# Flipping the College Classroom for Enhanced Student Learning[1]

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## Abstract

The "flipped" classroom has received a great deal of attention in recent years. The major idea behind the flipped classroom is to move lectures to outside of class time and move learning exercises and assessment into the classroom. Many teachers who have experienced this shift in instructional style have found that the flipped classroom is a change in mindset more than a change in methodology. The rapidly growing literature provides evidence that many teachers of flipped classrooms believed the experience to be exalting, with positive student learning and engagement outcomes. The primary goal in flipping the classroom for a first-year, introductory course in Principles of Agricultural Economics was to maximize student outcomes by better utilizing the face-to-face time with students. The design and implementation of the flipped classroom was a highly rewarding and educational experience for the instructor and resulted in higher levels of student learning and satisfaction. Flipped courses allow teachers to provide individualized attention to at-risk students and students who need motivation or academic skills.

## Introduction

The flipped classroom refers to a model of teaching where the traditional lectures are viewed outside of class on a video. Class time is spent on inquiry-based learning: team-based assignments, quizzes and exams. The idea draws on concepts that include: (1) active learning, (2) student engagement, (3) hybrid course design and (4) course podcasting (Educause, 2012). The flipped model, popularized by Sal Khan of the Khan Academy, is getting a large amount of attention in recent years (Ani, 2012; The Economist, 2011; Gobry, 2012; and Talbert, 2012b). Tucker (2012) confirms that, "flipping is rapidly moving into the mainstream" (p. 83). Berrett (2012) reports that the increase in interest in flipping is driven by several trends, including technological innovation, an increase in the demand for accountability for measurable student learning outcomes and budget pressures that provide an incentive to make large traditional lectures more productive. Some evidence suggests that the flipped classroom can result in improved student learning outcomes (Bergmann and Sams, 2012b; 2014; Strayer, 2012).

Bergmann et al., (2011) define the flipped classroom as: *"(1) a means to increase the interaction and personalize contact time between students and teachers and (2) an environment where students take responsibility for their own learning."* Wilson (2013) flipped her undergraduate statistics course with two motivations. First, she desired to move the course closer to a "significant learning experience," (p. 193) as defined by Fink (2013) and second, she desired to make changes that increased student interest, engagement and retention based on the ideas of how to teach "generation next," as popularized by Taylor (2010, 2011).

Tucker (2012) emphasizes that there is no single model for flipping and the core idea is to flip the typical instructional approach: *"With teacher-created videos and interactive lessons, instruction that used to occur in class is now accessed at home, in advance of class. Class becomes the place to work through problems, advance concepts and engage in collaborative learning"* (Tucker, 2012, p. 82).

The major attribute of a flipped classroom is that the teacher can spend more individualized attention on each student and provide more interactive experiences for enrolled students. This often translates into better student-teacher rapport and relationships. When students are placed in teams, students teach each other, a powerful way of learning new material, since students can often explain the concepts to each other in a style more conducive to learning.

Wilson (2013) defines a flipped classroom as *"…moving the typical 'transmission of knowledge' component of a class (i.e. lectures) to outside of the classroom and move the 'application of knowledge' (i.e. homework) into the classroom,"* (p. 194) and goes on to argue that given the current state of information availability in the digital age*, "…professors are no*

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*longer the only (or even the best) source for [the type of information typically included in a traditional classroom lecture]. However, it can be argued that professors remain the best source for guiding students in how to understand and apply information, particularly newly acquired information"* (Wilson, 2013, p. 194)

The primary goal in flipping the classroom in an introductory course in Principles of Agricultural Economics was to maximize student learning outcomes by better utilizing the face-to-face interactions during class time with students. The design and implementation of the flipped classroom was highly rewarding and educational for the instructor and as will be shown below, appears to have resulted in higher levels of student learning and satisfaction. Flipped courses have implications for retention, since pass rates are higher, engagement is greater and teachers can spend individualized attention on at-risk students and students who need motivation or academic skills (Bergmann and Sams, 2012b; 2014; Strayer, 2012).

## Methods

Since 2012, the College of Agriculture at Kansas State University has experienced all-time record enrollments. Although impossible to know the exact cause, enrollment growth is likely due to the boom in the agricultural economy and the recession in the overall (nonagricultural) economy. As a result, courses are full with waiting lists. To deal with this issue, the Department of Agricultural Economics opened an "overload" course for AGEC 120, Principles of Agricultural Economics and Agribusiness for the Fall 2012 semester. The course was opened after the large lecture course was filled with 202 students. The overload course also quickly filled to a classroom capacity of 39 students. After hearing of "flipping" for the past several years, I decided to give it a try, after teaching this introductory course in the large lecture format for nearly 20 years. The motivation for the change followed Bergmann and Sams (2012a), who "… reasoned that the best use of class time centered on engaging students in enriching activities and hands-on experiences" (p. 25). This report summarizes the differences in course format and results between the large lecture course (nine courses during 2001-2008) and the flipped course format (one course in 2012). The courses were all taught by the same instructor. Courses taught by other instructors were not included, since they had not used the "flipped" course format. All courses were included that had both grades and student evaluations available.

The course characteristics for both the traditional lecture course and the flipped course appear in Table 1. One major difference between the two course formats was class size. The traditional class had 150-200 students per course and the flipped course had 39 students enrolled. The smaller course size allowed for the flipped course format to be successful. Wilson (2013) reflects that the flipped course format, "…might be more difficult to implement with a large class" (p. 198). It is important to emphasize that many of the results of the flipped classroom reported here were due to the ability to teach a small class size, as discussed in Barkley (2001). In both traditional and flipped course formats, the content was identical and used the same textbook. The book was updated and revised over time, but the content was largely identical. The level of difficulty was identical. Table 1 summarizes the major differences between course formats. In the lecture course, lectures were conducted during class and covered the material in the book. In the flipped course, lectures were recorded and made available to students on the course homepage on the internet. Recording the videos was a useful exercise for the instructor. Tucker (2012) concluded that *"…crafting a great four- to six-minute video lesson poses a tremendous instructional challenge: how to explain a concept in a clear, concise, bite-sized chunk"* (p. 82). One major benefit to the instructor of flipping a course is to rethink course content by briefly summarizing lectures into videos.

**Table 1. Characteristics of Lecture-Based and Flipped Course in AGEC 120**

| | Lecture-Based Course | Flipped Course |
|---|---|---|
| Enrollment | • 150-200 students | • 39 students |
| In Class | • Lecture on book | • Inquiry-based learning<br>• Team essay assignments |
| Out of Class | • Read book<br>• Weekly Assignments | • Videos<br>• Read book |
| Assessment | • 4 Multiple-choice Exams | • Weekly Quizzes<br>• Biweekly Oral Team Exams<br>• Biweekly Essay Individual Exams |

Perhaps the largest difference between course formats is the quantity and quality of assessment. In the traditional lecture course, assessment was confined to four multiple choice exams: three midterms and one comprehensive final exam. Students enrolled in the flipped classroom experienced frequent assessment and had an assignment due each day of class. On Mondays, a quiz was given based on the video lectures. Wednesdays were lab days, with teams of four students working in collaboration to complete a lab based on the lecture material. Similarly, Wilson (2013) assigned each student into a "learning group" for group homework assignments and in-class activities. She concluded, *"Subjectively, I have witnessed much more interaction among students before and after the class since creating these learning groups"* (p. 195). Teamwork skills are often requested by industry recruiters and are developed in the flipped classroom through small group assignments and examinations. Fridays were exam days, with an oral team exam given every other week and an individual essay exam on every other Friday. The essay exams covered two weeks of material, including what had been covered in the team oral exams in the week before.

At the beginning of the semester, students experienced a transitional period to get used to the frequency of the assessment and the demands of doing work every day. After a few weeks, students appeared pleased that the course requirements forced them to keep up, do the work and learn the material. The flipped

format was also challenging for the instructor, as reported by Tucker (2012): "…there is no magic: course redesign is 'a hard job'" (p. 83). Horn (2013) summarized one of the major adjustments for the teacher*: "Classroom time is no longer spent taking in raw content, a largely passive process... The classroom becomes an interactive environment that engages students more directly in their education"* (p. 78).

## Results and Discussion

To give up classroom lectures and have unique and high expectations for students was at first stressful for the instructor and the students. Berrett (2012) reports that a flipped class, *"…demands that faculty members be good at answering students' questions on the spot, even when their misconceptions are not yet clear because they are still processing the information."* However, the course soon became exhilarating: student learning was high and consistent! Attendance was nearly perfect throughout the entire semester and I learned a great deal about each student. Motivation was individualized, based on each student's personality, ability and academic maturity. Eric Mazur of Harvard University explains that, *"We put a lot of emphasis on the transfer of information. Simply transmitting information should not be the focus of teaching; helping students to assimilate that information should"* (quoted in Berrett, 2012).

Perhaps the most important result of the flipped class was the personalized instruction. I got to know every student and was able to identify and assist struggling students throughout the semester. Wilson (2013) provided statistical evidence that the student evaluations of her course and student performance increased dramatically when her course was "flipped." One reason is that "Students perceive the instructor as approachable and available to help them when needed" (Wilson, 2013, p. 197). The ability to provide personalized instruction is due in part to small class size, but also due to the ability to use class time for personal instruction, discussion and evaluation.

One unexpected result of the flipped course was that it addressed differences in student learning styles. Both videos and the book were available and covered the same material. When students were asked in both informal and formal polls, they were approximately evenly split between those who watched the videos and those who read the book. Of course, the best students did both and benefitted from two modes of learning. Providing both videos and books enhanced learning by targeting differences in learning style across students.

Robert Talbert (2012a) adopted the flipped approach in his math class and found that it was, "sort of magical." Talbert enthused: *"It gave them time, space and a social network in class to encounter difficult tasks and complete them. It freed up huge amounts of time outside of class to work… and I think that students get that it benefits them in these ways."* The grades of the flipped course are compared to the traditional lecture course in Table 2. Higher grades perhaps reflect more student involvement in the course, more personalized interaction with the instructor and more effort due to the frequency of assessment. Wilson (2013) concluded that *"Overall course grades were 9.99 points higher in the first two sections taught using the new method than in the two previous sections"* (p. 197) Since exams were taken by individual students, she concluded that, *"Improvement in exam scores thus reflects improvement in individual student knowledge"* (Wilson, 2013, p. 197).

**Table 2. Summary of Flipped and Lecture Course Grades: AGEC 120, 2001-2012**

| | Flipped | | Lecture | |
|---|---|---|---|---|
| Course Grade | Number | (percent) | Number | (percent) |
| A | 14 | (0.36) | 244 | (0.16) |
| B | 21 | (0.54) | 433 | (0.29) |
| C | 4 | (.10) | 453 | (0.30) |
| D | 0 | (0) | 227 | (0.15) |
| F | 0 | (0) | 155 | (0.10) |
| Incomplete | 0 | (0) | 3 | (0) |

Notes: Lecture course taught 9 times: Fall 2006-2008; Spring 2001, 2003 -2007. Based on availability of grades and student evaluations.

**Table 3. Summary of Flipped and Lecture Course Student Evaluations: AGEC 120, 2001-2012**

| | Flipped | Lecture |
|---|---|---|
| Characteristic | Fall 2012 | 2001-2008 |
| Number of Students | 39 | 150-200 |
| Interested in Teaching | 4.9 | 4.7 |
| Well Prepared | 4.9 | 4.7 |
| Available for Help | 4.9 | 4.7 |
| Teacher Effectiveness | 4.9 | 4.4 |
| Amount Learned | 4.8 | 4.2 |
| Overall Course Rating | 4.6 | 4.2 |
| Percent Recommend Course to Others | 100 | 93 |

Rating Scale: 5=Very High, 4=High, 3=Medium, 2=Low, 1=Very Low.

Notes: Lecture course taught 9 times: Fall 2006-2008; Spring 2001, 2003 -2007. Based on availability of grades and student evaluations.

This anecdotal case study is of one instructor's experience with a "flipped" course. In what follows, data from student evaluations are provided. It must be emphasized that these data are merely suggestive; no intent is made to provide statistical analysis. The numbers presented are descriptive only. Student reactions to the flipped format relative to the traditional course are reported in Table 3. The flipped course increased student evaluations. However, the lecture-based course evaluations are for nine courses, compared to only one flipped course. A more rigorous evaluation and comparison could be undertaken with more data. A flipped course requires that each student come to class prepared particularly in a team-based course. If a student has a poor performance on the Monday quiz, teammates know that the lab on Wednesday will not go as well. Collaborative assignments demonstrated that, in many cases, peers can motivate students better than teachers. If you have high expectations and standards, students will meet them… and even like them in some cases.

There are, however, potential challenges to the flipped teaching practice. Wilson (2013) reports that, *"Some students perceive the lack of lecture and the*

*increased expectation for personal responsibility for one's own learning outside of class time as unfair or unreasonable"* (p. 198). Berrett (2012) agrees: "Students cannot passively receive material in class, which is one reason some students dislike flipping." Horn (2013) also found that flipping *"…doesn't tackle the root causes of the lack of motivation that persists among many low-achieving students." My experience was that a continuous flow of information about the motivation behind the new procedures worked well to reduce some early dissatisfaction with the course. A willingness to quickly and carefully respond to student questions and challenges seemed to help, together with flexibility to admit problems and correct issues when they arose. "The most effective flipped classroom practitioners are very thoughtful about their teaching practice… they're constantly modifying and tweaking their classes"* (Bergmann and Sams, 2012a, p. 25).

## Summary

The increased grade distribution provides the connection between the flipped course format and retention. If students were successful in their first semester, they are more likely to persist. Vincent Tinto, an expert in retention in higher education, stated, *"It is evident that the first year, indeed the first semester, is critical to the student's eventual persistence until degree completion"* (page 451, 1988).

The flipped classroom allowed for a close, supportive relationship between students and teachers. Tinto (1999) reports, *"Students will get more involved in learning, spend more time learning and in turn learn more when they are placed in supportive educational settings that hold high expectations for their success, provide frequent feedback about their learning and require them to share learning with others"* (p. 4). This quote captures the core characteristics of a flipped classroom.

A great deal of research suggests that the most important determinant of retention is student learning. According to Tinto, *"Most importantly, students are more likely to persist and graduate in settings that foster learning. Learning has always been the key to student retention. Students who learn are students who stay"* (page 3, 1999).

A first experience with a flipped classroom suggests that flipping could enhance learning and student engagement. The connection to retention is clear and direct, since the most important aspect of retention is… teaching and learning! The development and integration of new teaching methods into the classroom is beneficial. Successful adoption of new methods includes a great deal of thought, experimentation, trial and error, stress and failure. It is through this discovery process that progress is made and teaching and learning advance.

The design and implementation of the flipped classroom was a highly rewarding and educational experience for the instructor and resulted in higher levels of student learning and satisfaction. Flipped courses have implications for retention, since pass rates are higher, engagement is greater and teachers can spend individualized attention on at-risk students and students who need motivation or academic skills.

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