

# Flipped Learning in Higher Education

## Introduction

Virtually unknown a few years ago, the Flipped Learning model of instruction is gaining attention and adherents among instructors and professors at the college and university levels. In this model, some or most of the direct instruction is delivered outside the group learning space using video or other modes of delivery. Class time is used for students to engage in hands-on learning, collaborate with their peers and evaluate their progress rather than traditional direct instruction delivery. Instructors can provide one-on-one assistance, guidance and inspiration. This facilitates a shift from an instructor-centered classroom to a student-centered learning environment.

Flipped Learning is particularly well-suited to higher education settings for a variety of reasons. The in-class discussion and enrichment activities allowed by moving content delivery outside of class time provide opportunities for students to develop vital skills needed in the 21st century, including critical thinking, creativity, communications, and collaboration. The model can also be especially useful in large lecture courses where student engagement and interaction is usually minimal. When students receive the lecture outside of class they can use time in class with their peers more effectively by breaking up into smaller discussion groups or engage in other in-class activities. Instructors also make more effective use of their time by reviewing content that students actually need help with and guiding student discussions. The Flipped Learning model also allows for differentiated learning in classes of all sizes, since students can review the lecture content at their own pace and ask questions on their own time. Below are some examples from the U.S., Australia, and Canada of how professors have taken the initiative to flip their courses, along with initial data about what they found.

*“In the end, the benefits of the flipped approach are considerable. Students take more responsibility for their own learning. Working in class along with a master of the discipline (you), they learn to think more critically, communicate more effectively, and have a greater appreciation for the unique importance and logic of the subject. And they experience at least some of the satisfaction of learning how to think in a new and, in some cases, life changing way.”*

-Dr. Penne Restad, Distinguished Senior Lecturer  
Department of History,  
University of Texas at Austin.

## University of Washington

Scott Freeman, a popular instructor at the University of Washington in Seattle decided that despite good student evaluations for his gateway biology class he needed to improve his course's 17% failure rate. He knew the problem lay in his students' inability to critically apply the knowledge they absorbed in lecture. Eager to try something new, he adopted the Flipped Learning model for his course by having students complete textbook readings and take online quizzes before class. When students arrived in class he tested their comprehension by having students respond with hand-held clickers to questions on the material. He then asked them to turn to their neighbor to justify their answers. This model of learning, known as peer instruction, has been advocated by Harvard professor Eric Mazur for over a decade and is a common classroom activity in a flipped course.

He was able to reduce his failure rate from 17% to 4%, and the number of students performing at an A level has increased from 14% to 24%. Since the flip, the UW

professor continued to receive positive feedback from his students who recognize that his course works differently than traditional lecture classes. The University is now offering support for other teachers interested in flipping their classroom through their Center for Teaching and Learning.

### Source:

Washington college instructors are 'flipping' the way they teach. The Seattle Times. December 16, 2012. Retrieved at [bit.ly/YcstDH](http://bit.ly/YcstDH)

*“Honestly, Biology 180 was a refreshing change from all the classes I have been taking at UW. I not only learned a lot more in this class, but I was able to retain a lot of it even after the exam.”*

-Mustafa Jafry, student in Dr. Freeman's flipped course majoring in biochemistry and chemistry, University of Washington in Seattle

## University of British Columbia

Physics instructors at the University of British Columbia in Vancouver, Canada decided that they wanted to test a method of teaching that could better engage their undergraduates in large lecture courses (with over 250 students in each section). They created a formal experiment in which the same physics course would be taught by two experienced professors in the traditional lecture format up until the last week of the semester. During the last week two new, less-experienced instructors came in to teach one of the classes in an interactive flipped style while the other class maintained the same professor and traditional lecture style. In the flipped class, students read over textbook pages and then took an online quiz before class, using class time to answer questions with peer discussion groups, perform small-group active learning tasks, and receive personalized feedback from the instructor.

The instructors, including 2011 Nobel Laureate Carl Wieman, found that in the experiment students in the flipped section increased attendance by 20% and that engagement, as measured by four trained observers, increased by 40%. Even more impressive, they found that students in the flipped course scored more than twice as well as students in the control group on a multiple-choice test measuring comprehension of the content in the final week<sup>1</sup>. Students also enjoyed the flipped experiment: 90% agreed that they enjoyed the interactive learning methods tried in the last week. The instructors concluded that using these active learning methods in a flipped course can improve both learning and engagement.

<sup>1</sup>According to the study published in the prestigious peer-reviewed Science magazine, “The average scores were 41 +/- 1% in the control section and 74 +/- 1% in the experimental section. Random guessing would produce a score of 23%, so the students in the experimental section did more than twice as well on this test as those in the control section.”

### Source:

*Improved Learning in a Large-Enrollment Physics Class.* Science. May 13, 2011. Retrieved at [bit.ly/m9an4V](http://bit.ly/m9an4V)

## University of Michigan at Ann Arbor

One of the biggest challenges of learning math in the traditional lecture model is that students must perform the most difficult task - solving practice problems - outside of class where they have no help from their peers or instructor. Realizing this the math department at the University of Michigan at Ann Arbor flipped their mode of instruction for their introductory calculus courses allowing instructors to guide students through the exercises and clear up misconceptions before they become bad habits. In class students are asked to present their answers to their peers or work in small groups.

Instructors in the math department sought to ensure that students understand the key concepts behind calculus, rather than simply be able to solve template problems. To do this they use a 22-question “concept inventory” test that measures comprehension of underlying concepts. When they compared student performance on the same pre- and post-tests between their flipped courses and traditional courses, they found that students in their flipped course were able to make gains at twice the rate.

### Source:

*How ‘Flipping’ the Classroom Can Improve the Traditional Lecture.* Chronicle of Higher Education. February 19, 2012 Retrieved at [bit.ly/I4Shaq](http://bit.ly/I4Shaq)

*“The difference between my classroom before flipping and after is dramatic. The students are fired up now. They’re just devoted to active learning during the entire class period. It’s wonderful.”*

-Michael Garver teaches marketing at Central Michigan University

# Top Motivations for Higher Education Faculty to Flip their Courses

Goal	Importance
Improve students' critical thinking/creative problem solving/higher-order thinking/21st century/professional skills	1
Increase student participation, engagement, and motivation	2
Improve students' team-based skills and peer-to-peer interaction	3
Customize/differentiate learning	4
Make students the center of learning/encourage student ownership of learning	5
Better faculty to student interaction	6
Increase faculty freedom/enjoyment	6
Improve learning outcomes	6
Dealing with absences	7
Encourage faculty collaboration	7
Compensate for limited classroom space	7

Motivating factors were culled from 22 articles on Flipped Learning in a higher education setting.

## Challenges

Flipped Learning is a relatively new model for teaching and, as such, there are challenges to its implementation in institutions of higher education.

### Course Redesign

Perhaps the most common difficulty that faculty face is simply the extra time and effort required to redesign an existing course. Many instructors teach multiple courses, often at multiple locations, and may have other professional activities making it hard to find the time to flip a course. Instructors who have flipped their course have frequently remarked that it does require additional upfront work and a willingness to experiment with different methods. A study done on a flipped course of Dr. Judith Seaboyer, a Literary Studies instructor at the University of Queensland in Australia found that, "There is an initial large time investment, but this pays off in terms of lighter future workloads and students' deeper learning." The planning required at the beginning of implementing a flipped course can mean less work the next year around, as resources and activities can be used over again from year to year.

### Faculty Workload

A key to alleviating the pressure of redesigning a course is not working alone. Instructors often find it helpful to work with one or more colleagues to flip a course. Co-teaching is often cited as an advantage; instructors can make the videos together, switch off making the lessons for each unit, or have one make the videos and the other create classroom activities, including assessments. Just as important is for instructors and professors to be properly trained on how to infuse Flipped Learning into their classes; it's not just about a video. Many schools have put together information to help faculty explore flipped teaching, such as the University of Washington and Vanderbilt University, where instructors can find assistance in their centers for teaching and learning.

## Student Buy-in

Another significant challenge to implementing the Flipped Learning model is achieving student buy-in. While some students struggle with the traditional lecture method, others have become so used to that style that they have a hard time adjusting to something new and innovative. The active learning tasks that are characteristic of a flipped course require students to put in more effort during class and to stay current with the pace of the course. One professor noted, “The flipped classroom received a lot of resistance upfront. What the students didn’t say, but were effectively saying, was that they had to learn at the rate which the classroom was going rather than letting it slide and cramming at the last moment.”

## Student Evaluations

Student evaluations of flipped courses in higher education have varied, with some favoring the hands-on, peer-instruction activities in class and others finding it difficult to follow. One department chair noted his skepticism by pointing to student evaluations that gave the same professor half the the average rating in his flipped course compared to his traditional course. It is unclear if this is caused by student resistance to any form of change, the inexperience of the professor with the new format, a genuine dislike from students, or another factor. Eric Mazur, the Harvard professor, claims that student satisfaction is not the point if students are more engaged and performing better. The reality is that different students have different styles of learning and some will tend to favor the flipped model while others will not. As students and faculty become more experienced with the approach, it is likely that opposition will decrease.

### Source:

*Flipped Classroom Case Study*. University of Queensland, Australia. n.d. Retrieved at [bit.ly/1czR4ta](http://bit.ly/1czR4ta)

Flipped Learning may not be for every teacher in every type of class, so the first thing an instructor needs to do is determine its applicability to his or her course. Finding an online community of practice such as the Flipped Learning Network’s Ning, attending a webinar, conference or workshop, or participating in a training such as the Foundations of Flipped Learning is the best way to hear first hand from experienced practitioners the key to success in any classroom and lecture hall.

### Authors:

Neil Aronson, Pearson Intern, Summer, 2013, Kari M. Arfstrom, Ph.D. Flipped Learning Network & Kenneth Tam, Pearson.

### Resources:

Flipped Learning Network, a not-for-profit organization for flipped educators [www.flippedlearning.org](http://www.flippedlearning.org)

Foundations of Flipped Learning, a professional development course ([bit.ly/1bSJR2v](http://bit.ly/1bSJR2v))

Flipped Learning Literature Review, a meta-analysis of current research ([bit.ly/1c4zHy6](http://bit.ly/1c4zHy6))