Teaching To The New Test
Clayton Christensen, Michael Horn and Curtis Johnson 08.21.08, 6:00 PM ET
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Clayton Christensen's CREATIVE DISRUPTION

Balancing Disruptive Innovation
How to Change the Way Kids Learn
Rev Up Your Innovation Engine

The art and science of testing children to see what they have learned can and should change. Here's how.

All Americans want to educate our children so they have a fair shot at realizing their dreams. But we have very different ideas about how to accomplish that. In our book, *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns*, we map out a way to use innovation to disrupt the broken and monolithic U.S. public-classroom model and move toward one that puts the needs of each student at its center.

A powerful tool to help reach this goal is online learning technology, which offers students the ability to learn in ways that match their intelligence types in the places and at the pace they prefer. But with the shift to student-centric learning, assessment--the art and science of testing children to determine what they have learned--can and should change, as well.

In the past, testing has been used to do two jobs. The first has been to determine the extent to which students have mastered a body of material and are ready to progress. The second job is to compare students with one another. Student-centric technology, if it becomes truly personalized, should over time get rid of the need for examinations as we have known them.

The conventional teacher-administered exam can handle the second job, but the first one is more important, and it doesn't do that job well at all. Regardless of whether students have mastered the material in a unit, they all move on. Teachers don't find out what students have learned until an exam is graded, which tends to be some time after the unit or class is already complete. If students haven't mastered all the material but know it well enough to get a passing grade, they still must move on. Even if they fail an exam, the students typically must move on, because moving on is inherent in the model of monolithic instruction. The exam tells teachers and administrators only what percentage of the students has demonstrated mastery of what percentage of the material. The amount of time in which to learn the material is fixed, but the amount of learning varies significantly.

In his upcoming book, *Chasing the Rabbit*, Steven Spear, a senior lecturer at the Massachusetts Institute of Technology, recounts an experience that helped us frame the trap of monolithic instruction that we've gotten ourselves into in public education. While doing research in 1996 as a doctoral student studying **Toyota** (nyse: TM - news - people)'s famed production system, Steve temporarily took jobs installing passenger-side front seats on an assembly line at one of Detroit's Big Three and later at Toyota.

In the Big Three factory, the worker doing the training essentially told Steve, "The cars come down this line every 58 seconds, so that's how long you have to install this seat. Now I'm going to show you how to do it. First, you do this. Then do that, then click this in here just like this, then tighten this, then do that," and so on, until the seat was completely installed. "Do you get how to do it, Steve?"

Steve was quite certain he could do each of those things in the allotted time, given that he had earned a master's degree in mechanical engineering from mit. So when the next car came down the line, he confidently set about doing each of the steps. But the installation was trickier than he had expected. He couldn't finish the installation within the 58 seconds. His trainer had to stop the assembly line to fix the problem. He again showed Steve how to do it. When the next car arrived, Steve tried again but didn't get it right. In an hour he installed only four seats correctly. One reason why it's so important to test every product after it comes off the production line is that there are typically hundreds of steps involved in making the product, and a company can't be sure that each step is done correctly. In business we call that end-of-the-line activity "inspection." In education, we call it "assessment" or "testing."

But when Steve went to work at the same station in Toyota's plant, he had a different experience. First he went to a training station, where he was told, "These are the seven steps required to install this seat. You don't have the privilege of learning step two until you've demonstrated mastery of step one. If you master step one in a minute, you can begin learning step two a minute from now. If step one takes you an hour, then you can learn step two in an hour. If it takes you a day, then you can learn step two tomorrow. It makes no sense for us to teach you subsequent steps if you can't do the prior ones correctly." Testing and assessment were an integral part of the instruction process. As a result, when he took his spot on Toyota's production line, Steve was able to do his job right the first time and every time. In fact, Toyota had built into its production process a mechanism to verify immediately that each step had been done correctly, so that no time or money would be wasted fixing a defective product. As a result it did not have to test its products at the end of the assembly line.

What a contrast between the two methods for training Steve Spear. At the Big Three factory the time was fixed, but the result of training was variable and unpredictable, just as it is in the public schools' assessment systems. The "exam," checking up on the installed seat, came at the end of Steve's training. At Toyota the training time was variable, but assessment was woven into the work, and the result was fixed; every person who went through the training could predictably do what he had been taught to do. Toyota follows that principle in all its training, for every activity in the company.

When K--12 education in the U.S. was done in one-room schoolhouses, most instruction occurred at individualized rates. Then an explosion in the student population in the early 20th century forced schools to adopt one-size-fits-all instruction. They borrowed from factories the concept of batch processing, with a fixed time spent in each stage of the process of assembling an educated person. Repair, rework and reject became a costly element of the system, just as it did in assembly plants.

We estimate that at least 80% of a typical teacher's time is now spent in monolithic activity: preparing to teach, teaching and then testing an entire class. Less than 20% of that time is available to help students one-on-one. A profession whose work primarily was in tutoring students individually became one in which some of the most important skills are keeping order and commanding attention.

When students learn through student-centered online technology, assessment and individualized assistance can be interactive and woven into the instruction rather than tacked on at the end of the process. Software makers can also use the feedback loop to learn how to improve their products for different kinds of learners.

Lexia Learning Systems, a reading-software company in Concord, Mass., provides an example of the power of this approach. The company's product, Lexia Reading, assesses a student's understanding constantly. If the student demonstrates mastery, he moves forward. If he has not understood a lesson, the software harks back. Some students just need more opportunities to understand and practice the lesson in different ways.

This approach has proved valuable in districts such as Hall County, Ga. that use Lexia Reading. This district uses the constant assessments to provide teachers feedback so they can hone and target instruction, according to Aaron Turpin, the executive director of information technology and assessment for the county's schools, and David Moody, the county's director of elementary education. They say Lexia Reading not only helps students who are struggling to read but also allows students who are way above the minimum competency to soar.

Hall County principals use the quick feedback to monitor the progress of individual students and to be sure that students who are behind not only are making progress but also are making extra progress so they can catch up. This allows officials at all levels to do something they never could before: to see how all its students stand at any point in time, a true revolution in school management.

The Booming U.S. Assessment Market

Sales of testing products and services to K--12 schools and school districts.

2003/2004 $1.42 billion

2004/2005 $1.57 billion

2005/2006 $2.18 billion

2006/2007 $2.3 billion

2007/2008 $2.5 billion

Sales figures are in 2008 dollars. *Source: Outsell Inc.*

Clayton M. Christensen is a professor of business administration at the Harvard Business School. Michael B. Horn is the executive director of education at Innosight Institute. Curtis W. Johnson is the president of Citistates Group. They are coauthors of *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns*. Go to forbes.com/leadership for more of Christensen's thoughts on innovation.

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