

Teaching and Learning Together in Higher Education

Issue 9 Spring 2013

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Recommended Citation

Ross, David R. "Opening Up Opportunities for Engagement in Intermediate Microeconomics," *Teaching and Learning Together in Higher Education*: Iss. 9 (2013), <http://repository.brynmawr.edu/tlthe/vol1/iss9/4>

OPENING UP OPPORTUNITIES FOR ENGAGEMENT IN INTERMEDIATE MICROECONOMICS

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My intermediate microeconomics class, at 30-40 students, is smaller than the sage-on-the-stage extravaganzas one would encounter at most universities, but too large easily to foster the expert-apprentice relationship most conducive to turning novices into economists. Until recently, I hadn't thought of making that an explicit goal of the course. I had grown quite pleased with what I have been able to accomplish: helping most students achieve a high level of mastery of three sets of analytical tools (constrained optimization, equilibrium analysis, and comparative statics) seen as integral to the next steps in our major curriculum. A few students take those tools in combination with their experiences in the rest of our curriculum and their own reflections and cross the threshold to become economists. Too few. This paper describes my first semester's experience with trying to retool the course to better integrate it into the process of creating economists.

The strategy is largely one of continuing down a road I started some time ago of moving away from a lecture-based approach to one that frees up more time for engagement — engagement among students and between me and my students. The great leap I've made is trying to shift virtually all of my content-delivery to time and spaces outside of the classroom — a step sometimes called flipping the classroom (Bergman & Sams, 2012; Lage, Platt & Treglia, 2000).

It's been a helpful experience for me to see through conversation and readings our disciplinary curriculum as charged with helping novices cross the threshold to expert status (Shanahan & Meyer, 2006) and to ponder how I can do more to make this core course in the economics curriculum contribute to that process. I am convinced that the key lies in increasing reflective engagement of students in the process and that this engagement is feasible even with the relatively large enrollments that characterize the intermediate microeconomics course on most liberal arts campuses.

The study of economics enables one to see that one can accurately predict and explain a host of market outcomes using a framework in which individuals are assumed to pursue their self-interest in a purposeful, rational manner. Individuals alter behavior in response to incentives, exploiting the advantages from changing conditions and mitigating the harms. From this perspective, one comes to recognize market outcomes that offend — though waste, uncompensated harm, or transgression of norms of fairness and justice — as violations of one or more of the conditions that define the competitive market, the idealized benchmark of the discipline. And one develops yardsticks for evaluating the effectiveness of collective responses to those market failures.

Becoming an economist is a matter both of mastering the analytical tools needed to navigate this theoretical framework that has evolved over the past 250 years and of learning to use that framework as a lens for making sense of the dissemination of goods and services throughout the economy. The typical Economics curriculum starts with gateway courses that introduce this way

of thinking with (ideally) a limited set of analytical tools. It presumes, however, that inquiry in depth, that crossing the threshold to tackling problems as an economist, requires the mastery of a more sophisticated set of analytical tools, typically conveyed in three core courses: intermediate microeconomics (the theory of market exchange), intermediate macroeconomics (employment, price inflation and growth of the aggregate economy), and introduction to econometrics (application of statistical methods to examine the consistency of hypotheses with systematically collected quantitative data).

Mastery of these tools is a prerequisite for making sense of the journal articles one encounters in upper-level electives, formulating and testing answers to research questions in original scholarship, and crafting the underpinnings of arguments in policy debates. Some novices become economists by engaging in these activities. But, many don't. Most who don't are tripped up at or before the intermediate level by failing to master the analytical tools of the discipline at a high quality or exemplary level. That's a shame, because these tools can be made accessible to most college students. But, my concern here is with the students who master the tools, do well on exams, but aren't thinking like economists.

Colleagues in the natural sciences have encountered similar frustrations. I found myself nodding when I first heard (e.g., Crouch & Mazur, 2001) of the experiences at Harvard and other campuses, where A students would find that the experience of taking freshmen physics would have no effect on their answer to a question like, "When a large truck collides with a compact car, which exerts the greater force?" Most students before taking physics choose the truck. Most students after taking physics choose the truck — even those who correctly learned to apply Newton's Third Law of Motion on a host of exam questions. Mastery of the analytical tools is insufficient to make a physicist and is insufficient to make an economist.

Here's a problem that would be as likely to challenge intermediate microeconomics students as much as the truck-car collision problem challenges students in mechanics. The persistence of poverty continues to offend our sense of a just and caring community. One goal of anti-poverty programs is providing the poor with access to adequate housing. An economic novice would see as equivalent each of the following three policies for making a particular level of housing affordable: a rent subsidy (lowering the rental rate so that a dollar increase in the advertised rent might only cost the renter 80 cents more), a housing voucher (a coupon that covers the gap between what the renter is paying now and the rent on the apartment a typical family would choose with the subsidy), or an income transfer equal to the value of the voucher. An economist would think first about the family's options for balancing housing needs with other wants and desires and would rank the income transfer above the voucher above the subsidy as strategies for addressing the family's desires and would offer the reverse ranking if the policy goal is limited to increasing the quality of housing for the poor.

The expert's intuition emerges from the habit of asking how change alters incentives facing market participants — a focus on tradeoffs. The reasoning is a logical extension of the model of consumer choice at the heart of microeconomics. Asked to support her conclusion, the economist most likely would turn to a diagrammatic analysis showing how each policy would alter the budget constraint (resources) facing families and the interaction of those changes with family preferences for housing relative to all other goods and services. This is an analytical tool

taught in virtually any intermediate microeconomics course [1], but, like many in the course, not easily mastered.

Assessing progress toward expert status would best be accomplished by a concept question like, “Evaluate the relative effectiveness of a subsidy, housing voucher or equivalent income transfer in addressing the housing needs of low income families.” But, experience suggests that most students emerging from intermediate microeconomics would be ill-prepared for it, lacking a sense of what analytical tool to draw on to distinguish among the policy options and, indeed, perhaps not even making explicit reference to economic theory. There’d be one or two strong answers, with the rest in a muddle.

Instead, an instructor would be much more likely to ask, “Use appropriate graphical analysis to illustrate an explanation of why a consumer would **always** prefer an equivalent income transfer to a rent subsidy, but is **often indifferent** between a housing voucher and the equivalent income transfer.” A question of this sort will reward the instructor with a spread of answers nicely distinguishing strong from weak student mastery of the relevant analytical tool. But, it doesn’t allow the instructor to assess whether the students with strong answers understand the tool, or, as strategic learners, have memorized how the tool yields answers to similar questions.

I’d rather have students do well on exams of this sort, than not. But, this state of affairs isn’t good enough for at least two reasons. First, this course in intermediate microeconomics is supposed to provide preparation for the remainder of our major. Yet, students at Bryn Mawr who earn B or above in our intermediate theory courses nonetheless, struggle to

- Apply economic theories to topic at hand
- Identify and formulate an appropriate research question or hypothesis
- Draw implications or conclusions of analysis for key question or hypothesis

among other goals from the assessment rubric our Economics Department created to assess student ability to engage in economic research. I also have the sense (although we haven’t tested it) that our very good students (whether majors, minors, or just student who take one or two economics courses) leave Bryn Mawr with a limited capacity to articulate the economic processes behind the headlines or challenges of daily life. That is, I’m not seeing much progress in students becoming economists and, therefore, question the contribution my course has been making to that effort.

What seems to have worked for (many of) the physicists and others faced with a similar problem has been shifting much of the one-way content delivery traditionally accomplished through lecture into time and space outside of the classroom; then using class time for engaged problem solving. The value of this kind of engagement is not unknown in the teaching of economics. Active learning techniques (e.g., group work; think-pair-share) have been encroaching on the traditional chalk-and-talk structure of the traditional economics classroom (e.g., Salemi & Walstad, 2010).

By combining these techniques with a just-in-time approach to organizing class activities (Simkins & Maier, 2004), I’d (finally) gotten pretty good at teaching the analytical tools of

intermediate microeconomics. That is, I'd tweaked the course to the point where I can guarantee that every student who does what I ask them to do will master the analytical tools at a high quality level or above. (I still award my share of C's, because not all students are willing to partner with me.) My basic strategy has been to assess (through on-line modules) student mastery of the textbook material before class, divide my class time between mini-lectures and active learning focused on areas of weakness, and schedule weekly lab sections of 12-15 students during which I coach small groups through problem solving exercises. This has given me a relatively high level of engagement at relatively low cost and made it possible for me to focus office hours on the relatively small number of students needing extra attention. But, I've still been spending the majority of my time in the classroom deriving and demonstrating. Isn't that what a master craftsman (ahem) does with their apprentices?

Why not let the apprentices (er, students) watch the derivations and demonstrations on their own time and increase the time available for problem solving and guided reflection when the instructor is around to help? Here's the version of this sort of flipping the classroom I sought to implement this spring: I'd break down the lecture I would have given years ago into a series of steps — motivating the topic, deriving the tool, connecting it to previous work, and demonstrating its use. Then I drafted a one- to two-page preparation guide directing students to specific resources that seek to address each of those steps. It might be a subsection or solved problem from the textbook or a video more effectively laying out the steps. Often I'd try to provide alternatives, since some students connect more easily with a video while others get more out of a reading (and some students prefer one presenter's approach to another). I've become much more selective in the specific reading I assigned. Whereas my previous approach had been to assign a textbook chapter followed by questions to assess what I didn't need to cover in class; now my goal was to get students to the point before class they would have been upon leaving a traditional lecture room. I actually reduced the number of pre-class assessment questions (from my previous just-in-time approach) and increased the number of feedback questions, such as:

- What was the muddiest aspect of the last class?
- Pick a video or other resource for today's class and be as specific as possible in telling me what aspect of what the presenter or author did that most helped or confused you in understanding the material?
- After completing the preparation for class, what did you find most interesting or most challenging?

This feedback was immediately helpful, but also gave me much to think about as I tweaked the course along the way. Even more valuable for that purpose were weekly meetings with student consultant Roselyn Appenteng, who observed most of my classes and was a conduit for concerns and insights students did not feel comfortable sharing with me.

I envisioned the ideal class as a combination of very limited mini-lectures (on points that weren't clear from the preparation), problem solving tasks (to apply and enhance mastery of the latest analytical tool) and concept questions (that require students to demonstrate an understanding of the principles behind the analytical tools and to make connections with other aspects of microeconomic reasoning). I used seating charts for each class to organize the students into groups depending on my goals for the particular class and their mastery/comfort level with the

material covered before class. For the applied tasks, students would take a minute or two to start work, then share ideas for how to proceed, with me touring the room to coach as needed.

For the concept questions, I'd offer four possible responses; ask students to take a moment to think through their rationale for choosing one over the others; then ask them to use colored letter cards to signal their answer. If more than 70-80 percent of the students had the right answer, I'd ask for one or two students to share their rationale with the full class. If more than 70-80 percent had the **wrong** answer, then I'd probe to get at where folks were going wrong and provide my explanation. The ideal concept question would yield correct responses from between 30 and 70 percent of the students. Then I'd have them discuss the question in their group, testing the persuasiveness of their individual rationales. Running the "quiz" again almost always gave me that 70-80 percent correct response rate.

My goals for the semester were both modest and intimidating. I wanted to see how much of the content delivery (motivation for, derivation and demonstration of the analytical tools) I could shift to the preparation time before class. I wanted to increase the amount of class time students spent engaging with one another, sharing explanations for the logic of their approaches to particular problems, and I wanted to experiment with the lab section time freed up by shifting more of the group interaction to class time. In making these changes, I wanted first to do no harm — to ensure that students attained at least the same level of mastery of the analytical tools as in past years. Finally, I wanted to experiment with my concept inventory instrument and see if I could discern any improvement in student achievement on it, that is, to check our progress in spawning economists.

| | Exam 1 | | Exam 2 |
|-------------------|-----------|-------------|-------------|
| | Fall 2011 | Spring 2013 | Spring 2013 |
| Needs Improvement | 24.1% | 15.8% | 13.2% |
| Adequate | 51.7% | 55.3% | 55.3% |
| High Quality | 13.8% | 28.9% | 23.7% |
| Exemplary | 10.3% | 0.0% | 7.9% |

The deadline for this paper came before the end of our spring semester, but evidence from the first two midterm exams suggests that I've done fine against the "do no harm" yardstick.

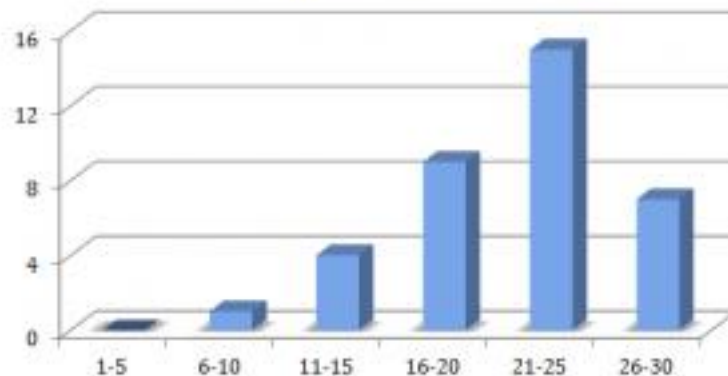
While nearly a quarter of the 29 students in 2011 fell below adequate mastery on the first exam, only 16% of the 38 students this spring failed to reach adequate mastery. And that upward momentum continued on the second exam. Three quarters to 80 percent of students have typically demonstrated high quality mastery in the past and I expect similar results this spring.

The more interesting question is whether I've made progress in helping students grapple with concepts related to these analytical tools, whether I can detect evidence of students crossing the

threshold. Economics lacks anything approaching the testing inventories that have attracted something like consensus among physicists as measuring the ability of students to go beyond analytical tools to internalizing the underlying concepts. I hope to develop one for microeconomics that will convince (at least me) that I am measuring what it means to think like an economist. My starting point is the microeconomics component of the Test of Understanding of College Economics, which was developed as a benchmark measure of economic literacy and has been used in a number of studies of pedagogical innovations, particularly in introductory economics (Walstad, 2001). Some of the questions make more explicit reference to the economist's toolkit that I would like (I hope to find replacements in the future); but this seemed a good starting point. I gave the test on-line to 42 students who showed up for my first class and then again the night before the final class of the semester. I have scores for 36 of the 38 students who completed the semester. The two graphs compare their performance on both assessments. The highest score on the January assessment was 29 out of a maximum of 30. Hence, truncation of measured ability is not a problem. One student scored 30 on the May administration of the assessment. Twenty-two students saw their number of correct answers rise by two or more points; six saw a drop of 2 or more. The median change was an increase of 3 correct answers.

I'm encouraged, but there is lots to think about. I need to convince myself that the inventory is measuring what I want it to measure. Am I really capturing ability to think like an economist? Will it stick? What would happen if I gave this assessment again next fall, or as these students are graduating, or five years after graduation? How much of the improvement is a function of my course design and how much would have happened regardless of any of my particular choices?

May Inventory Scores



I'll be teaching the class again in the fall and have set several next steps for myself. First, I was slow to take advantage of the flexibility the scheduled lab sections give me for different forms of engagement with my students. Much of the coaching through problem-solving that I had been during labs is now happening in class. I intend to use that time more frequently for small group reflection and to address obstacles students bring to achieving my goals for the course. Many students bring deficits (perceived or real) in prerequisite skills. Some students delight in the group work that dominates my class time, while others resist that sort of interaction. Small group meetings give me a better opportunity to address student distress over the novel flipped-

classroom learning environment I am creating and for us to share with one another suggestions for making the best use of preparation time for class.

Large lecture classes have no space for grappling with diverse student preferences and expectations. “Lab time” offers me an opportunity to do so. This is a demanding, required course in a liberal arts major. Crossing the threshold to becoming an economist isn’t a bright spot on the radar of someone who sees the course as one more credential toward an economics major that is a pale imitation of the business degree they really think they want or need. Other students chafe at the focus on analytical tools at the expense of tackling the big ideas of economics. There is no place in a lecture course for conversation about these divergent views.

To replace my in-class lectures, I relied on videos available over the Internet. I’m grateful to the growing number of colleagues who have shared their work. By far the most effective for my purposes are not recordings of classroom lectures, but purpose-created derivations or demonstrations. I was surprised at how often I failed to find an appropriate video that caused me to use in-class lectures this first semester far more often than I had hoped. I plan to fill the gap by creating my own videos over the summer. I consider it to be a failure of the market that more of the superb lecturers in the profession have not found a way to make their presentations available for the common good or on a reasonable subscription basis.

Good concept questions turn out to be hard to write, at least for me. Now that I’ve identified the biggest holes in my portfolio of questions, I plan to work on filling them this summer, as well. I also intend to make drafting such questions be a regular element of our class activities.

There’s much more I’d like to do, but next steps are supposed to be just that. The key takeaways from my experience are that shifting content-delivery to time and space outside of the classroom in a relatively large enrollment economics course creates opportunities for engagement (among peers, between teacher and student, and through self-reflection) impossible to achieve in a traditionally structured course. Creating such opportunities is an essential step if the course is to contribute to helping students cross the threshold from novice to economist. Doing so in no way harms and likely enhances mastery of the typically articulated learning goals for intermediate microeconomics. And I have some preliminary evidence that shifting the focus of the course in the way I have described is effective in helping students cross the threshold to becoming economists.

Notes

[1] She might instead (and perhaps even more precisely grounded in theory) rely on the mathematical properties of the underlying relationships as demonstrated through the application of multivariable calculus.

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