**Flipped Classroom White Paper**

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**EXECUTIVE SUMMARY**

In this paper I discuss using a flipped classroom with peer instruction approach to teaching economics. Briefly, a flipped classroom is one where the lecture material is delivered outside of class and homework is done in class, while peer instruction refers to having the students work collaboratively in class. I go beyond definitions to spell out the nuts and bolts of implementing this approach, including how to use frequent assessment to ensure compliance with out of class assignments. I provide links to many resources that can aid in the process and conclude with a short list of suggested best practices.

**MY BACKGROUND AND MOTIVATION**

I have been a professor since 1984, teaching mainly Economics, but also some International Studies and Political Science at George Mason University, CALTECH, Tulane, CIDE in Mexico City (in Spanish), Duke, and my current home, the University of Oklahoma, where I am a Presidential Professor of Economics.

In my own teaching as well as from doing peer reviews of other faculty, I have noticed more and more student disconnect during traditional lectures. Sitting in classrooms as an observer and watching the Vining, Facebooking, Instagramming, texting, Googling, and general web-surfing going on constantly during the professors’ lectures was a real eye-opener for me. As a back of the classroom observer, I could see the teacher – student disconnect much more clearly than I could from the front of my own classroom.

I then saw Eric Mazur’s amazing [“Confessions of a Converted Lecturer”](http://www.youtube.com/watch?v=WwslBPj8GgI) presentation which presented evidence that a Flipped Class + Peer Instruction approach improved student engagement, problem solving ability, and learning outcomes. Mazur convinced me to try to minimize traditional lecturing and to engage my undergraduate students in class using their own phones or laptops, with the goal of deepening their understanding of economics. I asked to cut back my graduate teaching and took some sections of principles to try and engage and interest students in economics. I began by flipping a small international economics class and am now doing flipping plus peer instruction in principles classes with 30-45 students, though I believe Eric Mazur has shown the methods will work in much larger classes as well.

While I am still learning and evolving as a teacher, I am not going back to my old ways any time soon and I am pleased to be sharing my experiences with you here.

In this paper I’ll define some terms and concepts, explain some of the nuts and bolts of implementing a flipped classroom and peer instruction, give some links to resources to help flippers, and share some tips from my own experiences in a flipped economics classroom.

**DEFINING TERMS**

The flipped class, at its most basic, is a class where the material traditionally presented as a lecture is delivered outside of class time and the material traditionally assigned as homework is done inside the classroom.

The [Flipped Class Manifest](http://www.thedailyriff.com/articles/the-flipped-class-manifest-823.php) defines it as follows:

*“In most Flipped Classrooms, there is an active and intentional transfer of some of the information delivery to outside of the classroom with the goal of freeing up time to make better use of the face-to-face interaction in school. When appropriate, information transfer typically takes advantage of technologies like* [*podcasting*](http://en.wikipedia.org/wiki/Podcasting) *or* [*screencasting*](http://en.wikipedia.org/wiki/Screencast)*. This allows for more time to individualize instruction in the class time and keeps content alive for remediation, review, or other reference when needed. Learners have immediate and easy access to any topic when they need it, leaving the teacher with more opportunities to expand on higher order thinking skills and enrichment.”*

However, there are a lot of ways to implement this idea. Flipping is more of a teaching philosophy than a rigid checklist.

Peer Instruction refers to a method of implementing the “problem solving during class time” part of the flipping equation. At its most basic, it means just what it says: the students teach each other! In my teaching, it means that if there is student disagreement about the answer to a question or problem, then I put the students into groups and let them try to convince each other which of them are right.

This approach can often work better than the instructor explaining the right answer because (a) the instructor may not be able to see at what level the students are having problems, (b) the instructor may not have the right vocabulary to get through to the students having problems, (c) students may feel more free to be open and probing with fellow students than they are with the instructor, and (d) the instructor has mastered this material for so long, they may well have forgotten what the keys were to initially learning it.

**THE NUTS & BOLTS OF FLIPPING**

I believe that a flipped classroom with peer instruction is a fantastic and very effective way to teach undergraduate economics. While I use videos to deliver the course content out of class, and a tool developed by Eric Mazur, called [Learning Catalytics](https://learningcatalytics.com/) to operationalize the “homework in class via peer instruction” part of the flipped classroom, there are a lot of ways to accomplish flipping your economics classroom.

Let’s take the first part of the flipping formula first. At the most basic level, you can assign reading from the textbook to be done out of class (we will discuss ensuring compliance with the outside of class requirements very soon). Or, you can record your lectures in a screencast and assign them to students for out of class viewing. My experience has been that students prefer videos to reading and that students prefer shorter videos to longer videos. There is also [research showing that breaking videos into shorter 5-7 minute “chunks”](http://blog.peerinstruction.net/2013/06/20/two-magical-tools-to-get-your-students-to-do-and-learn-from-pre-class-work-in-a-flipped-classroom/) helps students better retain the information. Of course for a 50 -75 minute lecture, that can be a lot of chunks! However, screencasts of lectures can be much more efficient than in class lectures. You don’t have to repeat yourself, or lose time at the beginning or end of class. You may find that the actual material can be covered in fairly short videos.

Another advantage of putting the traditional lecture material on video is that students then have the ability to “pause” or “rewind” the material. We are all familiar with students that are not ready for us to advance a slide in our class lecture, or who have trouble following our conversational pace. Video content lets students go at their own pace.

If you do not want to record your lectures or make your own videos, don’t despair. One thing the YouTube era has given us is a video for everything under the sun. In my principles class, I use videos from the [Khan Academy](http://www.khanacademy.org/economics-finance-domain/microeconomics). I was able to find appropriate videos there for about 85-90% of the material I wanted to cover. All of them are fairly short and I found no errors in the presentations that I use in my class. [Marginal Revolution University](http://mruniversity.com/) is another great source of short videos. They currently have courses on development economics, the political economy of Mexico, international trade, and history of economic thought, with more on the way (Full disclosure: My wife, Dr. Robin Grier is the creator of the Mexico course). [Jodie Beggs](http://www.youtube.com/user/jodiecongirl) has a nice set of micro and macro videos. For my survey of international economics class, I simply searched YouTube for the topic I was teaching and chose the most appropriate videos from a number of sources. I believe you can find appropriate material for almost any undergraduate economics class on the web. Publishers are also starting to provide resources to help would be flippers. For example, Pearson has produced a series of videos that could be used for flipping a principles class organized around Glenn Hubbard’s textbook.

​If you don’t want to outsource the videos, you can make your own fairly easily and cheaply. I use an iPad and a $2.99 App called [Explain Everything](http://www.explaineverything.com/). You can create PDF slides and then use the mic on the iPad to narrate over them and create a video. You can also underline or draw or write on the slides while you are narrating. This is how Robin made the videos for her Mexico class that is linked to above and I have used it as well. The software is very easy to learn and the students so far have liked the videos we have created. [Here is a link to some videos](https://www.youtube.com/results?search_query=explain%20everything%20demo&sm=1) explaining how to use the App. There are a lot of other apps for video-making ranging from free to fairly expensive that you can use as well. Some examples [are Jing and Camtasia, along with many others](http://en.wikipedia.org/wiki/List_of_screencasting_software).

​ Now let’s talk about getting the students to actually watch the amazing videos you have prepared or discovered for your flipped class. The key to compliance is assessment. I give good old-fashioned quizzes, delivered online out of class with enough credit involved to motivate student participation. While this can be time-consuming, many companies have software to streamline this process like Pearson’s My Econ Lab, Worth’s Econ Portal, McGraw-Hill’s Connect, Aplia, and Sapling.

In my class, there is an online quiz to be completed before every instructional class period. Students get some credit simply for taking the quiz and additional credit based on their score on each quiz. I make these quizzes worth 10-15 percent of the total grade. On the syllabus, I tell the students that everyone starts with zero points and builds up their grade by earning points from that common base. If this level of credit is not sufficient to get the compliance you desire, try 20 percent!

I put a time deadline on completing the quiz that gives me sufficient time to see their answers and evaluate what parts of the material may be causing problems and need to be addressed in class. Other instructors may start class with a quiz over the out of class reading or video assignments. I always end each of my quizzes with an ungraded question that solicits the students to tell me (or the TA if I have one) what part of the material is confusing to them. I prefer to come to class already knowing where the problems are.

**USING PEER INSTRUCTION**

Now let's discuss implementing peer instruction during class time. At the simplest level, the classroom part of the flipped classroom could just be students individually doing their "homework" with the instructor or TAs roving and tutoring. Alternatively the instructor could pose a series of questions to the class and evaluate their answers in real time. Students could answer with a show of hands, or by holding up flash cards of a certain color, or by means of an electronic device, like a clicker, or as in my preferred case, by means of their own web-enabled devices.

If all or most of the class get the right answer, the instructor can beam proudly and move on. If not, the instructor can try to explain the answer to the students, or they can use peer instruction by grouping students with differing answers for discussion / debate. After an appropriate interlude, the students are asked to "re-vote" their answer and the instructor can observe whether the distribution of answers has improved.

As I mentioned earlier, I think Learning Catalytics is ideal for peer instruction in Economics, and I’ve written about how to use that tool in another paper. But there are other ways to implement the concept that don’t require any advanced technology.

[Think, Pair, Share](https://www.youtube.com/results?search_query=think%20pair%20share&sm=3) is an excellent way to get students working collaboratively on a problem or concept. Robin and I each have used this tool with very good results. Putting students into teams to work on problems and then having a team present their results to the class can also be effective. Creating teams for class debates can also be productive. In my semi-flipped graduate Development class, students read papers before class and take turns being discussion leaders as they and their classmates work out the lessons, errors, and inspirations they find in the readings. I serve more as a curator, referee, timekeeper and reality checker than a lecturer.

One thing I really like about using the technology though, is that it allows students to participate and gauge their own understanding of the topic without putting them on the spot to speak in public. I give some credit for simply answering the question and additional credit for answering correctly and get essentially universal class participation. In my experience, asking for verbal responses in general or calling on particular students in class is becoming less and less useful, and many students have expressed appreciation for being able to participate without having to speak up in front of everyone.

**CONCLUSIONS & PRO-TIPS**

If you think that flipping with peer instruction sounds rewarding but also a lot of work, you are right! It is. And instructors don’t always have the luxury of a lot of time or institutional support to re-tool their classroom approach. One thing to consider though, is that you can take an incremental approach to arriving at the destination.

Instructors can pick one element of the approach and implement it throughout the course, then add additional elements the next time they teach it. I started with video homeworks and pre-class quizzes and then added peer instruction the next semester.

I’ll conclude this essay by giving some “pro-tips” for flipping with peer instruction.

1. Don’t tell your students you are experimenting, or what the technique is designed to accomplish. Just do it. Put everything on the syllabus and act like this is just the way it is. I’ve never used the terms flipped class or peer instruction to my students. They are often suspicious of being used as guinea pigs!

2. Don’t worry too much about the quality of the questions you use for peer instruction. If a question is too easy, students will complete it quickly, feel good about themselves and you can move on or even create a more nuanced follow up question then and there. If a question is too hard, it often can show you where students are having difficulty. When I started, I agonized over the questions. Now I just crank them out. If you decide to use Learning Catalytics, Pearson is going to support the software with sample questions for several economics courses.

3. Don’t give students too long a time to answer the in-class questions. Too long a period can break up the flow of the class and cause some students to tune out. After setting a too long period, I let my students vote on how long they should have and they voted to cut the time in half.

4. Do be consistent in your approach. If students are paying for hardware or access to software, be sure to use it regularly.

5. Do realize that you are not alone out there. There’s a large and growing community of instructors using the flipped classroom with peer instruction that share ideas and content on the web. My favorite site is the blog called [“Turn to your neighbor”](http://blog.peerinstruction.net/). You can start with what works for others and then over time create a personalized, custom approach that works best for you.

6. Do take advantage of what you learn from the pre-class quizzes to shape the following class period. It takes work, but knowing where problems are in advance can make class time much more productive.