

**Disrupting Class:
How Disruptive Innovation
Will Change the Way the World Learns**

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It is a pleasure to be here. Thanks for welcoming me to the LINC community. I can already tell that it's a fascinating group of people from around the world who are really committed to changing education and asking tough questions. I appreciate being invited, and am sort of humbled by that, to be honest.

As Dick just mentioned, with Clayton Christensen I wrote this book called *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns*. In it, what we tried to ask was: what are the root causes of why our schools struggle? If we can understand those root causes, how might we help schools innovate to solve those struggles? When Clay entered academia just over two decades ago, the question he brought with him was: Why do successful organizations fail? It is an interesting question when you step back from it, because it is fairly obvious why poorly run organizations would fail, but why successful ones? With great managers, great employees, great processes, why would they fail? That is a lot less obvious, yet it is what we see consistently through the sweep of history. Certainly in business history, the organizations that were once on the top, a generation or two later seem to be invariably in the middle of the pack or at the bottom of the heap. Countries go through this as well. You can look at really any organization and see this.

As he studied the problem, he reached a really counterintuitive conclusion -- although it might not be so counterintuitive for people at MIT. He concluded that it was the principles of good management, taught at places like the Harvard Business School where Clay was on the faculty, which ultimately spelled every organization's demise. [It is not true at MIT. It's much better there!] Clay studied this further and came up with a phenomenon that he termed "disruptive innovation" to explain why successful organizations failed. He has developed a series of theories to help try to make innovation - which has seemed so unpredictable for so long - more and more predictable over time.

What I thought I would do today is step back from that book and consider one of the questions we were asking about the U.S. education system: How do we change it from a factory model into a much more student-centric model that understands where different students are and adjusts for their needs and differences? The question obviously is different in different parts of the world. Sometimes it is access. How do we actually just get education out there? Sometimes it's a shift as well. Sometimes it is a blend of those two things. I want to use the model to talk about both of these problems, and both of these very interesting questions and opportunities in today's world. What I will do now is walk through the model, apply it a little bit to education, walk through a couple more

models, apply them to education, and so forth. Hopefully you will bear with me through this walk down theory lane.

We will start out with the disruptive innovation model itself. (See slide #2) What I have done on the y-axis is plot performance. The x-axis measures time. This represents any marketplace, or field or sector. What we see in every field is that there are two trajectories. The first one is this relatively flat line. It is the pace of performance that customers can utilize or absorb over time. The reason it is relatively flat is because our lives, our basic lives, do not change that much from day to day. The jobs I had to get done yesterday are something like what I will have to do today, and something like what I will have to do tomorrow. Of course, there is a range. There are some people at the high end who are never satisfied, no matter how much performance you give them. There are some people at the low end who are satisfied with relatively little. We basically have these trajectories.

Then there is the second line, which is really interesting. It is the pace of technological progress. What it shows us is two things. First, most technologies, when they enter a marketplace, enter as not good enough for the majority of users in that marketplace. But technology changes much faster than do our lives. Technology improves much faster than our lives change. So what at one time is not good enough for the majority of users, over time packs in more and more functions and features and performance, to the point that it actually overshoots what most of us can absorb or use.

Now, an easy way to visualize this is just to think about the early personal computers in the 1980s. Some of you may have sat at these personal computers and you remember typing on them. Every once in a while you would have to stop and coax the stupid word processing program to catch up with your fingers because the basic Intel 286 chip inside those early machines was not even good enough for basic applications like word processing, right? But true to form, Intel continued to improve the microprocessor year over year over year. For the most part, especially now as they introduce multi-core Pentium processors, most of us are over-served by all the speed and functions that they give us. Now there are a few people at places like MIT that demand more performance, but for the most part, most of us are over-served by the best.

Sometimes these trajectories up this blue line are year-to-year, incremental improvements. Other times, they are giant breakthrough leaps forward. But as long as the purpose is to sustain that blue line - to allow the leading organizations to make better products and services in the ways that they are designed to make better products and services to serve even more demanding customers - they almost always figure out a way to get it done. We call these "sustaining innovations." What we notice is that the incumbents, the leading organizations at the beginning of that blue line, are almost always the leading organizations at the end because they are so motivated to figure this out to serve their demanding customers even better. What I have done is push that diagram into the back plane there. The products or services that are initially in these planes are complicated, expensive, very centralized and therefore, inaccessible and

inconvenient. As a result, they can only serve a few people. There are tons of people out there who cannot literally access these products. We call them non-consumers.

Occasionally we see another kind of innovation come along. We call this one a “disruptive innovation.” (See slide #3) It is a horrible name for an interesting concept. It implies “breakthrough,” or a lot of other things - in the English language at least - but we mean something very specific by it. We mean an innovation that is actually not as good as the existing technology, judged by the historical measures of performance. It therefore cannot plant itself among those people in the back plane, but comes out into this new plane and serves non-consumers with a product that is not as good, but brings along a new dimension of performance. It makes the product accessible. It is simpler to use. It is more affordable and more convenient. It allows many of these non-consumers now to have access. It gets better and better year over year and also starts to be able to do the complicated things. One by one, the customers come out to the new plane because they are delighted with a product or service that allows them to do something for less money, while also being simpler to use and more accessible.

Now I’ll tell a quick story to demonstrate this point. It revolves around a story when Clay was entering academia in 1989 in Massachusetts. There was a company at the time that I am sure many of you know and remember, called Digital Equipment Corporation or DEC. We were talking about it over dinner last night. DEC was the leading company of its time. It built these products called minicomputers that were not particularly small— they were about the size of this podium here— and that did unbelievably demanding calculations and computations for very demanding corporate customers. DEC made a lot of money. Whenever you would read in the business press about why these guys were so good, it was not just that they had the best engineers working for them. It was also - the business press would say - that these guys just had the best management team in the world, just the best people leading the company. They made the right decisions year over year over year. But an interesting thing happened in 1989. Extremely rapidly within a six-month time period, the business just collapsed. It literally fell off a cliff in a pretty brief timeframe.

So you go back to the business press and say, “What happened?” They would say, “Those stupid managers”— even though the very same were people leading the company. Only if they had just seen the personal computer coming, they could have grabbed hold of it and changed the world. But they didn't. They did not really know what to do with it and therefore they have been consigned to the ashtray of history.” The explanation— and this is generally our explanation— of why organizations fail: stupid management. So the question Clay brought with him to academia was, “Why did smart managers decide to become stupid?” It did not make any sense in this particular case because every single minicomputer business— Data General, Prime, and Wang— collapsed in the same time period. While you would expect companies to collude on price occasionally, to collude to collapse was a bit of a stretch of the imagination. Yet that is exactly what happened. They all collapsed. So Clay dug back in and concluded that something else must have been going on. And indeed it was.

In the 1980s, management was seeing two kinds of business plans come to them. The first kind said: you make these unbelievably demanding products for demanding customers and you can charge a quarter of a million dollars, getting 45% gross margins on them. We have been doing what those whiz kids at the Harvard Business School tell us to do and listening to our best customers. They have been telling us that if you will just build the next generation minicomputer, with more functions and features, then your customers will be delighted to pay you half a million dollars, with 60% gross margins. However, another group came in and said: you guys really don't get it, do you? If you'd just get up out of your seats and look outside the window, you would see this thing called the personal computer. I'm telling you, it's going to change the world. So management got up out of their seats, saw the personal computer and made a few of them. But they also saw a few other things. As we already talked about, the personal computer that existed at that time was a crummy device compared to the minicomputer. It could barely do word processing, let alone any of the demanding things that corporate customers needed done.

Then these companies would talk to their customers and say, “Would you buy a personal computer?” Their customers would say, “Not a chance. It can't do anything we need. Why would we pay for that?” Then management looked at the business plans of the personal computers, which promised \$2,000 and gross margins of 40% that would quickly collapse to 20%. So the decision that management faced was this: Should we build better products for our best customers, for even better profits, or should we build worse products, that our customers cannot use and will not buy, for profits that would kill our business model? What should we do? It is an innovator's dilemma because the very logical things — if you don't also come out to this new plane with a new model— are the things that will kill you in the long run. And of course, that is exactly what happened!

So the question is: how did companies like Apple and the personal computer companies do it? Well, in the case of the innovators at Apple, they had the great advantage that they had no customers when they got started. All they had to do was to identify just who might want to buy a personal computer. So they marketed the first personal computer as a toy to children. For these customers, who could not afford a minicomputer, this was better than the alternative: nothing at all. They were delighted with this “crummy” device because it was plenty good enough for them and it got better and better and better. By 1989, it was good enough that it started sucking a lot of the volume out of the market. And thus the world was transformed. This was great news for most of the world because we now had affordable and accessible computing. It was not such great news for the leaders of DEC.

This story repeats itself in many fields. (See slide #4) What I have done here is to put up, in the blue column, companies whose stock we wish we had owned over the last couple of decades. They have been disruptive and they have disrupted the companies in the red, who in their own right were disruptive when they got their start. Looking at the top one, we see that the Detroit automakers have largely been disrupted by the Japanese— by Toyota and Honda. The question is: how did Toyota do it? They did not come in the beginning with the high-flying Lexuses. No, Toyota started with a crummy car in the 1960s called the Corona. It rusted quickly and was not very good. Yet with it, Toyota targeted non-consumers, the people who could not afford the gas-guzzling cars that

Detroit was sending down. The Corona was better than the alternative: nothing at all. Toyota went up-market from there -- from the Corona to the Tercel, to the Corolla, Camry, Avalon, 4runner, and then the Lexus. Toyota changed the world.

Incidentally, the managers at the Detroit automakers were not asleep at the switch. They saw these guys coming, and every once in a while, said, "You know, we really ought to go down to the low end there and compete with those buggers." So they would send down a Pinto or a Chevette. But when they compared the margins of selling one of those vehicles with the unmitigated blessing of being able to sell yet another Cadillac Escalade or a Ford Explorer, it just didn't make any sense. So they would retreat up-market and cede more ground. By the time they really got it, it was too late. However, today Toyota is being disrupted. This is an advertisement Hyundai is running right now: "Isn't it time someone did to Lexus what Lexus did to Mercedes?" (See Slide #5) They basically own the subcompact end of the market now and are coming up rather rapidly with more fancy automobiles. Underneath them are the Chinese with the Chery and the Indians with the Tata. You also see this phenomenon throughout department stores that are largely disrupted in the United States by discount retail companies like Kmart, Wal-Mart, and Target. Target has even gone up-market. In the U.S., we now call them "Tarjay"! Online retail is coming up underneath them. You can go on and on through a lot of these examples.

As we think about education, there are some obvious lessons of disruptive technology in terms of the Internet. The Internet has transformed many fields. As this is a different audience from the ones that I generally speak with, I don't have to set out much of the groundwork. I can just say that online learning is obviously a really interesting disruptive innovation that has great potential for a lot of applications. The question is: where would it get its start? You would look for non-consumption as the most promising opportunities to launch these innovations. When you step back and ask where these non-consumption areas might be, it turns out that there are several areas where online learning can start to make an impact. Here at LINC 2010, developing countries are first and foremost on a lot of people's minds, and rightfully so. As a solution to extend access, classic use of disruptive innovation is ready-made for this market.

I will share a quick story. I was on a panel a few weeks ago with people at the University of Phoenix, Career Education, and a couple of online providers of university courses. They were talking about what mobile device learning will be used for. They were saying that it is not really good enough to offer the full educational experience right now, but that maybe it will serve as a supplement. Yet I was thinking: if you weren't rooted where you are, you would probably say something very different. Imagine what your company could do with mobile learning and how it could run with it and develop from it. There is not just a market for higher education in developing countries, given that in developing countries, 70-plus million children do not even have primary schools. Three times that number do not even have secondary schools. There are huge areas of non-consumption that we need to do something about to make this world a better place. Given this fact, there are big areas of opportunity as well as challenges.

Adult lifelong learning is where online learning in the United States has gotten its big start and much of its growth. For people who do not have the time or capacity to go back to a full-time or night school, online learning, as you know, allows them to learn anytime, anywhere. In the U.S. it has been challenging to think through the K-12 market – to discover where these areas of non-consumption might be - because we have compulsory schooling here. This puts the U.S. at a decided disadvantage for innovating. However, there are pockets of non-consumption at the course level in high schools in the United States-- where there is a dropout crisis with 30% of students leaving schools, with nearly 50% in urban areas. This is a big area of non-consumption, and if you could put it in a different model, then you could really do some good for a lot of people.

These are just some of the other examples. (See Slide #7) I won't go through everything. I will highlight one that has been on my slide for a while, because I know it came up yesterday. A speaker from India was talking about the school bus going to remote areas with online learning. The U.S. is limited enough that the only way we can think about it is for the school bus commute. In rural places like Arkansas, they actually wire up school buses for the long, daily commute. Thus, at least the kids can be online, actually doing work and so forth. Of course, some are goofing off, but it's better than the alternative – doing nothing at all.

The question that I know a lot of people are grappling with is this: how do you shoot innovations that would be successful into these areas of non-consumption? Following this theory, the answer goes to the way we teach marketing at places like Harvard. Those practices actually doom a lot of products, services, and innovations to failure. The reason is that we tend to segment the market by customer demographics. We will have white males, ages 30 to 49, with and without kids. We'll segment by product category – car companies will do subcompact, SUV, luxury, and on and on. The problem with these segmentations is that from the perspective of the user or the customer, the world is not organized by any of these categories. I do not conform to the average demographic in my buying behavior, or in terms of people likely to buy certain products. I just have things arise in my life, jobs I have to get done. I “hire” different products or services to help me get those jobs done. The unit of analysis that you want to focus on is actually the job - and the circumstances surrounding the job - to understand how to get an innovation to take off, rather than analysis by these on-average statements that are much more high-level.

I will illustrate this with a silly story that took place in the mid-1990s at a fast-food restaurant in the United States. (See Slide #8) There is a fast-food company, but the name is not what it says on the slide. We just pulled off a silly image. They wanted to improve their sales of milkshakes. This company really knew its market, as companies tend to do. They knew the exact average demographic of the users most likely to buy milkshakes. They had done profiles of them, and on and on. When you walked into the restaurants, they had clearly segmented the world by product category because they had sections for snacks, main meals, and desserts. The milkshake was a line item among the desserts. They would do focus groups where they would call in the average demographic and say, “How might we improve sales in milkshakes? What would you do to the milkshake?”

They averaged together this customer feedback and tried to make improvements, but the sales did not budge at all.

In the mid-1990s, they brought in one of our colleagues. He had a very different question on his mind, which was: I wonder what job people will hire a milkshake to do? This is sort of a silly question, right? But he came there and sat in the back of the restaurant for 18 hours one day, taking copious notes. When did people buy milkshakes? What were they wearing? What else did they buy? Were they with people? Who were they, if so? Did they consume them in the restaurant? Did they take them back to their car? At the end of the day, he saw something really interesting: 80% of milkshakes were purchased in two times during the day. 50% of them were purchased in the early morning rush-hour commute, where people bought them and nothing else. They would never drink them inside the restaurant, but would walk with milkshake in hand back to the car.

So the next day he showed up and stood outside the restaurant. He confronted these people when they came out, milkshake in hand. He said, "Excuse me" — and in language that they would understand— "I've just got to know, what job did you just hire that milkshake to do?" They would look at him baffled. He would say, "Well, think about the last time you were in this circumstance. What else did you hire to do whatever you're trying to do now?" One person said, "Oh, come to think of it, I've got this long commute ahead of me - a 20- to 30-minute drive - and it's kind of boring. I'm not hungry now, but I know if I don't put something in my stomach, I'll be starving by 8:00 or 9:00. One time, I hired bagels, but take it from me, don't hire bagels because they're dry and tasteless, and you have to spread cream cheese or jam on them to make them taste good. If you do that, you start driving with your knees, and if the cell phones rings, you've got major problems. I hired donuts once, but they stuck up the steering wheel, made it all gooey and stuff. It was disgusting. Don't do that. I hired a banana once. The thing was gone in 30 seconds. I was starving by 8:00, and I was bored the entire commute. I hired a Snickers bar a few times, but I felt so guilty, I swore I would never do that one again. But when I hire the milkshake, let me tell you, it's just perfect. God gave us two hands; the left one is for the steering wheel. I've never known what to do with the other, but there's a cup holder right here. The milkshake is so thick and viscous that it lasts me easily the entire 20- to 30-minute commute. It takes forever to suck up that straw and it's just perfect. I don't know what's in it - if it's healthy or whatever - but it sinks to the bottom of my stomach and fills me up easily until 11:30!"

So it turns out that the milkshake does the job better than all the other products and services out there - which are not Burger King, McDonald's or Wendy's milkshakes, but actually the milkshakes, coffee, donuts, bagels, bananas, on and on. So the market is a lot bigger, and the share is a lot smaller. Understanding that and the circumstances would lead you to understand how you have to integrate to actually nail the job for the customers. This restaurant thought that they were integrated well. They had everything in the house, but actually - when they understood the job - they realized they were not integrated well at all. For the user experience, why not put the dispenser at the front of the line and give people prepaid swipe cards so they could dash in, gas up and get on the road. That would be much quicker for the rush-hour commute. You would swirl maybe

more fruit chunks into the milkshake, not because it makes it healthy— because they don't hire it to be healthy— but instead, because every once in awhile the customer would be driving along and gulp up a fruit chunk, keeping the commute more interesting. You would do things very differently once you understand the job. In the afternoon, the job was to have fathers and mothers placate their children, to make them feel like better parents. So you would design a very different product to do that job. It just points to something that Peter Drucker knew a long time before this, which was that the customer is rarely buying what the company thinks it is selling him.

I think this is relevant for education in a lot of respects. I will just talk about a couple of these respects quickly and then jump into what it might mean. To a large degree, particularly in higher education and particularly in other areas of the world, people hire education to get access to a better life. The fundamental job is the access to a better life. It is not the information by itself. That is a means to the end and to the ultimate job. Understanding this fact starts to help us understand how to design a product or service to meet those educational goals. The roles of accreditation, social needs and so forth start to become better understood. In the new book while discussing K-12 education in the United States, we talk about how kids really having two fundamental jobs. The first job is to make progress or feel successful every day. Schools, as they are currently designed, do not do that well at all. In fact, they make most children feel like failures and kick them out. The second job children need done is to have a place to have fun with friends. That social experience is fundamentally important. Most of those areas for success and fun with friends are extracurricular activities, and are actually consigned outside of the educational scope.

One of the really exciting things about online learning is the way you can embed success into the actual curriculum itself because you can have rapid assessment. Online learning is constantly tracking where the students are, giving them challenges just above their level in order to move them forward.

I also thought I would talk about the business model, or the organizational model today because it is related to this last concept. What actually is a business model to nail one of these educational jobs to be done? The first thing is to figure out that in every business model there is a value proposition. This is basically the job to be done. It is a product that helps customers do - more effectively, affordably, and conveniently - a job that they are actually trying to get done. To deliver on that job, to deliver on that value proposition, organizations use people, technologies, materials, money, and so forth. In a business model, processes develop as these resources interact with each other in different ways. Ways develop to address recurring problems successfully, over and over again, such that you can nail on that value proposition.

Processes are developed not to change. That is why a good process is developed to do really well what it does, not what it does not do well. Processes are, as a professor at MIT actually termed it, where culture is. Edgar Schein described well how this is really what culture is. These processes, unstated or stated, are just the way we do things. Then that leads into a revenue or profit formula. (See Slide #9) How much money do you need to

get to deliver sustainably, or to afford the processes and resources to deliver on that value proposition? Then these things start to work in reverse. The value proposition you are often delivering is not the one you thought you originally were going to set out to do, but it locks you into this business model.

To see why it is so hard to change, we can take the United States Congress as an example. If you are a congressman and you have an innovative idea to change a social program, you introduce a bill into our congress. However, it's not more than a couple of days before the senator from Texas will call you up and say, "Got to tell you, buddy, I'm going to filibuster this bill if you don't change this, and this, and this and this." Then you get a call from the labor unions. They say, "This isn't going to fly. I'm going to have all of the people who support us just absolutely vote no. But if you'll work with us and change the bill in this way and that way, then you know what? Maybe we'll let it go through." Then you get a call from the senator from California, and he says if you just would add a couple of pro-California policies in there, a little money for his district, then he will let it go through. You get all these processes and actors acting on the original idea. What comes out the other end is something that fits the organizational culture of the business or the organization, not something that you originally designed to actually solve whatever problem you were trying to solve.

It is much the same way in businesses. That is why it is so hard for business units – like those in Digital Equipment Corporation - to evolve. Of course, corporations themselves can evolve. We have seen examples of this where companies like IBM have set up autonomous divisions and freed them from the constraints of the existing business model, so that it could be the leader in the mainframes, as well as one of the early leaders in the personal computer. Target is another one of these examples. I think it is useful to think through these models, to think through how we nail the experiences and the set of constraints that we need to observe so that we can deliver what the users are actually trying to get done. I think - from what I understand of some of the LINC 2010 discussions - that hopefully this will be a useful model, as you think about the infrastructure needs, cultural constraints and other challenges that are present.

One other way to restate a lot of this disruptive innovation diagram is to think about the world in terms of concentric circles. (See Slide #11) I will speed through this, but I think it is better to leave on an uplifting note. In the beginning of any industry, people are out in the fringes. They are solving on their own these jobs, these problems that they are having locally. So in computing, when we had to do computing, we would whip out our slide rules and do it on the spot. The advent of the mainframe computer centralized an industry and made it very specific as to who could access computing, and so forth. It was very limited because of the price, location and complication involved in using a mainframe computer. The minicomputer allowed more people to be able to use computing. The personal computer brought it even further out. Notebooks, net books and so forth have brought it out further still. The mobile phone is really just a small computer in our hands now and this is bringing it out even further, and decentralizing the world more and more over time.

I think that is what we are seeing in education right now. The decentralization that follows centralization is only beginning in education right now, as we are picking off job by job. Originally, you saw it centralized in places like Harvard University. If you wanted a university education, you had to come to Cambridge, Massachusetts. Only a few people could do that. From a U.S. view — and I think you can draw the parallels in your own countries as well — the Land Grant Acts in the United States of the 1860s allowed state universities to come up and extend education to marginally more people. In our context, junior colleges and community colleges have extended access even further. Now you are getting the real explosion, online universities, which are extending access and decentralizing education so you can get it from anywhere, at any point, much, much more easily. We see lots of growth right now throughout the world.

In the U.S. nearly a third of students are now taking at least one course online in college. So that's about four million. Worldwide it is even bigger than that. Even in K-12 in the U.S. where the system is so ossified, we now have roughly two million students taking some form of online courses during their K-12 experience. We project that by 2019, 50% of all high school courses will be online. So change is actually coming rather fast. It is predictably improving as well. You are getting innovative things that are making it less and less of a distance phenomenon, as we have typically thought of it, and snapping it into hybrid environments similar to the mobile classrooms and schools that you talked about yesterday.

The technology that is allowing us to communicate with one another over great distances is improving by leaps and bounds. It no longer feels like distance when I can talk to you over a telepresence, which I am sure is going to be commoditized to allow many more people to have unbelievable video access. Online learning has progressed well beyond simple text-based things online to the point that we now have video. You guys have been leaders in seeing that one. We are starting to see game-based and simulation-based learning explode as well. That does not work for everyone. But those people who learn best through those environments are now having opportunities to access them. We are just really at the beginning of this revolution in the ways we learn. We are going to have to make a lot of changes in the ways we think about it. But despite those challenges, I think that there are a lot of opportunities right now that leave me incredibly optimistic. It is exciting to be in this community, because I am just really excited to learn from you. Thank you very much.