Open Educational Resources and the Bull's-Eye:
Opening Access to Knowledge AND Improving Teaching and Learning

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I am honored to be here. I was reflecting back, as I arrived late yesterday from California, that the first meeting I had with Dick and Liz here was on a very snowy afternoon. The city was essentially shut down. No one was around campus. I did find Dick's office, and the three of us had a great discussion about BLOSSOMS, exploring the vision, and the leadership required to move it forward. It was very much an early vision, and the program has moved at an incredible pace over these past few years. I really want to acknowledge that accomplishment. I am delighted that today's weather is better.

Today I want to talk about open educational resources (OER) and what I call the "bull's-eye." When OER was initially launched, we had two primary goals when we were thinking about opening access to knowledge. Certainly, MIT OpenCourseWare was one of the very first big instantiations of what could happen if knowledge became open. We unlocked the treasures, both at universities and at the Hewlett Foundation. In the early days, we sought to test out a variety of content, materials and licenses to seek and understand the space in a very significant way. While our first goal was to open access to knowledge, ultimately this is a precondition to reach the ultimate goal, to improve teaching and learning. We do not want open educational resources to become the next passing fad— the laptop in the classroom, the technology that not everyone knows how to use. Its end goal is to improve teaching and learning. In this context, I am going to highlight the work we are undertaking at the Carnegie Foundation with respect to improving teaching and learning.

This PowerPoint slide is of the Carnegie Foundation for the Advancement of Teaching. We are a hundred-year-old institution. We were chartered by an Act of Congress in 1905 to improve the mission of teaching. Every ten or fifteen years, a new president joins the Carnegie Foundation and the 9th President is Tony Bryk. I was one of his first hires because I love to build and explore new territories. We are building a new program of work for the foundation for the next fifteen years. This is a photo taken when we had the opportunity to work with the Stanford Design School. We had the design school come in and help us think about our R & D field building and community college focus work from a user-centered perspective. The Carnegie Foundation has historically focused on higher education. Tony Bryk, the president, has worked historically in K-12. Community colleges in the United States serve 47% of all students in higher education. They are the huge source of accredited education. They are also a great area to explore and innovate because they do not have some of the constraints that other higher education institutions have.

Next I want to talk a little bit about our overall conceptual framework. For community college students, we are focused on creating alternative pathways through developmental, or remedial, mathematics. I will talk in greater detail later about the mathematics and

statistics pathways. What is really important, though, is our R&D design, which helps us explore this space through a different lens. As we approach these educational challenges, we will blend the potential of openness, the power of networks, and the use of data and evidence to drive practice. What has typically happened in higher education, and just happens as a natural instinct, is that work gets put into silos.

With respect to the practice of teaching: faculty tend to sit in the classrooms alone with the students day by day. The faculty are isolated, tend not to interact with researchers, who themselves are conducting terrific studies in isolated laboratories and developing great designs. What the researchers learn through their studies typically does not feed back well into the classroom. Then we have commercial partners, who think about scale. We tend to put them into a yet a different circle and not integrate them as well. What if instead of having these three silos, we were to bring these groups together? What if from the very beginning we were to design for scale, use principles of openness, think about evidence and data, and bring that back into the practice of teaching?

Then we would not limit faculty to just being the users of content or materials; they would be actually co-developers. What we have then created is a co-development scheme. We are trying to pull these groups, these hubs, together within the Carnegie Foundation. We will have an information infrastructure, that we are now developing, which will be the technology, the backbone— the technical and the social, webbing that will bring us all together. At the same time, while we are trying to tackle particular problems of practice in education, we are thinking about "the whole elephant." I think I need another term, but we are thinking about policy engagement from the top-down as well. We cannot leave the scale and policy plan until the end, until five years out, and then consider how we think about spread. We have to design for it, really, from the very beginning.

The particular goal we are focusing on, and the first problem of practice that Carnegie is tackling, is to prepare students mathematically for the 21st century. We want to do this in a way that is holistic. In the United States, and most certainly in many other places in the world, there are issues of language, there are issues of literacy, and there are issues of how best to "do college." We want to be very focused and data-driven. Many community college students in this country are the first generation in their families to attend institutions of higher education. They tend to be from less affluent backgrounds. They do not have families who can help them navigate the system, so they need guidance. It is not only speakers of English as a second language—we have many languages, obviously, in this country— but those who do not have the academic language to be successful in school as well. So we are trying to think about the issues holistically as we solve this problem of improvement practice.

This PowerPoint slide denotes our current pathway through mathematics in this country. What we do is we direct everyone to calculus. This developmental math sequence is what approximately 70% of community college students in the United States enroll in before they transfer into college level courses. They tend to spend a fair amount of time, money and energy in these courses before they move to the transfer level. Some students' skills

start out in as low as arithmetic— which is really about grade three—then move into elementary algebra, intermediate algebra, and then into the calculus, pre-calculus sequence.

I was discussing this with someone recently, and they said, "Well this is kind of like what we used to do with Latin." Everyone used to need Latin. I took two years. I am sure there are many in the audience who also took several years of Latin. We have come to learn that perhaps Latin is not needed for all students, for many different reasons. I also always say this: I was a math major. I never want to preclude anyone from the joy of taking calculus. Everyone should have that experience if they so choose. But I think there should be alternative pathways for students, and that is what we are working to design at the Carnegie Foundation.

We are creating alternative pathways. One is called "Mathway," which will integrate quantitative reasoning with the arithmetic, pre-algebra knowledge base and redesign the course to be much more conceptual, much less procedural, and prepare students to move along into college-level math courses. This other one, which we are starting with first, is called "Statway." It is a one-year sequence to prepare students for quantitative reasoning and probability and to build in the important concepts around algebra into the statistical problems as they move ahead, but in a very conceptual, rich problem-based course design.

We call this next PowerPoint graph the "Survival Curve Graph." The senior team at Carnegie recently spent a week at the Institute of Healthcare Improvement, which is here in Harvard Square. They are an incredible organization that has worked for over two decades to use data for the science of performance improvement. We are an organization attempting to apply the same science to the education space. If we think about the survival curve for students in developmental math, 100% start out in the fall, and by the spring we have lost students, and we are down to 70%. By the following fall we are down to 57%. At the beginning of year three, we are at 42% students still "surviving". We thus waste an incredible amount of resources and energy through these classes and lose students along the way. If we were a business, we would be shut down. We have to create new ways to serve community college students, because obviously, what we are doing is not effective.

I wanted to share this video of Myra Snell with you. She is a professor at Los Medanos Community College in California. She has designed a one-year statistics course and is piloting an early implementation in her classroom. I think, as we sit here and talk about higher education, it is really, really important for us to remember that it is about the students. We can all bring technology to bear on this, but it is also really important to see the power of what really effective teaching stimulates for student learning.

[Link to five-minute video segment: begin at 12:42]
http://techtv.mit.edu/collections/linc/videos/7600-open-educational-resources-and-the-bulls-eye-opening-access-to-knowledge-and-improving-teaching-and-learning

CASSERLY: I think I enjoy sharing this because it captures the students significantly engaged with the coursework. Any quick comments on the video? Any thoughts?

AUDIENCE: The music's too loud.

CASSERLY: Music's too loud. Okay, we will fix that.

AUDIENCE: You miss some of the content.

CASSERLY: Some of the words are very hard to hear. Yes, one of the students created the video. More importantly, does that look like a typical math class?

AUDIENCE: No.

CASSERLY: Not at all. So what's different?

AUDIENCE: The interaction.

CASSERLY: Interaction.

AUDIENCE: Team play.

CASSERLY: Team play.

AUDIENCE: Critical thinking.

AUDIENCE: They coach each other.

CASSERLY: They coach each other. Who? So who's the teacher in that classroom?

AUDIENCE: The students.

CASSERLY: Right. Peer to peer teaching.

I love the girl with the big eyes. She is saying, "Wait" and "But what are you saying?" And for her to take that risk in a classroom and say, "Hold on. You know, I don't think we have it right." Or for her to step forward and say, "This is what I think is right." And to take the risk of being wrong, without fear of failure, of failing in front of your classmates. Having the comfort zone to do that. I think this is a great example of what we obviously want to work towards as we move forward in 21st- century teaching, as we think about how teams work, as we think about cooperation in the workplace, and leadership.

In our occupations, we are not tested just to fill in bubbles, like this CAOS exam in the video. It is terrific that Professor Snell did not initially realize that the answer was wrong.

The students figured it out themselves. They began a dialogue in the classroom, they knew enough to think critically, and found the test error on their own. Then the teacher had to also stop and say, "How am I going to use my time?" and decided, when she went home that night, that the next day they would revisit the same question, they would create their own data sets, and they would use the precious class time to solve this problem in a deep and meaningful way.

As we consider this, we also want to be thinking about how we can bring this into classrooms overall. We have open educational resources, and we know what is unique about them. We create them, we can share them, and we create the efficiencies that Dr. Vest was talking about. We can improve them, which is critically important. I can take your assets and I can build on them, so I do not have to start from scratch. I can take your lesson plan and localize and adapt it to my student population. Then we can redistribute. So this is really, again, a science of performance improvement. We have resources now that we can improve time and time again.

Thinking about the future… Carnegie has an old logo, which is a tree, from when we were founded in 1905. For a long time, the tree of knowledge was where people came to get knowledge. This is where we have been for a long time for much of our history in education. Now as we think about learning, we have knowledge coming at us from all directions. Within five years, it will be in the cloud. Data will be in the cloud, assets will be in the cloud. We will be able to pull them down from wherever we are, onto any kind of digital device that we might be holding. How do we begin to think about moving from the setting where we have had these very stationary places of knowledge? President Vest's discussion focused on the meta-university, where knowledge is then distributed in many different places. We can gather it in many different ways. We can gather it formally in the classroom with our classmates, we can gather informally through our friends, through Facebook, and our other colleagues. As we move ahead, we should be thinking about this cloud, this experience, because this is what the world will look like in the not-too-distant future.

This last PowerPoint is a map is our networked improvement community that we will be building here within the United States. All the assets that we are creating are going to be openly available. The effort is starting with 19 community colleges that will be coming together this summer at an institute at the Carnegie Foundation. The idea is that we bring teams from each of the colleges to Carnegie to work with the academics, to work with the commercial partners, and to develop content. The initial content for these new materials will be under a Creative Commons Attribution license. As we build the content and we have modules, we will also collect evidence on the effectiveness of the content for different students— what works for which student in which setting— so that we can begin to personalize education in a way that we do not do right now. As we begin to learn and understand this, we will continually improve the content and redistribute. It is through the collective community and the open community that we will be able to figure out what works.

What we really have to do is break down these silos that we have and figure out how we can work in a much more networked way. Clearly, we are all doing that in this audience— I am talking to the audience who understands. Our work at the Carnegie Foundation is to help community colleges build new pathways worthy of mathematics, worthy of the students, and worthy of their institutional missions. We can certainly extrapolate this to other educational missions as our collective work moves ahead. Thank you.