

Report on Coursera online course for University of Chicago and Booth School of Business

John H. Cochrane

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In Fall 2013 I developed an online version of my Ph. D. class “Asset pricing” and gave it contemporaneously with the campus class. Here’s what I learned, aimed to a U of C audience. A companion document includes a long review of specific software issues.

Goals

I had several goals in trying this course.

First, I wanted to evaluate whether online classes are useful for the University and Booth school’s outreach goals. We have an evident desire for “global” reach, and “brand” recognition. We want employers, colleagues, customers and business associates of our graduates to hear “you went to Chicago / Booth? What an amazing place!” We want people to know us and advise smart students to come to Chicago. Booth wants also to connect with alumni on an idea level, not just we send you students you send us money, and online offerings seem a great way to forge lifetime connections to and between our alumni.

Offering distinctive online classes seems an important way to achieve these goals. There are many generic introductory classes already offered. Classes that show a distinctive Chicago perspective seem particularly important to these goals. And high-level classes such as this one are particularly distinctive.

Second, I wanted to see how online tools can enhance the classroom experience, and to see if online tools could work in a high-level class. By moving presentation to online, I wanted to avoid traditional lecturing and save classroom time for intensive discussion among well-prepared students.

Third, I summarize research by writing textbooks, and online classes are the modern complement or perhaps substitute for textbooks. I wanted to learn and experiment with the technology.

I started with my PhD course in part because it is a “theory” course, which I thought would be easier to port online than a class with a lot of empirical or case material, and it follows a textbook. I look forward to bringing the more intuitive and empirical content of my MBA class to online format.

In reviewing my experience, note that this is a hard course. The first lecture is “a review of stochastic calculus,” and the core of the course is the mathematical theory of asset pricing. It is normally taught to second year PhD students building on a full year of PhD level microeconomics, macroeconomics and econometrics including time-series tools. Most online courses are simple introductory classes.

Lessons learned -- Students

The class attracted a remarkable 37,000 registrants, even though the only advertising was through Coursera and on my blog. This number quickly declined to about 4,000 who followed the videos and

about 250 who did all the homeworks and final exam. This is still about three times the number I expected to complete the course, and I did not expect the demand to follow the videos at all.

I learned that the audience for lecture videos, with perhaps light multiple choice quizzing, is much larger relative to doing the whole class and problem sets than I thought. For outreach purposes, structuring the class to appeal to people like that is important.

The level of engagement was greater than typical for Coursera courses. There is always a huge drop off as “shoppers” turn in to “students” and 10% per week loss rate is typical. In this class, nearly 50% of those who completed watching Week 1 went on to complete Week 8. From week 4 to week 8 our video numbers were almost static at a bit over 3,000. As of January 18th, a month and a half past the end of the course, 750 students had registered in the last week, and 1245 accessed the site, mostly watching videos, which seem to have a life of their own. (For those interested, Paul Bergen’s and Emily Bembeneck’s reports will have much more detailed student and retention profiles.)

The students were an interesting mix, including Booth alumni working in industry, PhD students at other institutions – even high level ones (I met a Harvard Economics PhD student who took the course!) – master’s students, industry professionals and undergraduates. One student at Goldman Sachs said he was going to make the course a standard part of his training program.

UC Santa Barbara (courtesy Steve LeRoy) wants to use the course in their PhD program, and we’re working out how to do that. One model for MOOCs is that they become the focus of self-study groups, for credit, at universities that can’t staff classes. I got a separate request from West Virginia University to use my lectures as assignments in a credit class. Lots of people may simply not ask and use the Mooc in this way.

Coursera is fairly clearly aimed at an adult education market, with fairly easy introductory courses. This describes well the typical Coursera customer who is reached by simply putting a course on their system. Most of the other universities and business schools (Wharton) who are ahead of us in the online endeavor are offering stripped-down introductory classes. The space to offer distinctive or advanced courses is wide open, and I think we gain more branding and reputation from such classes.

My class required a lot of work. PhD students taking the campus class report about 15 hours a week outside of class. In our exit survey, students who got through the whole course reported a mean of 12.7 hours per week, with standard deviation 7.24, and maximum value 40.

Obviously, willingness and ability to invest the required time is a major limit to the numbers who will take a high-level course, do all the work, and earn a certificate. In response to “what kept you from achieving your goals” 130 answered “professional life, 95 answered “personal life” and most text answers mentioned time. Time is an issue. In discussions with students and email correspondents, many said they were only following videos rather than doing all the homeworks because of the needed time commitment.

I'm not unhappy about this outcome. I offered a no-holds-barred PhD class with PhD-level problem sets. The students who had the time to do that apparently were well satisfied, and those who did not have the time seem satisfied with the experience of videos and light quizzing.

In the future I will clearly separate the "easy" reinforcement quizzes from the harder problem sets to better serve both groups. Several students say they enjoyed the videos and want to come back and do the whole class at a later date, and didn't realize that the quizzes were easy multiple choice affairs.

Though this report contains a lot of my complaints about Coursera, only 5 students answered that "technology" kept them from achieving their goals. Of course, the survey is the 250 who made it to the final exam out of 37,000 who started, and frustrations with technology might account for some of the lost students!

One important lesson is that we (University / Booth) need to market distinctive courses directly to potential students and not just count on Coursera and the group of people who spend a lot of time taking Coursera courses. Booth should find marketing online offerings through alumni/development network a particularly fruitful source of students.

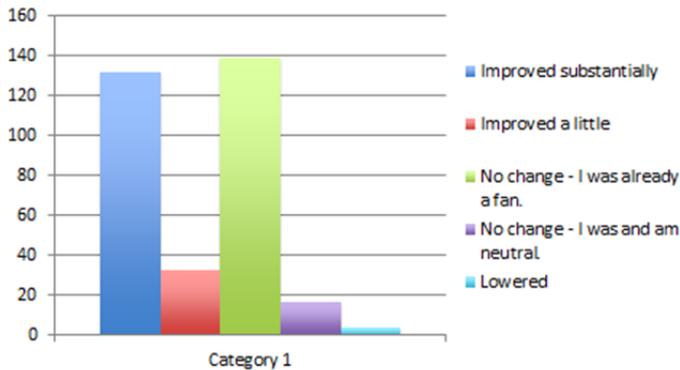
Second, incentives past the achievement of a Coursera certificate may be important to keep people going through the class.

Lessons learned -- my goals

The number and character of people interested in taking even advanced courses online is of course one of the big lessons learned. If the Booth school were to put our superstar teachers in advanced classes on the courser platform – for example, Steve Kaplan's "Entrepreneurial Finance and Private Equity" – I think we would see huge numbers and, more importantly, intellectual and brand impact.

Since one reason to do online classes is for the "branding" effect, I asked in the exit survey how the experience of this class changed the students' opinions of the University of Chicago and the Booth school. The result in graph form speaks for itself (thanks to Emily)

Exit Survey: How Did This Course Affect Your Opinion of UChicago/Booth?



I made my on-campus PhD students take the online course. They were required to view the lectures, and do the quizzes and problem sets before the campus class. I then focused my classroom teaching on discussion rather than presentation of material.

I think this worked remarkably well. Even PhD students, told to do a set of readings and come to class Monday ready to discuss, typically evidence relatively little familiarity with the readings. Forcing them to watch the videos and answer quizzes – with electronic grading and a firm deadline – produced students far more prepared than I have ever experienced. The level of class discussion was very high.

Feedback from the students was strongly positive, though they found some of the software glitches with Coursera a bit annoying. A few students said they really preferred the Coursera lectures. They enjoyed the fact that lectures were more condensed, so they could go quickly through things they were familiar with, but also that they really enjoyed the opportunity to stop, rewind, and study hard parts in depth without worrying about slowing down the class or appearing to ask a stupid question.

Online lectures eliminate the standard experience of getting lost halfway through, watching the clock, and hoping to catch up later.

However, another lesson: the “flipped classroom” requires a different and greater level of effort from the faculty. It’s easy to stand up and write equations on the board, the you pretend to learn, we pretend to teach model. Guiding a discussion while reviewing the important points takes more effort and preparation.

Many Booth courses are structured once per week for three hours, or even more infrequently in the executive and international programs. My experience suggests that pairing a steady online experience, with online communication tools, culminating with in-class discussion will substantially improve the experience of our MBA classes.

Lessons learned -- process

You need an Emily! I worked closely with Emily Bembeneck of the U of C IT group. Emily is very familiar with the software, and handled many of its obscure parts. It is vital to have someone with this personal familiarity with all the quirks of the software.

Emily is also very good at understanding pedagogy of online courses, and this expertise is even more important.

For example, I was all set to record standard hour and a half lectures during my fall classes. No, said Emily – the videos need to be 5-7 minutes long, and do it ahead of time. Divide the lecture into such segments if needed. This alone was a crucial insight. Emily also insisted that the quizzes be structured so students had several chances and could emerge with a sense of mastery. It took a lot of effort and head scratching to achieve these results, while Emily patiently insisted. Both of these would have been course-killing mistakes, and would have required me to redo huge amounts from scratch.

The FT review of Wharton's MOOC effort is revealing here (<http://www.ft.com/intl/cms/s/0/2bfeed6a-5cf0-11e3-a558-00144feabdc0.html> December 9 2013):

The Wharton school at the University of Pennsylvania recently launched four Moocs on Coursera's platform, offering the first-year MBA courses in marketing, corporate finance and operations management,...

Wharton's Introduction to Corporate Finance, filmed in front of a live class. This is the Death March of Moocs. If you make it to section 5b.4, The Capital Asset Pricing Model Part 1, without blood pouring out of your eyes, you deserve more than a Statement of Accomplishment. You deserve a \$300,000-a-year post-MBA job with the Blackstone Group.

The professor, Franklin Allen, provides add-ons, in the form of notes, slides and problem sets and a lively discussion board, but I could see little value beyond what you would get by plodding through a textbook. Prof Allen seems diligent and thorough. And it is certainly noble of him to try. Somehow I imagine his was the lone hand that went up among the finance faculty when the request was made for a Mooc. But the subject matter does not seem made for this medium....

The best was Organizational Analysis taught by Stanford's Dan McFarland. He offers a long, rich course with features to take advantage of the medium. You can choose whether to watch his lectures with him sitting in the corner of the screen or not. Frequent quizzes keep you alert.

Prof McFarland does regular "screenside chats" in which he discusses questions and comments raised by students on the very lively discussion boards. You can buy a custom e-textbook for \$5.86 and supplementary readings for up to \$100. He arranges small group video discussions using Google Hangout and, if you like, you can shoot for a distinction or advanced distinction by writing papers evaluated by your peers.

Next year, many more MBA Moocs are coming on stream. They will range from great to awful and elicit different levels of commitment from students. They are more academic than practical. But for an investment of nothing more than your time, there is going to be a lot of value here.

Allen and Wharton made a crucial mistake, which Emily saved me from. You cannot tape 1.5 hour live lectures. (Having a few students watching the taping is a good idea however, unless you're a superb actor.) As a result, they will have to redo the whole thing.

The McFarland story emphasizes a crucial point – the key to success in an online course is providing lots of engagement with students. I and TAs participated actively in forums and weekly google hangouts. These were popular and students reported they were important to keeping them going. I'm going to be much more attentive next time around.

Again, Emily also insisted on the forums and google hangouts. Again, her knowledge of the pedagogy and best practices was vital to the success of this class.

Finally, Emily served as project manager and scheduler. I'm an academic, always late for everything. That simply will not do for an online class. Emily's role was vital.

I also had two great TAs, Aaron Pancost and Paymon Khorrami. They were up all hours monitoring forums, helping to suggest quiz questions, finding all sorts of typos bugs and misunderstandings, and so on. You need great, self-motivated, thoughtful, technically savvy TAs for a mooc.

Thus, one big "lesson learned" is that the support needed to put together an online class is much larger than I had thought, and requires pedagogical as well as software and video expertise. I envisioned sitting down with the web cam in my laptop and just throwing the class online. This could not be further from the truth.

The U of C IT department made the lecture videos. The quality of these videos is very impressive, and again far better than what would have happened on my own. The shots of the campus framing each video are also important for the branding aspect. There was a whole forum discussion on "is Chicago's campus really that beautiful?"

Many faculty express the fear that they will be inundated with emails. I found this did not happen at all, and keeping up with the forums was not at all a serious constraint on my time. Having TAs that also kept up with the forums and could quickly address typos or other glitches was important.

Now, some less cheery lessons.

Putting this course online took much more time and effort than I had imagined. Academics measure time in research hours. Preparing this class, running it, preparing and delivering the classroom version, and my regular administrative duties consumed all my time including weekends from June 15 until the end of class in December.

Partly this time requirement is the nature of technology: zero marginal cost, but much greater fixed costs. Xeroxing up a problem set full of typos is much easier than porting the same problems online, error free in machine gradeable form. Once done, the marginal cost is zero, but “once done” is not free.

I scheduled the debut of the online class contemporaneously with my campus class. This might have worked OK if I had completely prepared the online class, but I was not quite done. Preparing the online class (primarily getting quizzes and homeworks into online format) took about two weeks per week, with usual administrative responsibilities and preparation for the real class. The result was a crunch as the online class caught up with the calendar, and I ended up not doing a very good job of my real class to avoid catastrophe.

Lesson: If you're going to mix online and real classes, the online class must be completely done and ready to go before you start teaching!

I did not get as much benefit as I imagined from running them simultaneously. I had the real class do the online material one week early, hoping they would catch bugs, but that never happened. For this reason, I recommend that a faculty member run the first instance of an online class during a quarter he or she is not teaching, and then integrate the material in the real class during a separate quarter. Running them concurrently can work once the online class is completely settled, and makes sense in the “flipped classroom” model.

Quizzes and homeworks are a problem. They have to be machine gradeable. Despite all the hype, right now that means multiple choice or numeric entry problems. (Coursera allows text and algebraic expression answers, but these are not really useful in practice. See the Coursera-specific software comments below for details.) I think we did an amazing job of squashing Ph.D.-level homeworks into multiple choice and numeric entry formats, but those formats remain very limiting.

Here, there are strong limitations of the Coursera software that can and should be fixed, immediately. The companion document lists some of these issues in detail. You want students to see question 1, perhaps with subparts, attempt the question, have a few chances (perhaps with declining scores and hints) so that simple arithmetic errors don't leave him or her behind, then view a detailed explanation, and then to move on to question 2 that builds on question 1. This simply is not possible now, and we had to kludge various hacks around the software limitations.

But even with these simple workflow limitations fixed, creating good machine-gradeable assessments for advanced courses remains a challenge. Be aware of these costs. You cannot pose “puzzle” questions – you have to write multiple choice answers to puzzles with seductive wrong answers. You cannot ask students to prove a theorem. Though “sketch a graph” or make one on a computer is a much better way than verbal answers to assign problems in class, the technology can't grade a graph.

It is, however, more possible than you thought to write machine gradeable problems for advanced classes and I got pretty good at it. One key: you separate the grading from the experience. I will have students do a long derivation, then write “in order to grade this, input the expected return if $\gamma = 2$, consumption growth = 5, etc. etc.” The grading act is filling in numbers, just to confirm they got the

answer right. The experience is deriving the equation. But the two do not have to be the same. I asked students to make graphs, then answer verbal or numerical questions to assess if they got the graph right. The experience consists of making and looking at the graph, not filling in the numbers on the website to incent and grade the effort. I also got pretty good at coming up with seductive “wrong” answers for multiple choice questions. Students did not seem to mind the extra step of filling in numbers to satisfy the machine. In the exit survey, the students were in the end much more positive about questions that required numerical input than multiple choice verbal conceptual questions.

Beware the illusion that when you do it once, you’re all done and can just push a button. As is always the case in teaching a new class – and porting a well-established class online should be regarded as the same effort as a new preparation – the first effort just teaches you how to do things better next time. Developing a new class will be a multi-year effort. And even if you’re perfect, the software is clearly going to evolve, requiring constant upgrades of any class.

As the costs of porting a class online are high, the costs of changing things are high as well. Improving a lecture means re-shooting it, re-editing it, reimporting the visuals. Even fixing typos takes a lot of time.

So, like any software project, doing it once does not mean you’re all done – it basically means you’re ready to start from scratch and do it all over again right! That fact multiplies the costs even further.

Bottom line and strategic issues

The bottom line: My hopes and goals were far exceeded. I think online, Chicago-distinctive, high-level classes have the potential to spread the “brand name” far and wide, and to reach and intellectually engage a clientele of important and influential people who will not come to campus for our degree programs.

However, the costs of development are much higher than I imagined.

The model of putting a few fluff introductory level classes online seems to me pointless, and a crowded space already.

But top faculty are unlikely to want to put in this huge effort on a voluntary basis. And creating classes, marketing classes and (just as importantly) improving classes is going to take an expensive support staff. Going online will imply a major commitment of time and money from Booth and/or the University.

On the bright side, I did receive an email from a donor asking where he could give money because he thought the project so important. So perhaps an ambitious online presence is a project that can generate marginal donor money and fund itself that way.

Given this experience, the School and University face a harder strategic question. The costs are going to be big. But how can we not go online? Do we really want our alums taking Stanford’s online classes?

Many faculty have asked if I worry that the online class will cannibalize our in-person curriculum. My experience suggests no. The online class does not provide anything like the personal experience of the campus classes, and the mixed class allowed my campus class to go well beyond and deeper than the online class. The campus class also provides the interaction and motivation needed for most people to complete a class.

Rather, like the garage band that puts its files for free on the internet and then can charge more for its concerts, I think the online version serves its function by raising our brand value. And, if online is going to cannibalize campus, then Stanford and Wharton's online will cannibalize our campus classes anyway!

Many faculty jump to the question how we will monetize online offerings. This question is fraught with difficulty, because if you charge you have to worry much more about cheating, and if you charge you really have to start thinking about giving some sort of formal credit. In my opinion, we can only start charging once we have a very well established and successful free product – and we've solved the credit issue.

The market price seems to be free. However, we pour so much money into branding efforts, perhaps the resources devoted to online classes should be viewed that way, as an investment into branding alumni relations. If we develop online tools primarily to support and improve our campus classes, then we may regard putting those classes online outside the school as an effort with no marginal cost.

In the end, we are a nonprofit, in the business of disseminating what used to be called knowledge and is now called intellectual property! Perhaps we should not jump to the question of how each activity should generate revenue.

Coursera Software Review

John H. Cochrane

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During Fall 2013 I put my Ph.D. level Asset Pricing class online via Coursera. This is a summary of software issues I encountered. This document is intended for University of Chicago, and Chicago Booth faculty and staff developing Coursera classes, and as suggestions for improvements to Coursera.

Coursera is good “version 2.0” software. It is robust – I never had it crash, nor did I find any bugs. It has many limitations that need fixing. It’s a bit clunky, with many things hard to find, and not very well structured overall. Coursera has added features in response to user feedback (like mine), but now risks feature bloat and adding to the complexity of the overall structure by adding features. It needs to relentlessly simplify and keep an accessible structure. Unlike software for full time professional users, Coursera must stay accessible to typical university professors who only use it on occasion.

Already, Coursera has developed its own language and terminology which pose a barrier to newcomers. There is a vocabulary of a hundred or so words, like “variation,” “session,” “publish,” and so on, each with precise meanings.

Lectures and visuals

The University of Chicago IT team produced my lecture videos. I thought the quality very high. You can see clearly the work of professional camera and video people at work.

Presentation of visual material is the weak point of my lecture videos. Most lectures involve describing a slide, a graph, a table, or some other visual object. Visuals are vital to keeping lectures from being boring. Yet, we never found a satisfactory way to show both the lecture and the thing I was pointing at –table, graph, etc. I sent my materials to IT in pdf form, and they incorporated those into the lecture video, but this method did not allow me to highlight the element of the table or graph I was talking about while talking. (I structured the main part of my lecture to be describing material hand written on a blackboard, in part to avoid this problem.) Currently, the U of C IT group is using Wacom tablets for sketching and to generate real-time highlighting of what the professor is talking about. In any case, it is vital to settle a technology for integrating lecture, presentation materials, and some way to point at the materials while lecturing, at the start of any new course.

Surely, however, the standard Coursera format for a lecture should have *two* “screens” visible, one with the lecturer and one with the slide being shown, an easy method for “pointing” at the element of the slide we want to show, and an easy way to update and change the slide/table/graph being shown without reediting the lecture video. The lecture and the slide/table/graph should be separate elements. This should be an utterly standard part of all Coursera lectures!

We need some sort of annotate lectures tool. I found a few typos on the board or points that needed clarification. I kludged by putting an in-video quiz in that explained the issue, but that’s obviously not

ideal. The option for a little running window of text with the lectures for side comments might address this. It would be nice if students could annotate lectures as well.

This is part of a larger problem. The integration of visual material in quizzes, forums and everywhere else is very clunky.

Right now, say I want to illustrate a point with a graph or sketch or put one in a quiz or quiz answer. The process is: create graph or sketch on some software on my machine; save as png; upload png to asset administration; click to produce embed code; copy embed code to quiz or forum editor; paste; edit raw html adding alt= tag; look back on my computer to see what the size was in bits, then add height="" and width="" attributes manually (do arithmetic to keep aspect same), then see if it works. There is a curious bug that uploading a new file does not get rid of the old file, so new files have to be uploaded with new names and href="" adjusted.

This is really clunky and a major disincentive to producing a visually attractive course.

- Coursera needs integrated sketch software so I can make a drawing or annotate something on the fly!
- It needs to implement drag and drop image embedding, with easy resizing.
- Need to fix the bug that if you upload a new version of a graphic file, you can't get rid of the old version

Quizzes and exams

My biggest frustration (and huge time sink) was dealing with the limitations of Coursera's quiz and exam system. It was also my students' biggest frustration and loudest complaint. This may be due to my attempt to put a high level class into a system designed for easy classes. But both Coursera and the University of Chicago want to do high level classes, so this needs to be fixed.

Workflow

In a relatively advanced class, quizzing is more than a 5 second radio-button multiple-choice exercise, and questions may require substantial algebra, programming or calculation. For such a class, quizzes require some structure.

For example, think of a typical 20 question or so quiz, as was common in my class. The student starts question 1, which requires a numerical answer or algebraic expression. The student should be able to enter his answer, see immediately if it is right or wrong. (The instructor may want to have the student do a group or parts a, b, c, all together before evaluating, and needs that control.) If wrong, the student should be able (perhaps with a hint), to try again, perhaps getting a 90% grade reduction with each attempt. At some point, he either gets it right or enters "final attempt," and then sees a detailed explanation. This explanation provides important context and feedback right now, while the student is thinking about the issue.

Complex calculations or thought assignments often take several steps. So if questions 2-5 follow question 1, it's vital for the student to know he has the right answer and right conceptual framework for question 1 before continuing on to questions 2-5. Otherwise, if he made a silly error in question 1, there is no hope for getting 2-5 right. Good homeworks are a guided multistep discovery and generalization process.

Even when questions do not build, it is important that the student be able to see he or she has mastered a question or group of questions, read the final detailed explanation, before going on to another subject.

This structure is simply impossible in Coursera right now, and that's quite frustrating because it would take so little programming to accomplish. Now, the student sees all questions on a quiz in a single webpage. He or she must complete all of them, and then submit them for grading. All "question level explanations" show immediately on the first attempt, so there is no way to give the student a second chance on arithmetic or algebra without displaying the full explanation. There is no way to get question 1 right before moving on to question 2 so questions can build on each other.

At the most basic level, the quizzes show up as one gargantuan webpage! Every computer testing I've ever seen has each question on a separate page and then the student clicks "next" or "previous" to move around. It would at least be nice for students and instructors to have the option to structure quizzes as desired.

One wants to give more attempts for numeric or algebra answers than for multiple choice answers, but that's not possible either. For checkbox answers, the correct and incorrect status of each answer shows immediately, so there is no point to a second attempt. Radio boxes show only the selected answer, so a second attempt makes sense but a third or fourth maybe not. One also may want to lower the grade more for subsequent radio box attempts than for subsequent numerical answer attempts.

One solution would be a third box after "question level explanation" that is "answer", which only shows up after the question is graded in its "final attempt."

We hacked around these limitations by giving "practice" versions that did not count for final points, with no "question level explanations" and then a "final" version which had the "question level explanations." The student entered the final version once, and then got to see the "question level explanations." This still did not allow students to build from one question or part to another, have different numbers of tries for different kinds of problems, but it at least meant they had a chance to fix arithmetic errors. Still, this is a hack and a kludge. It also creates two copies of the questions, making changes doubly expensive.

We also did quizzes with multiple attempts and declining points, but could not give full explanations at the end, so students may not have had the full benefit.

We considered hacking the inability for questions to build on each other by having 10 different quizzes rather than 10 questions, but that would have been just too confusing.

In sum, it must be possible for the professor to

- set a quiz so that “question level explanations” show up after the “final attempt” only; (with possible decline in grade with each attempt before “final”)
- set a quiz so that each question has a different number of attempts (some are harder than others). Obviously questions need some consistency, so if this is implemented the quiz question needs to show in big type “3 Tries Left On this Question” ;
- More generally, every question in a quiz has to have the same grading policy. We should be able to set different grading policies for different questions – and these show to the student, of course.
- set a quiz so that students can have question 1 graded, see the correct answer and see the explanation, before going on to question 2;

Answers should repopulate! If you are allowed to take a quiz a second time you currently have to reenter all the answers, even the ones you got right! A second attempt should repopulate all the answers, and then you just change the ones you got wrong.

We need questions with subparts! Large guided self-discovery questions naturally have question 1 part a, b, c, (and subpart I, ii, iii) etc. Coursera only has numbers. Granted one can physically give out a 84 question quiz, but the organization would be much easier to the student with standard parts and subparts.

It is also very obscure to the professor just when things show up. Only by repeated experimentation did we figure out when each type of quiz showed answer-level explanations, question level explanations, explanations to non-selected answers, etc.

Quiz input

I will not be nostalgic for the long hours spent at Coursera’s quiz input. Nor do I look forward to reviewing and improving.

I really appreciated the ability to enter latex math, and the excellent instant latex and html debugging.

Minor bug: the interface is different between the quiz editor and the forums. Use one interface, preferably the quiz editor interface. The forum interface is an example of “improvements” that just make things more complex. It was easier to enter math in the quizzes.

Now for the problems and complaints:

The text editor can be very slow. It needs to operate on a local copy, not send every keystroke to the server. The editor slows to a crawl when editing the raw quiz xml.

The quiz editor doesn’t have autosave! If you x out the window, you lose everything without even an “are you sure” question box. Ask me how I know. Course pages do auto-save, the quiz editor does not, adding to potential confusion.

Professor, TAs and support staff often work on the same document, then destroy each others' work. It needs a collaborative mode like google docs. At least "note: user x is working on this document," or some lockout mechanism to prevent multiple users from over writing each other's work .

There is no search and replace! An editor without search and replace??

There is no ability to copy a whole question and paste it, except with the massive, confusing (and very slow to edit) underlying xml. There is no way to copy a whole quiz and paste it, again except with the massive, slow to edit xml (The xml editor really hangs up talking to the server.) This means reorganizing questions between different quizzes is hard, repeating a quiz question on a final exam is hard. If you do copy xml, you get the cryptic "use a different number" warning.

Ideally, you want to build a database of quiz questions, quickly see them and include or exclude them (vary year by year), adjust parameters, etc. That would be a nightmare now. Set it up so we can!

Coursera desperately needs a quiz "print" function, that takes the xml for the whole quiz and prints it out in once place. (I guess I could "take" the quiz and then print the webpage. But hopefully you will fix the quizzes so that the whole quiz does not show up on one page, rather that students go forward and back through questions, and then that hack won't work.)

Big picture: Classes need review reorganizing, restructuring: How do I look over my quizzes, see what needs editing, cleaning, moving around, etc.? Now, only by painfully entering each quiz, clicking on each button, seeing what the question is, etc.

(More generally, Coursera should have a section blocked off as UI issues or User Experience Issues; one for instructors and one for students. There are just so many.)

There is no way to insert a new question between questions. You have to insert at the bottom and then slowly click to move up.

The question selector pane ("Question 1", "Question 2" on the left) needs to uncouple from the question editing pane ("Variation 1"). Once I get to question 22, I have to select, then scroll all the way to the top to see it, etc.

Settings are all hidden in boxes. ("Edit Quiz settings," "Edit quiz preamble," question "settings" buttons, etc. How do you check that they are all right? How do you change them all? Answer: laboriously open each question and look at them. The "print mode" or "review mode" needs to let you see quickly what all the settings are without laboriously going through a quiz, checking all the little boxes to bring up little input windows.

The whole system needs flyover help. For example, I'm inputting a quiz. I forgot the difference between "checkbox" vs. "radio." Do I want to close the window, hit "admin help" and go searching? All coursera lingo at a minimum should have flyover help.

< and > inside latex math works in quiz editor, but is interpreted as html when taking quiz.

Math input

In economics like math courses, we want to give questions where an algebraic answer is required. The “math expression” evaluator is really crude. It evaluates expressions by putting numbers in, though the expressions may be invalid for certain ranges. This also severely limits the kind of answers that can be required. It doesn’t know variables can have subscripts, and it doesn’t recognize function names like $u(c)$.

Math needs to be evaluated by symbolic algebra not numeric input! These tools have been easily available for 15-20 years. Let the students enter latex, then evaluate equality to the desired expression with symbolic algebra, not numerical input. The “check equality” functions of standard latex-symbolic algebra packages are very powerful.

Math needs a multiple value input. It is much prettier to ask, after a long setup, “please enter expressions for the mean, variance and correlation of returns,” than “please enter the mean” then “please enter the variance” and then “please enter the correlation” as separate questions. Similarly, I often wanted to have the students create a graph, and since Coursera can’t create a graph I have them enter three data points.

Both math and numeric input need something better than the current vector answer for this sort of question. I used vectors a lot in situations like the above, but that’s really a kludge.

Question types

The numeric input question types only allow one to input correct answers. They should allow us to give hints for specific incorrect answers. For example, if the answer is “5” as in 5%, the answer 1.05 or 0.05 can generate a hint that the units are wrong.

You can’t give two correct algebraic expressions, it wants one and one only. But often two are correct. For example, if it happens that $X=A+B$, then the answer X^2 could also be $(A+B)^2$. There is no way to tell Coursera that $X = A+B$ or to input a second correct answer.

Numeric options should take math expressions for simple arithmetic. For example, you can’t enter 1.5 as $3/2$. Ok, you could make it a “math expression,” not “numeric input,” but then 1.4999 is wrong. And you can’t do a vector of math expressions. Lots of numerical answer questions end up with pointless arithmetic at the end that is easy to do wrong. So, I should be able to allow answers between [1.4 1.6] so that 1.488, 1.50, and $3/2$ etc. all score correctly.

Checkboxes are useless for quizzes with multiple attempts, because students see all answers at once. A quiz type with multiple correct answers in which unselected answers are not automatically considered “not true” would be useful. 2 of 6 options are correct, say A and D. The student picks A and C. He sees that A is correct, C is not correct, but does not instantly see which of B,D,E,and F is in fact the correct answer. (One can hack, with radio buttons; “which statements are correct, A and B; A and C; A and D; B and C...” but these quickly explode in size!)

I hacked around this limitation as follows:

In this homework, we will be using a new attempt to hack around Coursera's limitations. We often want to ask "which of the following 5 options is correct?" If we give a checkbox, however, then you see the right and wrong answers immediately, so you only get one try. If we try to put in radio buttons, the permutations of 5 possible answers go nuts.

So, we're going to grade these as "multiple numeric answers." We will ask,

1) Is the moon made of green cheese?

2) Is the sky blue?

3) Is the ocean wet?

4) Can pigs fly?

You will answer this question by entering "2 3" with spaces, and without a comma, as if it's a vector numeric answer.

(This is actually a preamble of a quiz that used this type of question.) Obviously, not ideal.

There should be standard feedback on every quiz. "I found this quiz easy/hard confusing/clear valuable/pointless" etc. plus how much time each one took. Yes I could hack that by adding a question at the end, graded for zero points, then manually collecting the answers. But the key to Coursera success is going to be refinement of existing classes, and this sort of thing should be built in.

Deeper point *The key to Coursera success is refinement of existing classes*. You're not really thinking about how I approach last year's class and improve it!

Grades

I can't be the only one who is simultaneously running an online and real class. But there was only one "gradebook" which is a huge xls file, so mining this for campus students' grades was a lot of work.

I didn't want to run a separate "session" as that would duplicate everything. Since this is a common issue, it would be very helpful to allow us to transparently keep a separate gradebook for a defined set of students, i.e. the campus class of a "flipped" classroom.

Forums

When you reply to a forum question, you are by default "subscribed" to that forum forever more, cluttering up the forum administration. I couldn't figure out how to "unsubscribe" Turn off automatic subscribe!

A big problem in the forums is that students want to refer to quizzes by question number and subpart. "Week 2, question 5, answer 3 I don't get it." OMG, to answer this it takes 5 minutes to go find what

they are talking about. We need some way to very quickly make links to quiz questions so that we can see the question – without retaking the quiz – and answer it. Emily suggested to courser a single popup button “this question is really confusing” that students could check, an excellent idea.