applications for what they're learning."

Evans says that instructors need to be imaginative with their lectures because they do not have forces such as peer pressure keeping students in seats, as they would in the classroom. "People have different ways of teaching things, but with video, you only have one chance to say something," says Evans, noting that a failure to keep the online class engaged can result in hundreds, if not thousands, of students logging off. "There are no tangents or wandering off. You get a snapshot in time, and it doesn't allow for even good digressions." He suggests avoiding anecdotes and verbal detours that make sense in the classroom but might not work online.

COURSE UNCERTAINTIES

Some sceptics remain doubtful that MOOCs can foster a satisfactory learning experience, no matter what technologies are used. They worry that students do not acquire the same breadth of knowledge as in a classroom-based course, and that potentially important bits of content can be left out. Efforts such as discussion boards do not really create a sense of community that replicates a classroom, says Carl Wieman, director of the Carl Wieman Science Education Initiative at the University of British Columbia in Vancouver, Canada. "I wouldn't deny that's possible," he says. "I would deny that anybody has demonstrated they have technology that can do it."

WALTER AND ELIZA HALL INST.

"It is a very different feeling from a regular university course."
Marnie Blewitt

Concerns such as these can be mitigated by community-building technologies that allow students to build connections with each other and their teachers. Instructors can offer one-on-one discussions using Web-based communications programmes; they can also get involved in interactions on discussion forums.

For early-career instructors, the broad appeal of MOOCs can offer something else: name recognition. "Younger faculty do see it as an opportunity for fame, if not fortune," says Evans. "You can really get your name out there far faster." That means that the stakes are high. "We taught more students in this one course," says St. Leger, "than we probably will teach in person for the rest of our careers." ■

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TURNING POINT
Thijn Brummelkamp

Thijn Brummelkamp will receive a Gold Medal and €10,000 (US$13,000) in September from the European Molecular Biology Organization (EMBO), based in Heidelberg, Germany, for co-developing techniques that allow genes in human cells to be inactivated. A geneticist at the Netherlands Cancer Institute (NKI) in Amsterdam, Brummelkamp also co-founded Haplogen, a company in Vienna that aims to identify targets for drugs that treat infectious diseases. He details how he came to be known as an innovator and toolmaker.

How did you become interested in genetics?
When I was young, I liked taking apart radios and televisions. DNA comes close to that: you can break it down and see the consequences. When I started my PhD at the NKI, my project was to identify genes that play a part in cancer. I became frustrated by the limited options for studying the genetics of human cells as opposed to those of model organisms. You cannot do genetic crosses in human cells.

What did you do to tackle this problem?
A colleague and I made a DNA construct to produced hairpin-shaped RNA molecules that silenced genes indefinitely. In the two or three months after we published the research in 2002, about 1,500 people asked for our reagents. You expect a few reactions, but not 1,500. More than 10 years later, people still use hairpin RNAs to examine gene function in human cells. You can make libraries of these hairpin RNA molecules, silence many genes and see which gene is linked to a phenotype of interest.

What did you do after your PhD?
I became a Whitehead Fellow at the Whitehead Institute for Biomedical Research in Cambridge, Massachusetts. The fellowship allows you to work for several years as a group leader without the stress of a tenure clock. And it gives you the freedom to find and start projects.

In 2005, you were named one of the top innovators under the age of 35 by *MIT Technology Review*. How did you feel?
I'd heard of the list, but it was a surprise. It's wonderful to be recognized so early in your career. That can help to convince people to come to your lab, and that is important in the beginning.

What challenges did you face when you moved to the NKI in 2010?
Moving a lab definitely involves some logistics. It takes years to set yourself up — you need to train people, and write grants and safety protocols. If you switch continents, suddenly it all needs to be done again. Not all my lab personnel joined me, so I lost people with experience. Also, transferring grants is not always easy. Almost all animal and safety protocols are different: for example, virus safety-level categorizations can differ from country to country. This slowed things down a bit. I had to wait before experiments could be done, and some experiments that could not have been performed here were done by collaborators in the United States. But now things are fine.

How did co-founding Haplogen affect your career?
It's one of the most exciting things I've ever been involved in. You meet entirely different people — people who work in companies and who help with financing. I'm learning more about the process of drug development, and that's an entirely different world.

What was your reaction when you won the EMBO Gold Medal?
I had not expected I would be considered, let alone that I'd receive it. It's wonderful because many people have noticed it, and I've already had some invitations to seminars and meetings because of it. It's a bit frightening because the expectations might be difficult to live up to.

Do you have any advice for graduate students and postdocs?
What has helped me is being involved in making tools. We could look at known biological problems with new techniques. If you make the tool yourself, you have first access and the most experience with it. That has kept us in business. ■

INTERVIEW BY ROBERTA KWOK