can't simply be updated in terms of changing what they know and what their skills are and therefore they immediately are out of date in terms of preparing students for the work of the future. But an algorithm can be changed almost instantly. And so the conversation about ed tech is often one that is really at its core about return on investment, about thinking about education as an investment that we're making as a society on behalf of the private sector in and on behalf of taxpayers. And that you know, is really something that can be measured in dollars and cents. And when people are aware of that, I think they tend to be less naive about the promise of ed tech.

**Berkshire:** You mentioned the jobs of the future and, you know, I'm a little bit obsessed with that right now. On the one hand, the calls for a kind of urgent systemic change are coming with even more urgency. People seem to be driven by a genuine unease over what the future holds. But the confounding part of the argument is that you have employers who themselves stand to be wiped out by technological change, making the case for systemic change at the school level. And it can kind of make your head explode if you think about it too much.

**Schneider:** Which is the reason why we don't think about anything too much on this show.

**Berkshire:** Well, on that note...Jack, I want to give our listeners a little update. A few episodes back, we launched an entrepreneurial endeavor. We put up a Patreon page because that's what people do now

**Schneider:** And you're going to give us an update on return on investment.

**Berkshire:** Well, it is still small, but it is growing.

**Schneider:** Just like my brain.

**Berkshire:** So just a big thank you to everyone who has chipped in. It will help us keep the podcast going and also, perhaps if we round up enough gas money, send the Have You Heard mobile out onto the road. Again, the address where you can drop by and make a small donation is [www.patreon.com/HaveYouHeardPodcast](http://www.patreon.com/HaveYouHeardPodcast).

**Schneider:** I'm Jack Schneider.

**Berkshire:** And I'm Jennifer Berkshire.

**Schneider:** And if you're a Patreon member, then hang on for a second and we'll go into the weeds with you. Everybody else, thanks for listening.

**Berkshire:** This is Have You Heard.

Jack's Reading List (with a little help from some friends)

[Hack Education](#)

[“Teaching Machines, or How the Automation of Education Became 'Personalized Learning.’”](#) by Audrey Watters

*Is Technology Good for Education? By Neil Selwyn.*

[“Questioning Our Mania for Education Technology.”](#) by Jack Schneider

[“Thoughts About Technology Then and Now.”](#) by Larry Cuban

[“Teaching Machines.”](#) by BF Skinner