A MOOC, a Number Two Pencil, and a Ruler: Debating the Transferability of Knowledge Between Online and Traditional Educational Delivery Platforms

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Objectives and Purpose

On May 14, 2013 hundreds of University of Minnesota undergraduates filed into Wiley Hall for a final examination in Economics 1101, Principals of Microeconomics. Each of these students was tested based on knowledge gleaned from lectures, course materials, online problem sets, and previous examinations.

I also sat for the examination although I had not completed a single assignment, attended a lecture or even enrolled in the course. Instead, I completed a massive, open, online course (MOOC) on Microeconomics taught by a professor at a completely different institution.

Testing has never been a personal strength, and even if it were, I have little interest in examinations as a leisure activity. The reasons for this brief, non-scientific exercise were to test the transferability of knowledge across educational delivery platforms and to explore whether success in a MOOC would translate to success in a "traditional" higher education environment.

Although the overall concept for this paper has elements of a research design, the recency of the MOOC phenomenon minimizes the applicability of existing theoretical frameworks. Furthermore, the experimental limitations exclude objective analysis, broad conclusions, or generalizability. Therefore, this paper is intended to promote research and stimulate debate on the fast-moving and rapidly-changing debate of whether MOOCs might be meaningfully incorporated into credit-bearing courses at accredited institutions of higher education, and if so, how.

Background

Over the last two years, MOOCs have gained considerable attention among educators, entrepreneurs, policy-makers, and the public at large. This zeitgeist has been fueled by both trade journals and popular outlets like the New York Times which dubbed 2012, "The Year of the MOOC" (Pappano, 2012).

The vast amount of press coverage about MOOCs has produced a variety of opinions and counter-opinions that extend current debates about higher education into a different, if not entirely new realm. These discussions center on the commercialization of higher education (Farin, 2013), the entry of high-tech entrepreneurs into the educational market (Anderson, 2013), university internationalization and global reach (Lane & Kinser, 2012), opportunities for educational development in emerging economies (Rivard, 2013), access among low income students, admissions and recruitment marketing, prestige-seeking competitive behaviors (Carey, 2013), digital divide access issues, and business-like disruptions in an industry that is traditionally slow to change (Yuan & Powell, 2013).

While each of these viewpoints comprises an important component of the MOOC debate, there is a noteworthy undercurrent relating to the business model of traditional higher education. Much of this debate centers on reduced costs and maximized efficiencies. Thrift (2013) argued that the media "obsession" [with MOOCs] is related to middle-class frustration with tuition costs, a cost-savings opportunity for policy makers flummoxed by higher education expenses in times of economic retrenchment, and a way to maximize institutional efficiency as higher education scales to meet 21st century workforce demands. These points are implicit responses to the Baumol and Bowen (1965) argument that non-profits suffer from a "cost disease" in which

costs always go up because organizations spend all revenue to maximize outputs, but do not realize gains from labor market efficiencies.

Higher education has long sought these efficiencies and MOOCs present a potential opportunity to reduce per-student educational costs while maintaining quality and expanding access. Even Bowen has argued that online education and MOOCs might be a solution to cost inflation because lectures might only be recorded once, allowing professors to allocate time to "higher-value tasks" (Rivard, 2013).

Presented with a new technology and a seemingly enthralled public, law-makers, institutional leaders, and private entities like the Bill and Melinda Gates Foundation have sought ways to integrate MOOCs into the "traditional" higher education marketplace. Since MOOCs provide students with certificates for successful completion and are offered by highly-regarding public and private universities, they present an opportunity to translate online education into credit-bearing options.

Colorado State University appears to have been the first to offer transfer credit for successful completion of a MOOC. To ensure academic integrity, students were required to pay a fee to take an examination at a proctored testing site (Lewin, 2012).

Other institutions have started allowing similar credit-bearing opportunities for MOOC completion including Antioch College, Cleveland State University, Utah State Universities, the University of Arkansas, and the University of Cincinnati (Kolowich, 2012; Jaschik, 2013).

The American Council on Education (ACE) also sanctioned five MOOCs from the Silicon Valley based provider, Coursera. To earn credit students must pay for a digital signature service to ensure that the MOOC participant and the class registrant are the same (Lederman, 2013).

In the policy arena, a bill in the California legislature proposed that the state "compel" public institutions to award credits for MOOC completion, particularly in entry-level courses which generate enrollment bottlenecks and extend time-to-degree (Gardner & Young, 2013). This bill never gained political traction, but it signaled the potential entrance of credit-bearing MOOCs into the state with more public-enrollments than any other in the country (United States Census, 2008).

Of course, there is nothing new about alternative pathways toward college credit. The College Level Examination Program (CLEP), Advanced Placement (AP), and International Baccalaureate (IB) programs have provided generations of students with opportunities to earn college credit by taking coursework or passing examinations. Other prior learning assessments exist in which colleges grant credit for time in the workforce, military, or other service (Birenbaum & Dochy, 1996).

Even massive, open classes have origins predating the Internet. Indeed, The Continental Classroom was born as a pragmatic and cost-effective method to educate a large number of science teachers in the aftermath of the Sputnik launch by the Soviet Union in 1957. The first course, Atomic Age Physics attracted 400,000 viewers despite the six A.M. start time. A follow-up chemistry course attracted 600,000 viewers. By 1961, more than one million students tuned in for a course on probability and statistics taught by the estimable Frederick Mosteller. 75,000 of those students who viewed the course lectures earned credit from more than 300 American universities (Bertsch-McGrayne, 2011, p. 158).

Differences between MOOCs and Traditional Higher Education Classrooms

MOOCs incorporate characteristics of both traditional educational environments and early open-course efforts, but add functionality and flexibility making them appear as efficient substitutes for old educational platforms as well as improvements over previous online education systems including MIT's OpenCourseWare.

First, MOOCs deliver three specific educational functions free of charge: educational content, peer interaction, and course-feedback. Previous open-platforms (e.g. Continental Classroom, MIT OpenCourseWare) provided the content but offered little feedback on coursework and few opportunities for peer engagement. Conversely, standardized testing for credit options (e.g. Advanced Placement, International Baccalaureate) are designed as capstone assessments of formal classes where content is delivered through traditional educational infrastructures. Traditional educational environments provide all three elements, but at a cost to the student or taxpayers.

Second, MOOCs add value by leveraging the size and scale of the Internet. Unlike traditional classrooms where a knowledgeable instructor holds much of the information, MOOCs benefit from the aggregated knowledge of thousands of individuals. Class message boards feature voting mechanisms that promote compelling concepts or help identify confusing or complex material. Message tagging allows segmentation of users into groups with like-minded research or policy interests. With thousands of virtual classmates taking Microeconomics, I quickly found subgroups discussing highly-specialized and favored topics (e.g. Brazilian subsidies for higher education, concert ticket scalping). As it turns out, the concept for this very paper was conceived and fine-tuned on a MOOC message boards.

Third, MOOCs increase instructor flexibility of the curriculum and grading procedures. With apparent demand for high-quality, free education, and few limits on classroom time or space, instructors control course topics, start dates, duration and breadth of material the MOOC is intended to cover. Instructors are also free to produce lectures of varying length and may augment (or not) their own content with web applications, optional readings, or social networking events. With so many possibilities, the MOOC universe quickly crowded with hundreds of courses on a wide-ranging number of topics and even a variety of formats within topics. For instance, this paper is based on my experience taking Microeconomics Principles on Coursera. Not only are there two other Microeconomics Courses available on Coursera, but the instructor for this particular MOOC (José J. Vázquez-Cognet) has offered the same course in four week and eight week durations.

In addition to curricular design, MOOCs offer greater flexibility over grading and certification. Since MOOCs are attended by a large number of students spread across languages and time zones, labor-intensive instructor feedback is replaced with more efficient (albeit less individualized) mechanisms like multiple-choice quizzes, automated grading algorithms, and crowd-sourced peer grading.

Within those boundaries, instructors have substantial latitude to set up courses as they see fit. Instructors offering student-friendly policies may allow untimed quizzes, unlimited quiz retaking, and acceptance of the highest score for each assignment. They may also allow multiple pathways toward certification or simply set the required grade threshold lower than they would in traditional classrooms. Alternatively, instructors might adopt policies that are similar to, or even more stringent than those afforded in a typical classroom. For example, University of

Michigan professor Gautam Saul informed MOOC participants that correct quiz answers would not be provided so his Finance course could be offered in future years (Rivard, 2013).

Significance for Higher Education Researchers, Institutional Leaders, and Policy-Makers

These differences raise important questions which, due to the newness of MOOCs, are central to debates in state houses, policy centers, and universities around the world. In this paper, I am proposing two very broad questions based on my personal experience taking a MOOC:

1. Is academic knowledge transferable across educational delivery platforms?
2. Are MOOCs a potential substitute for traditional classes?

Several studies (Sue, 2005; Smith, Ferguson & Caris, 2001; Teh, 1999) have compared the pedagogical differences and student outcomes between online and in-person classes. These typically involve two experimental groups, both tested for baseline knowledge and then tested again after taking their respective class format.

While this work tests the extent of student learning using different learning platforms, my questions involve the transfer of knowledge from one type classroom to the other. If policy makers argue that students should be able to earn college credit by passing a MOOC followed by a proctored examination, then we should be interested in finding out whether those two systems are compatible.

My MOOC Experience

This paper was based on my experience taking Microeconomic Principles, an eight-week MOOC offered through Coursera that started in January, 2013. The course was taught by Dr. José J. Vázquez-Cognet, from the Department of Economics at the University of Illinois at Champaign-Urbana. I chose this course due to a personal interest in the topic, because it started

at a convenient time, and was offered through Coursera with which I had previous positive experience. To my knowledge, there were no other Microeconomics courses offered at that time on other MOOC platforms (edX or Udacity) although another Coursera option was excluded due to a conflict with a Macroeconomics MOOC starting later in the Spring. When I began this MOOC, it was for personal development only. The idea for this paper was catalyzed in a message board discussion after the course was underway.

Each week, approximately two hours of recorded lectures became available online. Basic concepts and ideas that required in-depth explanation (e.g. supply and demand, opportunity costs) were presented in standard lecture formats using low-tech video while more nuanced experiments (e.g. how trade adds value, the tragedy of the commons) were demonstrated by undergraduates in pre-recorded simulations. The MOOC further expanded the classroom boundaries by filming lectures and interviews in topically-relevant establishments with local entrepreneurs. Many videos showcased campus architecture and each lecture ended with a branded title card. It was evident that MOOCs can provide a powerful medium to reach prospective students, parents, alumni, donors, legislators, and lifelong learners located around the globe.

Students were presented several pathways to course completion. I opted for weekly quizzes ranging from 9-15 questions. This track afforded unlimited chances to retake quizzes with the best score counting for the final grade. Quizzes submitted in the three-day window between the due date and the hard deadline were penalized by ten percent. After quiz submission, answers to questions or references to important lecture videos were provided.

I earned a score of 93% in the class, well above the 80% threshold required for certification. Nevertheless, this score did not reflect quiz retaking. If each quiz was averaged by

the number of attempts, the score dropped to 84.5%, still above the threshold for certification. Totals for scores and attempts can be found in **Table 1.**

Table 1. Quiz scores and averages

Quiz Number	Awarded Final Score	Average Final Score Per Quiz	Possible Points	Awarded Percentage	Avererage Percentage	Difference
0	5	5.0	5	100.0%	100.0%	0.0%
1	9	8.0	9	100.0%	88.9%	-11.1%
2	13	9.7	14	92.9%	69.0%	-23.8%
3	14	14.0	15	93.3%	93.3%	0.0%
4	14	12.5	15	93.3%	83.3%	-10.0%
5	14	12.0	14	100.0%	85.7%	-14.3%
6	12	12.0	14	85.7%	85.7%	0.0%
7	11.7	9.7	13	90.0%	74.4%	-15.6%
8	11	11.0	12	91.7%	91.7%	0.0%
Total	**103.7**	**93.84**	**111**	**93.4%**	**84.5%**	**-8.9%**

Other options for certification were active participation on message boards or application of the covered principles to a final project of academic or professional interest. Each option was gamified in the form of badges, which not only provided flexibility to explore the course at varying depths, but ensured lively discussions on the message boards.

It was on these message boards that I noticed a discussion about MOOCs in which a student asked the group whether it was better to take a Microeconomics MOOC or a similar class in a traditional environment on his own campus. In response, I proposed the following idea:

> Next semester enroll in the course. Go to none of the lectures at all. Read none of the notes. Do not visit office hours. Make absolutely no effort to learn from that instructor. Then, take the exams and see how you do. If you can pass the second course with knowledge from the first, then you could assume that the MOOC is comparable to the other course if not exactly "better."

This proposal seemed possible because the individual in question was employed by an institution of higher education and benefitted from discounted or free coursework. Furthermore,

he had already completed his formal education and was therefore freed from penalties (beyond pride or shame) to achieve a particular score.

Gonzo Experiment

As it turns out, I also work at a university, have completed most degree requirements, and am fairly confident that my future academic or career plans will not be impacted by an optional examination score. As a result, I inquired about taking the final examination for what appeared to be the commesurate course at the University of Minnesota, Principles of Microeconomics (ECON 1101). Shortly thereafter, I received permission and began what what I have since called the "Gonzo Experiment", a nod to self-inflicted journalism pioneered by Hunter S. Thompson in the 1960s and 1970s.

Of course, the use of the term "experiment" is intentionally tongue-in-cheek because nothing about this exercise that can be reasonably called scientific. Instead of deriving a replicable result from a pre-formulated hypothesis, and a priori research questions, the "Gonzo Experiment" was intended to promote discussion and research on potential differences between MOOCs and other educational delivery platforms. Nevertheless, I hewed as closely as possible to an experimental design.

To begin, I avoided all possible information about the University of Minnesota course. Aside from examination instructions (date, time, place and what I should bring) the instructor withheld all other details about the course.

In prepaparation for the examination, I only studied materials from the Microeconomics Principles MOOC, including online videos, lectures, discussion boards, quizzes and accompanying textbook for the course Microeconomics (Krugman and Wells, 2005). I also

limited the amount of time studying these materials to approximately 90 minutes per week. This typically involved re-watching the course videos (usually at 150% of normal speed), reading the appropriate chapters, and then reviewing the quiz. I did not complete any problem sets or exercises that were not required in the initial MOOC syllabus.

Additionally there were several design elements that would be recommended in future empirical investigations even though they occurred coincidentally here. For example I had never taken a formal Economics course at any level. This is not to suggest that I knew nothing about the topic, just that I had never systematically explored the foundational concepts in a formal classroom environment.

Second, the MOOC and the final examination were both tied to introductory, undergraduate-level Microeconomics courses taught at large, public, research-intensive, flagship and land-grant universities in the midwestern United States. While there might be large differences between the course content or instructional methods, it is hard to imagine more similar institutions for comparison. It is debatable whether both coureses were intended for the same audience, but since the purpose of this paper is to discuss the possibility of credit-bearing transfer of MOOCs, I have presumed that similar MOOCs might be the basis for undergraduate course credit at their respective institutions.

Finally, this experiment was improved by the fact that I had no incentive (beyond shame) to do better or worse on this examination than I would naturally. I had already earned the certificate for MOOC completion, and the final examination had no bearing on my academic career. There was no financial penalty because the MOOC and the cost for the examination were free.

The Examination

At the specified time, I went into the lecture hall armed with number two pencils and a ruler that would be used to draw the straight lines in basic econometric models. I took my seat and immediately noticed students reviewing a comprehensive study guide that, until this moment, I had no idea existed.

This caused an immediate, and ultimately accurate, sense that I was not prepared for the examination. Not only was the content beyond my level of knowledge, but I had not accounted for the impact of testing under the duress of a time limit and hundreds of other students confidently pacing through the examination.

Results

Several days later, I received the initial results which are displayed in the **Table 2.**

Table 2. Final examination results

	Total Questions	Questions Covered by MOOC	Maximized Score
Correct	23	12	23
Total	62	37	37
% Score	**37%**	**32%**	**62%**

Based on a comparison of the final examination and the MOOC syllabus, I divided the results into three categories. The first, Total Questions is the raw score calculated based on all examination questions irrespective of their content or inclusion in the Coursera MOOC. The second category, Questions Covered by MOOC is the score calculated based on questions whose content was included in the MOOC, regardless of breadth or depth. This calculation also excluded questions that I answered correctly, but were not covered by the MOOC. The third category, Maximized Score is based on the exclusion of questions not covered by the MOOC, but the inclusion of all correct answers.

Discussion

To be clear: I thoroughly bombed the examination. The most accurate representation of my score is 32%, compared to the 84.5% I earned in the MOOC.

There are many possible explanations for such a wide difference between the two scores, some of which are explored in the next sections.

Breadth and Depth of Material Covered

The courses covered significantly different amounts of material. The Minnesota course met for 2.5 hours per week over a 15 week semester for an approximate total of 37.5 course hours. The MOOC Quiz Mastery Badge, required approximately 20.5 hours of work between the lectures and the quizzes. On a per-week basis the number of hours are approximately comparable (2.5 per week) but the duration of the Minnesota course nearly doubled the total amount of content delivered. This is roughly consistent with my finding that 59.6% of the material on the final examination, was covered in some way during the MOOC. Naturally, I could have put forth more effort by participating more actively on the message boards, completing a final project, or delving into the material further, but given the parameters of the Gonzo Experiment, I must conclude that even with perfect knowledge of all MOOC material, the difference in course length impacted the score.

I would further argue that the MOOC, while providing a very good survey of basic economic theories, left little time or opportunity to explore questions about why certain models or concepts exist. For example, Dr. Vázquez-Cognet explained how to calculate price elasticities of demand in the following way:

…in economics we'll deal with a lot of, many different *elasticities*…*a*nd that compact equation for elasticity now is simply thi*s*…It's a percentage change in the price in the quantity of x as a result of the percentage change in the price of x.

The calculation of percentages, rather than raw quantities differed from other models but I never gave much thought as to why that would be and it never occurred to me to inquire further or engage my classmates on the topic. Naturally, the Minnesota final examination asked why percentages are used. Upon reviewing the MOOC transcript (quoted above) I realized that Dr. Vázquez-Cognet had alluded to the "many different elasticities" suggesting that standardization with percentages allows comparability among different unit types.

This is a small, anecdotal example, and there is no counterfactual evidence that either myself, or a classmate in either classroom format would have asked why we calculate elasticities with percentages. Moreover, the basic dictates of academic freedom allow each instructor to include content as they see fit. Nevertheless, it raises questions as to whether one-directional, pre-recorded lectures, coupled with asynchronous message boards promote a linear, scheduled approach to teaching resulting in fewer intellectual detours.

Application and Practice

While the actual material covered in each class helps explain my abysmal score, another possibility is a lack of systematic practice with problem sets. The MOOC instructor demonstrated many concepts with econometric models and championed their use to understand complexity in the real world. One of the course objectives for the MOOC was to "use supply and demand diagrams to analyze the impact of overall changes in supply and demand on price and quantity" (Vázquez-Cognet, 2013). These models were obviously helpful, but not always mandatory for conceptual understanding and successful course completion. For example, a

typical MOOC quiz question began [1]: "The market for apples is in equilibrium at a price of $0.50 per pound. If the government…"

This question was really about understanding the governmental intervention, not necessarily about deducing the market price for apples from a model. This is not to suggest that the MOOC ignored the basic skill of determing price from a model, just that it had not required that we practice synthesizing these ideas.

In contrast, the Minnesota final examination included a number of problems requiring the interpretation of models as a pre-condition for explaining other concepts. For example, a similar final examination question read: "Refer to the diagram below" followed by, "Suppose that the government…" (University of Minnesota, 2013).

The questions are basically the same, but the former gives slightly more information and seemingly requires less interpretation or practice. The difference in the questions also belies the fact that, the conceptual understanding I gained from the MOOC was not the same as the skill mastery that students in the Minnsota course gained from systematic opportunities to practice on earlier examinations and homework assignments.

During the examination, this was a substantial source of frustration, because numerous concepts were within the scope of the MOOC, but applying that knowledge to test questions remained confusing or slightly beyond reach. After the examination I discussed this challenge with the course instructor, Kelvin Wong [2], who agreed that I had apparent knowledge of some of the concepts, even though I could not translate those accurately on the test.

This problem aligns closely with the literature on conceptual knowledge and procedural knowledge (Star, 2005; Baroody, 2003; Baroody et. al, 2007). Procedural knowledge was

[1] To ensure examination security, I have deliberately eliminated complete questions from this paper
[2] Like the temperature

defined as "familiarity with the individual symbols of the system and with the syntactic conventions of acceptable configuartions of symbols" (Hibert and Lefevre, 1986 pp.7-8 as cited in Star, 2005). The stated difference between knowing something conceptually, but lacking the flexibility to assign that knowledge in a different context was a significant challenge during the Gonzo Experiment.

I would argue that MOOCs, for all of their technological wonder, have limited assessment capabilities. Due to the large number of students enrolled, instructors lean heavily on static, multiple choice quizzes, computer graded problem sets, or peer-graded exercises. Quizzes require a substantial bank of items and answers, particularly if retakes are permitted or correct answers are provided. Given this constraint, it becomes difficult to develop or incorporate dynamic, model-based questions or more challenging forms of assessment.

Difficult, but not impossible. The first MOOC I took from Coursera directed students to an open-source, Java based web applet called NetLogo, where we could experiment with model parameters and see the impact in real time. Quizzes and lectures directed students to construct the model in a certain way, and then answer questions based on the result. Carey (2013) described similar assessment with a "Molecule Builder" in the edX Introductory Biology Course. In both of these cases, the MOOC instructors and course designers found ways to include more robust assessment options.

Naturally, more complex assessments take time and effort which might otherwise be applied toward lecture content or discussion board moderation. So while the edX course from MIT provided challenging assessment exercises, the lectures themselves appear to be videotaped directly in the classes offered on MIT's campus. This contrasts with the Microeconomics MOOC which offered compelling videos that were specifically designed for the online format,

yet provided fewer opportunities for the kinds of assessment that promote practice and procedural learning.

Clearly there can be flexibility in MOOC design, but detailed customization comes with a certain amount of risk. Since MOOCs run like a real class with real deadlines, a small bug or technical oversight can turn instructors and teaching assistants into a technical support or crisis management team. This is exactly what happened to a MOOC titled "Fundamentals of Online Education: Planning and Application", which was shut down prematurely due to a series technological flaws (Kolowich 2013).

Grading Procedure/Repeated Examinations

A different, yet related explanation for my extremely poor performance involves the disparity between high-stakes and low-stakes assessments. For now, few MOOC certificates have value in the educational market and the cost to enroll is zero. Therefore, students have few incentives for completion aside from the intrinsic value placed on viewing the lectures or studying for quizzes. Since MOOC instructors presumably want students to successfully complete their courses, they may be motivated to adopt student-friendly, low-stakes assessments.

The Minnesota students, on the other hand, were partially motivated by the very real costs of failure: lost tuition dollars, repeated coursework, graduate school admission, a competitive labor market, or the wrath of a disappointed parent. These penalties provide stronger incentives for students to rise to a challenge, and likely reduce the motivation for professors to lower the bar.

The Gonzo Experiment allowed me to transplant the motivations of someone with nothing to lose, into the high stakes testing environment. The disastrous results of my

examination performance caused me to rethink how I had completed the MOOC in the first place.

As a student in the MOOC, I used the quizzes as both practice and assessment. Because the instructor for this specific MOOC allowed unlimited attempts, and counted the best score, guessing was implicitly rewarded. After reviewing the time stamp data from my own quiz attempts, I can see improved scores after taking a break to study or review course materials on quizzes four, five and seven. Quiz two, on the other hand, shows rapidly repeated assessments with stagnant or negative impacts on the score.

Concluding Thoughts

The preceding discussion explored some of the possible reasons for the gulf between the score I earned in a Microeconomics MOOC, and the score I earned on a Microeconomics final examination. Of course, there are countless other ways to explain the difference, including the very real possibility that I am not very good at taking tests, have little capacity for learning economics, or randomly had a bad day. Even more obvious is the fact that the two courses, taught by two different instructors at two different universities will never be comparable and that no amount of preparation in one, would be sufficient for success in the other.

This paper has neither the sample size nor the dispassionate objectivity required to confidently answer the questions raised by this difference. Nevertheless, this Gonzo Experiment has led me conclude that without a systematic opportunity to earn transfer credit, I cannot legitimately expect the same educational experience or assessment in a free classroom as in a credit-bearing one. Likewise, I cannot assume that faculty will expect the same level of

dedication and effort from me, when I have paid nothing and have little to lose. This sets up a peculiar stalemate which could be solved by simply beginning to award credit.

With a few exceptions, institutions have not moved in this direction. Instead, they have been largely passive about accepting MOOC certificates for credit, even as they promote MOOC development and align themselves contractually with MOOC providers. By doing so, institutions have established a contradiction in which MOOCs are promoted as legitimate representations of institutional quality, while simultaneously diminishing their value as transferrable credit-bearing courses.

In my own case, I have successfully completed the requirements for courses designed and taught by faculty at the Universities of Michigan and Illinois. Yet those institutions do not consider my accomplishments credit-worthy until I have been admitted to, paid for, sat through, and successfully completed the same courses on their campuses or through their own closed, distance education platforms. Of course, once I go through that established process, my credits are readily available, and transferable, even to Minnesota.

To be fair, institutions have good reasons for caution. They risk brand dilution, foregone revenue, faculty governance challenges, legal issues, and the ability to police academic integrity. Moreover, institutions risk opening the door to credits from an increasingly large, and potentially wild MOOC marketplace.

At the time of this writing quality control appears to be a minor problem because the three main MOOC providers (Coursera, Udacity and edX) have sprung from elite research-intensive universities (e.g. Stanford, Harvard and MIT) and because expansion has been largely limited to similarly prestigious public and private universities around the world. This has resulted in a small group of schools competing for large enrollments in extremely specific topical courses

taught by exceptional faculty. Indeed, I can say without hesitation that the two MOOCs I have completed, were among the best classes I've taken in a long academic career.

Still, one can imagine an environment where MOOC proliferation produces significant variations in quality as providers diminish academic rigor and reduce certification requirements in a competitive race to the bottom. Transferable academic credits leading to actual degrees from accredited institutions are a valuable asset, and institutions are understandably vigilant about controlling the perceived value of academic credentials.

In contrast to the nefarious underworld described above, it is also possible that MOOCs will become less like academic classes, and more like media outlets. An example of this model is Larry J. Sabato's MOOC, "The Kennedy Half Century" which was announced amid great fanfare along with a book, PBS documentary, website, and mobile app of the same name. Professor Sabato is one of America's most reknown public intellectuals, and his MOOC gives anyone in the world with an Internet connection a seat in his classroom. Furthermore, students can earn a statement of accomplishment by receiving 70% on a single, ten question final quiz (Sabato, 2013**).** I happen to be enrolled in Sabato's course and imagine that it will be enlightening. Still, one must question whether the academic rigor is commensurate with similar courses taught at Mr. Jefferson's University or whether a certificate from this course should be accepted for academic credit.

Despite all of these risks, the current higher education model is equally problematic. From the dreaded cost disease to the disparities between the Global North and South, MOOCs may help alleviate some persistent challenges, while potentially exposing new and unexpected ones. Even if one discounts this non-scientific, anecdotal Gonzo Experiment's conclusions that MOOCs are not substitutes for traditional platforms, and may not succeed in translating

knowledge across the gap, I would argue that they are valuable additions to the educational landscape. Nevertheless, until course credit is routinely available, the incentives for MOOC students and instructors faculty will remain misaligned, and the differences I have explored here will likely persist.

Future Research

The conclusion that MOOCs are currently not substitutes for traditional educational environments is certainly open for debate. Clearly this Gonzo experiment should not be interpreted as praise or criticism of this fast-moving and occasionally controversial topic. Instead, my intention was to promote discussion and research on whether the information learned through one platform would be sufficient for success in another.

In my case, it was not.

Future research on MOOCs should focus on understanding whether, under the right conditions, the gap I found, might be narrowed.

Because MOOCs provide rich data on robust sample sizes, it is feasible and cost-effective to employ A-B control group testing using different course design options. In fact, Dr. Vázquez-Cognet and a team of researchers at the University of Illinois are conducting this type of research on the very Microeconomics MOOC, described in this paper.

Similar experiments might explore how the amount of material (measured in both course duration, and length of weekly lectures) is related to course outcomes or how different grading or scoring options contribute to course success and attrition. By varying the permissible number of quiz attempts, researchers could determine optimal levels of difficulty for different types of MOOC participants across a variety of different disciplines. With this data MOOC certificates of

achievement could be differentiated by user motivation, with more generous assessment policies geared toward lifelong learners and more stringent policies for transferable coursework.

Furthermore, researchers might benefit by answering the questions I proposed earlier:

1. Is academic knowledge transferable across educational delivery platforms?
2. Are MOOCs a potential substitute for traditional classes?

If MOOCs are being accepted as credit-bearing courses, we should all know whether the knowledge learned in them is applicable in other environments. While a large scale version of this experiment is certainly possible, it would require testing at sanctioned centers around the country. Instead, I would propose a more localized approach in which a group of students on a particular campus are allowed to complete a MOOC for credit. Those who succeed would then be eligible for extra credit for taking an examination from a different course section, or from a commensurate course at a comparable institution. A similar experiment with traditional course-takers may reveal whether the transferability of knowledge across platforms, might be more generally explained by variations between instructors or institutions.

Finally, before moving forward with continued MOOC development and the potentially costly administration of testing and transfer credits, we need to better understand why people take MOOCs in the first place, and more importantly, why so many students fail to complete them. According to non-random data compiled by MOOC researcher Katy Jordan, only 6.85% of students who began Coursera MOOCs with certification (n=31) ultimately completed the course (Jordan, 2013).

On their face, these rates seem low, but I believe the data are misleading because comparisons with traditional, often costly, higher education options fail to capture the motivations for persistence when something is free. Still, we should be confident that MOOCs are actually generating the per-student cost savings realized only when courses are “massive”.

Limitations

As I have stated throughout this paper, the Gonzo Experiment was non-scientific and should not be construed as an empirical study. Although the researcher made efforts to control for various experimental effects, there were ample opportunities for "cross-contamination." Finally, the results represent the biases associated with being the primary investigator, author, only subject, and homo sapiens.

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References

Anderson, T. (2013). Promise and/or peril: MOOCs and open and distance education. Retrieved from http://www.col.org/SiteCollectionDocuments/MOOCsPromisePeril_Anderson.pdf

Baroody, A. J. (2003). The development of adaptive expertise and flexibility: The integration of conceptual and procedural knowledge. The development of arithmetic concepts and skills: Constructing adaptive expertise, 1–33.

Baroody, A. J., Feil, Y., & Johnson, A. R. (2007). An Alternative Reconceptualization of Procedural and Conceptual Knowledge. Journal for Research in Mathematics Education, 38(2), 115–131. doi:10.2307/30034952

Baumol, W. J., & Bowen, W. G. (1965). On the performing arts: The anatomy of their economic problems. The American Economic Review, 55(1/2), 495–502. Retrieved from http://www.jstor.org/stable/1816292

Baumol, W. J. (1993). Health care, education and the cost disease: A looming crisis for public choice. Public Choice, 77(1), 17–28.

Bertsch-McGrayne, S. (2012). The theory that would not die: How bayes' rule cracked the enigma code, hunted down russian submarines, and Emerged triumphant from two centuries of controversy. Yale University Press. New Haven.

Birenbaum, M., & Dochy, F. J. (1996). Alternatives in assessment of achievements, learning processes and prior knowledge. Retrieved from http://www.voced.edu.au/content/ngv20098

Carey, K. (2013, March 25). The brave new world of college branding. The Chronicle of Higher Education. Retrieved from http://chronicle.com/article/The-Brave-New-World-of-College/138107/

Carey, K. (2013, June 5). MOOCs, robots, and the secret of life. New America Foundation Blog Retrieved from http://higheredwatch.newamerica.net/blogposts/2013/moocs_robots_and_the_secret_of_life-85293

Desantis, N. (2012, January 23). Stanford professor gives up teaching position, hopes to reach 500,000 students at online start-up. The Wired Campus. The Chronicle of Higher Education. Retrieved from http://chronicle.com/blogs/wiredcampus/stanford-professor-gives-up-teaching-position-hopes-to-reach-500000-students-at-online-start-up/35135

Fain, P. (2012, June, 15). Making it count. Retrieved from http://www.insidehighered.com/news/2012/06/15/earning-college-credit-moocs-through-prior-learning-assessment

Gardner, L., & Young, J. R. (2013, March 14). California's move toward MOOCs sends shock waves, but key questions remain unanswered. The Chronicle of Higher Education. Retrieved from http://chronicle.com/article/California-Considers-a-Bold/137903/

Hiebert, J., & Lefevre, P. (1986). Conceptual and procedural knowledge in mathematics: An introductory analysis. In J. Hiebert (Ed.), Conceptual and procedural knowledge: The case of mathematics (pp. 1-27). Hillsdale, NJ: Erlbaum.

Jordan, K. MOOC completion rates. Retrieved from: http://www.katyjordan.com/MOOCproject.html

Kalman, C. S. (1987). Continental classroom remembered. American Journal of Physics, 55(7), 583–583. doi:10.1119/1.15083

Kolowich, S. (2012a, September, 8). MOOCing on site. Inside Higher Ed. from http://www.insidehighered.com/news/2012/09/07/site-based-testing-deals-strengthen-case-granting-credit-mooc-students

Kolowich, S. (2012b, September, 29). MOOCS for credit. Retrieved from http://www.insidehighered.com/news/2012/10/29/coursera-strikes-mooc-licensing-deal-antioch-university

Krugman, P., & Wells, R. (2005). Microeconomics. Worth Publishers. New York.

Lane, J., & Kinser, K. (2012, September 28). MOOC's and the McDonaldization of Global Higher Education. WorldWise. The Chronicle of Higher Education. Retrieved from http://chronicle.com/blogs/worldwise/moocs-mass-education-and-the-mcdonaldization-of-higher-education/30536

Lederman, D. (2013). Expanding pathways to MOOC credit. Inside Higher Ed. Retrieved from http://www.insidehighered.com/news/2013/02/07/ace-deems-5-massive-open-courses-worthy-credit

LeFevre, J.-A., Greenham, S. L., & Waheed, N. (1993). The development of procedural and conceptual knowledge in computational estimation. Cognition and Instruction, 11(2), 95–132.

Lewin, T. (2012, September 6). Colorado state to offer credits for online class. The New York Times. Retrieved from http://www.nytimes.com/2012/09/07/education/colorado-state-to-offer-credits-for-online-class.html

Maddux, C. D., Johnson, D. L., & Ewing-Taylor, J. (2003). Distance education: Issues and concerns. CRC PressI Llc.

Mosteller, F. (1962). Continental classroom's tv course in probability and statistics. The American Statistician, 16(5), 20–25. doi:10.2307/2681960

Pappano, L. (2012, November 2). Massive open online courses are multiplying at a rapid pace. The New York Times. Retrieved from http://www.nytimes.com/2012/11/04/education/edlife/massive-open-online-courses-are-multiplying-at-a-rapid-pace.html

Parry, M. (2010, August 29). online, bigger classes may be better classes. The Chronicle of Higher Education. Retrieved from http://chronicle.com/article/Open-Teaching-When-the/124170/

Pope, J. (2012, November 19.). New frontier for scaling up online classes: credit. Boston.com. Retrieved from http://www.boston.com/business/technology/2012/11/19/new-frontier-for-scaling-online-classes-credit/2V1OqpGchXTKy3Q7cIzhTN/story.html

Rivard, R. (2013, March, 29) Bill bowen's new book on MOOCs and online education. Inside Higher Ed. Retrieved from http://www.insidehighered.com/news/2013/03/29/bill-bowens-new-book-moocs-and-online-education

Rivard, R. (2013, July, 5) No right answers.. Inside Higher Ed. Retrieved from http://www.insidehighered.com/news/2013/07/05/one-mooc-professor-wont-let-students-know-right-answers

Sabato, L. J. Syllabus, course logistic and grading policy. Retrieved from: https://class.coursera.org/kennedy-002/wiki/view?page=overview

Schnoebelen, A. (2013, April 26). Students avoid "difficult" online courses, study finds. The Wired Campus. The Chronicle of Higher Education. Retrieved from http://chronicle.com/blogs/wiredcampus/students-avoid-difficult-online-courses-study-finds/43603?cid=at&utm_source=at&utm_medium=en

Smith, G.G., Ferguson, D., & Caris, M. (2001). Online vs. face-to-face. Technological Horizons in Education, 28, 18-22.

Star, J. R. (2005). Reconceptualizing procedural knowledge. Journal for research in mathematics education, 404–411.

Statistical Abstract of the United States. (1985). U.S. Government Printing Office.

Sue, Valerie M. (2005, September 22). Comparing online and traditional classes. The Free Library. (2005). Retrieved from http://www.thefreelibrary.com/Comparing online and traditional classes.-a0138703656

Teh, G.P.L. (1999). Assessing student perceptions of internet-based online learning environments. International Journal of Instructional Media, 26, 397-402.

Thrift, N. (2013, February 13). To MOOC or not to MOOC. WorldWise. The Chronicle of Higher Education. Retrieved from http://chronicle.com/blogs/worldwise/to-mooc-or-not-to-mooc/31721

University of Minnesota. Department of Economics. (2013). Syllabus. Retrieved from: http://www.econ.umn.edu/econ1101/

Vázquez-Cognet, J. (2013). Introduction to microeconomics. Coursera. Lecture conducted from Champaign-Urbana, Illinois.

Vázquez-Cognet, J. (2013). Definition and classifying of price elasticities of demand. Coursera. Lecture conducted from Champaign-Urbana, Illinois.

Weissmann, J. (2012, July 18). The single most important experiment in higher education. The Atlantic. Retrieved from http://www.theatlantic.com/business/archive/2012/07/the-single-most-important-experiment-in-higher-education/259953/

Yuan, L. & Powell, S. (2013). MOOCs and open education: Implications for higher education. Retrieved from http://publications.cetis.ac.uk/wp-content/uploads/2013/03/MOOCs-and-Open-Education.docx