

## OPINION PIECE

---

# Coordinating the edX online course Mechanics ReView: some observations

**Colin Fredericks**

HarvardX, Harvard University, USA

---

### Abstract

Some observations on the differences between teaching face-to-face and through an online course. The opportunities, as well as the things that may be lost, as online education grows.

**Keywords:** edX, online learning, mechanics review, active engagement, MIT

### Coordinating the edX online course Mechanics ReView

I have recently finished coordinating my first online course.

I chose the word 'coordinating' rather than 'teaching' in that sentence, and I'd like to take a little time today to explain why.

Some preliminary details: The course was Mechanics ReView, a physics course offered on edX in the summer of 2013. The course was created by the RELATE physics education research group at MIT, led by Dr David Pritchard. Dr Pritchard's group continues to research the course, and if you'd like to read more about his conclusions I encourage you to follow the group's recent papers. I was part of the group at the time, but have since moved down the street to Harvard.

Mechanics Review focused on the usual topics in Newtonian mechanics - force, energy, momentum, rotational motion, and so forth - at a fairly sophisticated level. It was intended as a second introduction to the topic, for those who had seen the material before and were interested in re-learning it or sharpening their skills. Teachers were our primary target, but because the course

### Corresponding author:

Colin Fredericks, HarvardX, Harvard University, USA  
Email: colin\_fredericks@harvard.edu

was offered on edX, we attracted students from all different backgrounds and from all across the world.

The materials used in Mechanics ReView came from a fairly successful on-campus course taught in an active-engagement style, with students doing problems at the board for 80% or more of the class period. I have several years of teaching experience at a variety of levels, and I was fortunate enough to assist Dr Pritchard in teaching Mechanics ReView on-campus to our students at MIT. The comparison between the on-campus and online experiences, even in courses that drew from the same resources, was sharp enough that I felt compelled to write about it.

Teaching a face-to-face course is something I enjoy. I like that there is an immediate feedback loop between teacher and student, whether via conversation or clicker. Dialogues are high-bandwidth situations: I not only hear a student's words, but hear the tone as well, read facial expression, see body language, and my students can take in the same from me.

I also like being able to twist my lesson and change it on the fly to respond to an insightful question, or even one that comes from ignorance. I'm limited in what resources I can use, but I can deploy them as I see fit, and I can do so very quickly, especially if I'm in my own classroom full of my favourite diagrams and demonstrations.

More than anything, I love seeing the lightbulb moment when a student suddenly grasps a difficult concept. That's what warms my heart and keeps me going on the tough days.

Online courses are a very different environment. Even in places where internet access is reliable and fast, teaching an online course is a low-bandwidth experience. You never see the vast majority of your students, never hear their voices. Communication is typically through written word alone. Responses take hours if not days.

Making a change in the course also takes days. It's not acceptable to deploy a homework problem that no one has tested, or text that has not been proofread. When you have a sudden brilliant inspiration, you need to be patient and develop it just as carefully as you do the rest of the course.

With the entire internet at your disposal, you have many more resources to deploy, but only of certain types. You can't just pop into the demo room to pick up a balancing bird and pass it around the classroom.

In online education, the lightbulb moment becomes something you hear about after the fact. When a student has a realization, no one else knows about it until and unless they write in the course forums. There is no immediacy.

The majority of my job this past summer was not as a teacher, but as a coordinator. I was lucky enough to have a large and wonderful team working with me, and even they weren't teaching the way we think about it in the classroom. They checked problems, proofed texts, fixed bugs, participated on the discussion forums, and generally took care of the day-to-day operations of the course. My job was to provide them with what they needed to do their job well, mostly in the form of support, guidance, and executive decisions. The less work I had to do, the better the rest of the course was working. It was far more managerial than professorial.

Don't take my words as disparagement for online education - take them as 'forewarned is forearmed'. Online education provides many wonderful opportunities, not only for students, but for us as educators. If you're the sort of person who enjoys being in the classroom, you have the opportunity to learn new skills and habits when you move to the online arena. If you don't really enjoy teaching and see it as more of a burden, you have the opportunity to educate others without needing to do it in the classroom.

As an educational researcher and developer, I can't help but be enthusiastic about the current form of online education. Thousands of students! Millions of data points! I'm looking forward to seeing some of the amazing research results that will come out of this over the next 5–10 years. I enjoy being in this field and riding the wave. I'll just need to find another way to scratch that itch for in-person teaching.