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ABSTRACT

With the concept of the flipped classroom taking the teaching world by storm, research into its effectiveness, particularly in higher education, has been lacking. This research aims to rectify this by detailing the results of an experiment comparing student success in American Federal Government in a flipped classroom, a traditional, lecture-based classroom, and an online class. The findings suggest that the flipped methodology improves student perceptions about and attitudes regarding the class, both of which can be important in stimulating student learning. While all groups demonstrated a significant increase in performance over the semester, student grades were higher in both the traditional and flipped classes as compared to the online section.

KEYWORDS

American government; flipped classroom; teaching political science

The classic picture of the college classroom is that of a stuffy, older professor standing in front of a blackboard lecturing to a large classroom of students, some falling asleep, some speaking with friends, and only a few paying attention. Undoubtedly, this is what many students dread, fear, and expect when walking in on the first day of class. Those of us who have been fortunate enough to have made it to the front of the classroom understand these challenges and fears as we often experienced them ourselves as undergraduates.

As teaching philosophies in higher education have evolved from a focus simply on research with teaching as a minor plot point to a sustained attention to the quality of teaching, professors have been forced to reevaluate their classrooms and to develop new methods through which to reach their students. One of those new methods is an approach known as "flipping the classroom" or the "flipped class." In general, a flipped classroom entails lectures being prerecorded so that students can listen to them at home on their own time, leaving classroom time for other activities such as discussion, debate, simulations, or group activities.

While the idea of a flipped classroom is attractive to many professors, there has been little research to date on its effectiveness as an educational method in higher learning. This article attempts to rectify that by utilizing a semester-long experiment of student success and perceptions across different learning environments. This article proceeds as follows: First, I summarize the concept of the flipped classroom, discuss some of the arguments proposed in favor of it and describe how I implemented this idea in my American Federal

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Government classes. Second, I describe the experimental design used to compare the flipped classroom to other instructional modalities: the traditional, lecture-based classroom and online classes. Finally, I analyze the results and discuss the conclusions drawn from this experiment. The results suggest that, while no distinct educational advantages were evident across these three classes, student perceptions of the classroom are nonetheless important in stimulating student interest and learning.

The flipped classroom

While there are as many definitions of a flipped classroom as there are teachers who do it, the basic idea behind the concept is that students take part in activities in the classroom instead of lectures. Lectures and lessons are instead available to students prior to class. The assignments that students are then asked to take part in can vary from discussions and debates to interactive simulations and group work (for further descriptions of the flipped approach, see Berrett 2012; Lage, Platt, and Treglia 2000). These activities give students a more hands on approach to learning, appealing to students with a wide array of learning styles.

The idea of the flipped classroom first developed at the K–12 level, particularly in high school. While the basic premise (active learning in the classroom) has been around for some time, in 2007, Jonathan Bergmann and Aaron Sams began to record their lectures for their classes at Woodland Park High School in Colorado. While out of the scope of this article, Bergmann and Sams have detailed their work in a series of blog posts for *The Daily Riff* (www.thedailyriff.com) and Knewton describes the origins and concepts of the flipped classroom in an infographic available at http://www.knewton.com/flipped-classroom/.

What is the methodological underpinning this approach? In fact, some argue that a flipped classroom is not a true flipped classroom unless some sort of active learning is going on (Brunsell and Horejsi 2013). The flipped classroom forces both instructors and students to focus on the active learning of students. Prince (2004, 223) defines active learning as "any instructional method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they are doing." What occurs in the flipped model, then, is the passive learning from lecture or other materials outside of the classroom, allowing for active-learning assignments within the classroom. Given the positive data surrounding active learning (for a good summary, see Prince 2004), the flipped model provides a framework through which instructors can include more of it in their classroom.

Similarly, Flip It Consulting, an organization focused on providing resources and ideas for professionals to flip not only the classroom but other professional activities, defines the flipped model as an acronym: Focus on your Learners by Involving them in the Process. As such, Flip It argues that compared to the lecture model, a flipped activity is focused on participants, is activity driven and places a larger emphasis on higher order thinking skills ("The Lecture vs. The Flip").

Partly because of how the flipped classroom can be applied, there is no ideal consensus on how much of the class needs to be flipped or the nature of the assignments that can be used. Some instructors utilize the flipped model to free up classroom time for engaging discussions that can be more fruitful with students being fully prepared ahead of time. Other instructors will utilize this model for only some portions of the class. Further, the flipped classroom can open up time for the utilization of simulations that can give students hands-on experience with the Congress, bureaucracy, or even the Supreme Court that they might not have grasped otherwise.

Given the relative newness surrounding the idea of the flipped classroom, research into its effectiveness has been rather limited. Robinson Meyer in *The Atlantic* (2013) reports on a 3-year study examining the implementation of the flipped model in a graduate pharmaceutical course that found increased student learning gains and a growing student preference for the flipped model. Using the heading of "learning before lecture," Moravec et al. (2010) find that asking students to complete a short worksheet or lecture prior to an introductory-level biology course helped increase student learning. The flipped model is even making an appearance in law school classes (Rapoport 2013).

Other studies have examined specific teaching tools that are often used in support of the flipped model such as videos and podcasts. Fulton (2012) reports on results at the high school level that indicate that math proficiency increased anywhere from 5.1% in an algebra class to 9.8% in a calculus course. With respect to the use of videos in the classroom in general, Herreid and Schiller (2013) summarize the extensive literature concluding that videos alone have a positive influence on student attitudes, behavior, and performance. Examining videos in a flipped model specifically, a recent study on their use in a pharmaceutical class that aimed to educate students on renal pharmacotherapy led to increased student knowledge and improved student perception of the class (Pierce and Fox 2012).

Some researchers have been more critical of the flipped method. Ash (2012, 6) argues that some educators "believe that flipping is simply a high-tech version of an antiquated instructional method: the lecture." The root of this criticism comes from the fact that students are merely changing the location in which they listen to the lecture from the classroom to the home. Nielsen (2012) also discussed her own reasons for not flipping including the fact that not all students have the needed technology at home and that "flipped homework is still homework." Meanwhile, Mangan (2013) details student concerns over how they might perform in a classroom style that is unfamiliar to them.

One of the common complaints that professors have regarding their students is that they do not come to class having done the readings or being otherwise prepared for the day. In a flipped classroom, these concerns will not be alleviated because students may actually be asked to do more work (Meyer 2013). Further, this problem can be magnified in the college setting where there are fewer meeting days than high school or middle school environments where the flipped classroom has traditionally been implemented.

The literature and its focus to this point is problematic. First, studies such as Fulton (2012) and Herreid and Schiller (2013) looking at the effectiveness of the flipped classroom have focused on particular aspects of the teaching method such as the use of videos or podcasts. Other studies, such as Moravec et al. (2010), only flip a small part of the class. As such, few conclusions can be drawn about flipped classes as a whole class and not merely a part. Secondly, most studies of the flipped classes (including the ones noted above) have looked at science or math classes, not a social science class such as political science. This research builds on these gaps by applying the flipped model to an entire class in an introductory American government course.

Classroom model utilized

Because the flipped classroom is one of the independent variables of interest, it is necessary to explain the set-up of the class used, particularly since there is no generally accepted definition of flipping. The basic idea around which I organized the class was small groups

of students who would work together throughout the semester on a series of engaging assignments. Before that could begin, however, I had to develop and record lectures that students could access outside of the classroom. Utilizing the Garage Band application for Mac, I recorded a series of MP3 s based on my actual classroom lectures. These lectures ranged in length from 15 minutes to 45 minutes depending on the topic. While some professors have chosen to video their lectures and to post the videos to the Web or YouTube or utilize other programs that allow them to sync their lectures with a series of slides, I chose MP3 s because they are the most portable. Students can download them onto their smart phones or burn CDs to play in their cars. They are not dependent on having to be near a computer in order to participate.

Once these lectures were recorded (a significant investment of time to begin with), they were posted to our learning management system, Blackboard. The key idea, however, is that, while some may initially believe the flipped classroom is technology dependent or, rather, high technology dependent, professors and students alike only require a basic minimum of technological experience to make the concept come alive.

I then developed a series of group projects, the descriptions for which are contained in Appendix A. These assignments included the writing of their own group constitution, the creation of their own newspaper (which would then be "sold" in another class thereby simulating the conditions of real-world media problems), and the creation of their own interest group through the making of a Facebook (or "Fakebook" page). These assignments were topped off with a two-week-long simulation beginning with Senate Judiciary Committee hearings to confirm a slate of Supreme Court nominees and ending with those confirmed justices hearing and deciding a real-world Supreme Court case.

Overall, students were excited by these projects. In the constitution project, while some groups chose to focus on the American Constitution, other groups created constitutions for fictional worlds such as *The Hunger Games* or even "benevolent" dictatorships. In any case, all of the students were personally engaged in reading, examining, and understanding the US Constitution, an opportunity they do not usually get in a traditional classroom setting. In other projects, such as Newspaper Wars, groups put together quality newspapers that were quite competitive when it came to "selling" them in other classes. Finally, in the interest-group project, some students even created real Facebook sites to engage students across the university in movements centered around changing the available food options on campus. Overall, then, students found these assignments engaging and exciting while giving them hands-on experience with concepts of government.

To address a potential concern regarding group work, for many of the assignments, there were two components: a group assignment and an individual essay regarding the group portion. For the individual papers, students were usually asked to describe how their group came up with their ideas and how this connects back with the ideas discussed in the material. For example, following their group newspaper assignment, students are asked to discuss the decisions the group made about how they constructed their newspaper and what this says about the political economy of the media today.

The next major decision is how to schedule and organize the classroom. Because my classes met two days a week, I would break those days up as shown in the sample schedule in Appendix B. The first day the class would meet, we would discuss the readings and the lecture so that I could ensure that the students fully grasped the material. On the second day, I would allow the students to work in their groups while I traveled from group to

group addressing problems, answering questions, and ensuring that all students were fully participating.

Experimental design

In order to examine the differences in learning across three different modalities—flipped, traditional (lecture-based), and online—I asked to be assigned three sections of American Federal Government in the Spring 2014 semester. At my university (a small, public, regional institution), American Federal Government is a general education course required of all students and so attracts those outside political science who might otherwise have a vested interest in taking the class. This is an important point for two reasons. First, political science majors may differ in some discernable way from nonmajors, which may affect the results here. To address this, future research may compare success in a majors-only introductory American government course and a nonmajors introductory American government course. Secondly, if we as political scientists hope to recruit new majors for our programs out of these introductory, required courses, it is all the more important that we design courses that are attractive and effective in order to energize and engage potential new majors.

In each of these, I randomly assigned a traditional teaching method, flipped method, and online class to each section. Students were aware of whether they were registering for an on-campus or online class, but they were not aware whether the on-campus class would be traditionally taught or flipped. While this design did not randomly assign participants to each model of teaching, it does control for most other extraneous factors including instructor, textbook, assignments, and exams. All readings, lectures, and notes were exactly the same across the three classes with the only minor difference in being how the group assignments were rephrased as individual assignments. This resulted in the traditional and online students oftentimes not only completing the work an entire group would be doing, but doing it on their own. To account for this, instead of asking for two parts as the flipped class was (described above), papers were shortened into one single paper.

I designed two surveys, one to be given at the beginning of the class and one at the end (Appendices C and D, respectively). The preclass survey consists of three parts: The first asks for information regarding sex, age, academic status, and major as well as why students took the class. The second part contained a learning-style survey and the third contained a set of 10 questions drawn from the US Citizenship Test to measure student knowledge. The postclass survey asked students about their impressions of the class, how they would rate the instruction they received, and whether they would take a similar class again. Finally, the same 10 questions were given to measure any improved performance across the three sections.

For the on-campus classes, surveys were given anonymously in the first week of classes while the online class was asked to complete the survey within the first week via Survey Monkey. The response rates for the preclass survey were high: 93% for the flipped class (of 29 students), 97% for the traditional class (of 30 students), and 100% for the online class (of 11 students). The postclass survey was given the final week of class, again anonymously in the traditional and flipped classes and on Survey Monkey for the online class. For the post-class survey, response rates were 76% for the traditional class, 73% for the

online class, and 72.4% for the flipped class. For both the preclass survey and postclass survey, students completed an Institutional Review Board-approved informed-consent form.

In reporting their majors, only one political science major was reported across the three classes (dual major with history) and the most common major was psychology (eight students) followed by nursing (seven students), and undecided or undeclared (six students). This further underscores that this class was directed mostly towards nonpolitical science majors. The most common reason given for registering for the class was because it is required (94%).

One major caveat that should be kept in mind with this design is that it is a one-semester snapshot of one set of students and does contain a small sample size, particularly with respect to the online section. It is entirely possible that the results may be different given a different set of students or a different mix of students. Ideally, this study could be continued over a series of semesters to confirm the findings; however, due to the teaching needs of my school and department, it was not possible to expand the study beyond one semester.

Results

Pre-class survey and midterm grades

The pre-class survey was designed to do two things: discern any differences between students demographically across the three sections that could affect student perceptions and performance and measure students' current knowledge regarding American government. Table 1 displays the modal responses across the entire study population and Table 2 contains the modal responses in the traditional, flipped, and online courses.

According to Table 1, the typical student was over 25, female, and an academic freshman with a grade point average (GPA) between 3.0 and 3.5. This matches well with the overall university's demographics (62% female, almost 30% freshmen, with an average full-time age of 25 as of Spring 2014).

The more important piece of information to come from these results is to know if any of the differences across the three sets of students are significant that could affect the eventual outcome of the study. Based on an initial examination of Table 2, it would appear that there are differences in the classes as to age and GPA. To test this, I utilize an analysis of variance (ANOVA) with a Tukey posttest to determine significant differences. Table 3 displays the ANOVA results and Table 4 displays the Tukey values for significant variables (Learning Style).[1]

Table 1. Overall preclass survey results.

Question	Modal response
What is your age range?	25+
What is your gender?	Female
What (academic) year are you?	Freshman
What is your approximate current GPA?	3.0–3.5
What grade do you expect to receive in this class?	A
Learning Style	Visual
Modality	Flipped

Table 2. Preclass survey results by modality.

Question	Traditional	Flipped	Online
Age	25+	17–19; 25+	20–22
Gender	Female	Female	Female
Academic Year	Freshman	Freshman	Freshman
GPA	3.6–4.0	3.0–3.5	2.1–2.9
Grade Expected	A	A	A
Learning Style	Visual	Visual	Visual
Knowledge Pretest (Average)	7.5	7.1	7.2

While just slightly significant, learning style across the three classes appeared to differ. The Tukey test indicates that the differences are between the online and traditional classes; while the median for both classes was visual, the frequency with which they appeared in the two classes is slightly significant. Since the online class could be argued to be less visual in nature (since students are not personally watching the professor give a lecture but listening to it), it could affect the eventual success or failure of students in the online class.

At the midpoint of the class, following the midterm exam, I anonymously collected both the midterm exam score for each student as well as each student's overall class grade at the midterm. Table 5 displays the averages for each class and Tables 6 and 7 provide ANOVA results for these two data points.

The first thing to notice is that on the midterm exam (which was the same for all three classes), the traditional class scored highest with a 77.93 average followed by the online class at 76.85 and the flipped class at 71.9. However, when looking at the overall class grade at the midterm, the flipped class has the highest average at 84.29. Interestingly, the only statistically significant difference in all of this was in the midterm exam grade between the traditional and flipped classes.

One possibility for the difference in average class grade at the midterm is the impact of group work. In the flipped class, students completed some assignments collectively whereas students in the traditional and online classes completed the same assignments on their own. This could lead to two outcomes that could be causing these differences: First, students who would not have otherwise completed the assignments were able to contribute minimally to the paper and still get the group grade. Second, with students working

Table 3. ANOVA results for preclass survey group differences.

		Sum of squares	*df*	Mean square	*F*
Age	Between Groups	0.556	2	0.278	0.164
	Within Groups	110.209	65	1.696	
	Total	110.765	67		
Gender	Between Groups	0.018	2	0.009	0.044
	Within Groups	13.673	65	0.210	
	Total	13.691	67		
Year	Between Groups	4.912	2	2.456	2.991
	Within Groups	53.368	65	0.821	
	Total	58.279	67		
GPA	Between Groups	4.141	2	2.071	1.881
	Within Groups	71.550	65	1.101	
	Total	75.691	67		
Learning Style	Between Groups	15.184	2	7.592	3.402*
	Within Groups	145.051	65	2.232	
	Total	160.235	67		

*$p < .05$.

Table 4. Tukey results for learning style.

	(I) Modality	(J) Modality	Mean diff. (I-J)	Std. Error
Learning Style	Traditional	Flipped	−0.42656	0.39950
		Online	−1.35185	0.51828*
	Flipped	Traditional	0.42656	0.39950
		Online	−0.92529	0.51275
	Online	Traditional	1.35185	0.51828*
		Flipped	0.92529	0.51275

*$p < .05$.

Table 5. Midterm averages.

Modality	Average midterm exam (*SD*)	Average midterm class (*SD*)
Traditional	77.93 (11.262)	79.58 (11.046)
Flipped	71.9 (18.544)	84.29 (12.355)
Online	76.85 (12.765)	72.21 (11.344)

Table 6. ANOVA results for midterm averages.

		Sum of squares	*df*	Mean square	*F*
Midterm Exam	Between Groups	1898.277	2	949.138	4.155*
	Within Groups	14392.178	63	228.447	
	Total	16290.455	65		
Midterm Class Grade	Between Groups	268.492	2	134.246	1.045
	Within Groups	8095.699	63	128.503	
	Total	8364.191	65		

*$p < .05$.

Table 7. ANOVA Tukey posttest for midterm exam.

	(I) Modality	(J) Modality	Mean diff. (I-J)	Std. Error
Midterm Exam	Traditional	Flipped	11.64049	4.04209*
		Online	6.68704	5.59515
	Flipped	Traditional	−11.64049	4.04209*
		Online	−4.95345	5.54276
	Online	Traditional	−6.68704	5.59515
		Flipped	4.95345	5.54276

*$p < .05$.

together, the assignment could simply be legitimately better than those completed by one student who would not have the opportunity to work with others. This could also lead to the problem of too many cooks in the kitchen, but this survey design is unable to discern that.

Post-class survey and final grades

While the pre-class survey looked at demographic differences, the post-class survey was designed to measure student impressions regarding the classes (the post-class survey appears in Appendix D). Table 8 displays the average results both overall and within the classes for the impressions questions and Tables 9 and 10 provide ANOVA Tukey results for the differences.

Taken together, these tables demonstrate that students in the three classes *perceived* their classes very differently. In the case of the first three questions, which asked about student

Table 8. Overall postclass survey results.

Question	Overall (*SD*)	Traditional (*SD*)	Flipped (*SD*)	Online (*SD*)
On a scale of 1–5, with 1 being the least and 5 being the most, how much did you enjoy this class overall?	$M = 4.16$ (1.027)	$M = 4.73$ (0.550)	$M = 4.1$ (0.625)	$M = 2.75$ (1.488)
On a scale of 1–5, with 1 being the least and 5 being the most, how would you rate the delivery of instruction in this class?	$M = 4.33$ (0.792)	$M = 4.68$ (0.646)	$M = 4.29$ (0.644)	$M = 3.5$ (0.926)
On a scale of 1–5 with 1 being the least and 5 being the most, how likely would you be to take a class like this again?	$M = 3.53$ (1.332)	$M = 4.32$ (0.894)	$M = 3.33$ (1.111)	$M = 1.88$ (1.246)
What grade do you believe you earned in this class?	*Mode* = A, B	*Mode* = B	*Mode* = A	*Mode* = A
Are you enrolled for classes in the summer 2014 or fall 2014 semesters?	*Mode* = Yes	*Mode* = Yes	*Mode* = Yes	*Mode* = Yes
Knowledge Posttest	$M = 8.2$ (1.650)	$M = 8.2$ (2.287)	$M = 7.9$ (0.899)	$M = 8.8$ (0.690)

Table 9. ANOVA results for the postclass survey.

		Sum of squares	*df*	Mean square	*F*
Enjoy Class Overall	Between Groups	23.072	2	11.536	18.661***
	Within Groups	29.673	48	0.618	
	Total	52.745	50		
Delivery of Instruction	Between Groups	8.275	2	4.137	8.613**
	Within Groups	23.058	48	0.480	
	Total	31.333	50		
Likely to Take Same Type of Class Again	Between Groups	36.391	2	18.196	0.000***
	Within Groups	52.314	48	1.090	
	Total	88.706	50		
Earned Grade	Between Groups	4.071	2	2.036	3.538*
	Within Groups	27.615	48	0.575	
	Total	31.686	50		
Enrolled for Summer or Fall	Between Groups	0.133	2	0.066	0.317
	Within Groups	10.024	48	0.209	
	Total	10.157	50		
Knowledge	Between Groups	4.895	2	2.448	0.895
	Within Groups	128.485	48	2.734	
	Total	133.380	50		

*$p < .05$. **$p < .001$. ***$p < .000$.

enjoyment in the class, rating of instruction in the class, and likelihood to take a class like it again, the traditional students had consistently higher ratings than the flipped and online students. Table 7 also bears out how large these differences are in the three questions by showing that the differences are statistically significant.

These perception differences are quite apparent when we turn to the comments offered by the students on the post-class survey. Table 11 summarizes the comments and includes the frequency of how many times a similar comment was made. In the traditional class, students most frequently enjoyed the teacher, followed by debate and discussion, and that

Table 10. ANOVA Tukey posttest results.

	(I) Modality	(J) Modality	Mean Diff. (I-J)	Std. Error
Enjoy Class Overall	Flipped	Traditional	−0.63203	0.23987*
		Online	1.34524	0.32667***
	Traditional	Flipped	0.63203	0.23987*
		Online	1.97727	0.32461***
	Online	Flipped	−1.34524	0.000***
		Traditional	−1.97727	0.000***
Delivery of Instruction	Flipped	Traditional	−0.39610	0.21145
		Online	0.78571	0.78751*
	Traditional	Flipped	0.39610	0.21145
		Online	1.18182	0.28615***
	Online	Flipped	−0.78571	0.28796*
		Traditional	−1.18182	0.28615***
Likely to Take Same Type of Class Again	Flipped	Traditional	−0.98485	0.31850**
		Online	1.45833	0.43374**
	Traditional	Flipped	0.98485	0.31850**
		Online	2.44318	0.43102***
	Online	Flipped	−1.45833	0.43374**
		Traditional	−2.44318	0.43102***
Earned Grade	Flipped	Traditional	0.16883	0.23140
		Online	0.66701	0.66071
	Traditional	Flipped	−0.16883	0.23140
		Online	−0.82955	0.31315*
	Online	Flipped	0.66701	0.31514
		Traditional	0.82955	0.31315*

*$p < .05$. **$p < .001$. ***$p < .000$.

Table 11. Student postclass survey comments.

Modality	Like (Frequency of similar comments)	Did not like (Frequency of similar comments)
Traditional	How it was taught (3)	Notes not online (2)
	Videos used	Discussions (2)
	Teacher (9)	No extra credit
	Fun class (4)	Too many questions on midterm
	Debate and discussion (4)	papers (3)
Flipped	Lectures before class (2)	Too much reading (3)
	Group work (6)	Group work (6)
	Different teaching methods (3)	Online lectures
	Papers worth more than tests (2)	
	Wasn't boring (2)	
	Learning how government works (2)	
Online	Lectures (2)	Teacher
	Instructor (2)	Repetitive class
	Discussion boards	Discussion boards (2)
	Helped improve writing skills	Lecture
		Textbook
		Papers (2)

Table 12. Final exam and final class grade comparisons.

Modality	Average final exam (*SD*)	Average final class (*SD*)
Traditional	76.43 (13.658)	83.32 (9.502)
Flipped	71.21 (10.284)	83.25 (7.349)
Online	76.85 (27.004)	72.21 (11.979)

it was a fun class. They did not like, however, that there were so many papers. In the flipped class, interestingly, group work was equally likely to be something that was liked and disliked by the students. Finally, online students were more critical of the class, with more comments about what was disliked (discussion boards, papers, lectures, textbook, teacher) than liked (lectures, teacher).

While there is a difference in student perceptions across the three classes, there does not seem to be much in the way of performance differences. While there was a slight difference statistically between the traditional and online classes in the knowledge portion, it was only at a $p < .05$ level. To further examine the actual performance differences, we can examine the final exam and final overall class scores. Table 12 has the averages for each class on the final exam and the final class score and Tables 13 and 14 contain the ANOVA results.

With respect to the final exam grades, the traditional and online classes both outperformed the flipped class by approximately five points; however, as far as the final class grades go, the traditional and flipped classes are separated by only 0.07 points but are both 11 points higher than the online class average. These differences are borne out in Table 13 with the ANOVA results demonstrating that the differences in final exam and final class

Table 13. ANOVA results for final exam and final class grades.

		Sum of squares	*df*	Mean square	*F*
Final Exam	Between Groups	1732.249	2	866.125	3.764*
	Within Groups	14268.466	62	230.137	
	Total	16000.715	64		
Final Class Grade	Between Groups	744.230	2	372.115	4.526*
	Within Groups	5097.259	62	82.214	
	Total	5841.489	64		

*$p < .05$.

Table 14. ANOVA Tukey post-test results.

	(I) Modality	(J) Modality	Mean difference (I-J)	Std. Error
Final Exam	Traditional	Flipped	5.21164	4.09179
		Online	15.32593	5.61580*
	Flipped	Traditional	−5.21164	4.091779
		Online	10.11429	5.58863
	Online	Traditional	−15.32593	5.61580*
		Flipped	−10.11429	5.58863
Final Class Grade	Traditional	Flipped	0.06853	2.44654
		Online	9.41289	3.35654*
	Flipped	Traditional	−0.06853	2.44564
		Online	9.34436	3.34030*
	Online	Traditional	−9.41289	3.35654*
		Flipped	−9.34436	3.34030*

*$p < .05$.

Table 15. Knowledge test results before and after class (out of 10).

Traditional	Before: 7.27 After: 7.9	−0.955
Flipped	Before: 6.86 After: 8.24	−4.422***
Online	Before: 6.14 After: 8.86	−4.80***

***$p < .000$.

grades were statistically significant. The Tukey results then show that with respect to the final exam, the traditional and online classes were statistically different and, with respect to the final class grade, grades in both the traditional and flipped classes and online classes significantly varied.

One final area of actual performance to examine is the pre- and posttest knowledge. Table 15 provides these data for the samples. Using a paired-samples *t* test, both the flipped class and online class showed a statistically significant increase in their knowledge of basic facts about American government, with the online class showing the largest increase. Taken together with the final exam and final class grades, however, success in the classroom seems to be mixed.

Discussion

While the sample size is admittedly small, one of the most interesting findings from this experiment are the learning gains made in the online section compared to the other two sections. The online section had the lowest average final grade for the class, they had the highest class average on the final exam. Further, when comparing the pre- and posttest knowledge levels, the online class gained the most knowledge, with an increase in 2.72 points. Despite the seeming success of the students in the class, online students reported the lowest levels of satisfaction with the class. There could be any number of reasons for this discrepancy from a mismatch of work expectations on the part of students and the actual work load to differences in demographics as noted in Table 2. Additionally, the sample may not be valid given the particularly small sample size and self-selection of students into the online section.

Examining Table 11, which describes the types of comments students had about their respective classes on the post-class survey, the variety and frequency of student comments

across the three sections should be noted. In the flipped section, students had six different types of positive comments compared to five different types in the traditional section and only four in the online section. This matches well with the lack of negative comments from students in the flipped class further demonstrating student attitudes towards the flipped class.

Embedded in these comments is also a split in student attitudes in the flipped class to group work with six students noting the presence of it as a positive and six students noting it as a negative. For any instructor who has used group work and is familiar with student concerns about equity and fairness in the work, this split will be a familiar one. While it is out of the scope of this article to offer a solution to this problem, it does highlight a familiar drawback of the flipped approach.

The major results of this experiment, then, appear to be twofold: There does not seem to be any major difference in student performance across the three different modalities. Flipped classes do not appear to have any effect, positive or negative, on student performance. On the other hand, student perceptions of the class are very different between traditional, flipped, and online students with traditional students enjoying their class time more than the other groups of students.

Conclusions

While the data gathered here may not seem to lend much support to the flipped classroom, I believe the bigger conclusion is that there is no harm from it either. If anything is apparent from the results regarding student perceptions, it is that dynamic and engaging instruction is still of paramount importance to students. Regardless of the technology or model used, students still want a classroom experience that is fun as well as innovative and that can be given in any number of ways.

A major caveat to these findings, I believe, is required. Since there is no agreed upon definition of the flipped classroom, these findings are based on my idea of what the flipped classroom is and how to implement it. To the extent possible, I believe my flipped class keeps to the spirit of flipping and advances it at the college level in particular. The results, then, should not deter enterprising professors and teachers from developing their own ideas about the flipped classroom and testing them in their own environments. Another teacher in another school may indeed find more success with their students; at a minimum, the results show that the flipped classroom is not detrimental to our students and so should be encouraged in their pursuits of a more skilled teaching presentation.

Not central to the main question under study, it is also important to point out the poor performance of the online class in this study. While the student population was small (11 registered with only nine really completing the class), the overall performance of the students was poor compared to the other classes.

As a start to determining the comparative success of different teaching methods, this study makes headway in showing that, while performance may not vary much, student perceptions do. We must remember that as college professors and representatives of our fields of study, our goal should not only be to educate our students but to stimulate and encourage them and perhaps to collect a few converted majors along the way. When students enjoy a class, they are more likely to put more effort and interest towards it. The finding that students enjoyed a traditional-style class more than a flipped or online

class should be taken seriously if we wish to not only please students but bring them along for future classes.

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Note

1. I utilize the ANOVA test of significance throughout this article. When variables are shown to be significant, I then display the Tukey posttest values to determine which groups are statistically different for those significant variables only.

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