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Flipping a Distance Learning Calculus Class

Amy Riordan

Embry-Riddle Aeronautical University - Worldwide, riordana@erau.edu

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Flipping a Distance Learning Calculus Class

Amy A Riordan, MS

Embry-Riddle Aeronautical University (ERAU)

Abstract #2228

Numerous instructors have moved part of the instruction outside class meetings in order to provide more classtime for collaborative or supervised problem-solving and skill-building, often reporting dramatic improvement in the areas of retention, engagement, and achievement. The additional challenge faced by ERAU-Worldwide is the video-conferencing platform that connects groups of students in diverse locations to an instructor in one of the classrooms or teaching from home. This study focuses on the issues inherent in the distance between students and instructor while attempting to replicate other published experiences. Exam scores in flipped, non-flipped, and online courses without the videos are compared.

Research

This flipped class was offered in the May term, in 2016, which began May 31st and ended August 1st. There were eleven total students in the class, seven of them were in the host class and four were from the remote location. The students were asked to watch recorded video lectures and take a quiz before they came to class. The pre-class quizzes asked questions about the videos to make sure the students watched them before coming to class. Then during class, the students were paired up to work on their homework as the instructor walked around the classroom answering questions and then present their work to the class. By the end of each class the students would have all of their homework completed. When analyzing the final grades from this class they were compared to the final grades from an Eagle Vision home class that was taught by the same instructor during the March term, which ran from March 21st to May 22nd in 2016. The March term class was taught in the traditional format, lecture during class and homework at home. When analyzing the final grades the first test that run was an F-test: two-sample for variances and this test was not significant ($p > 0.05$); therefore, the variances were assumed to be equal. That test was followed up by a t-test: two-sample assuming equal variance and the results from that were also not significant ($p > 0.05$) meaning there was no statistically significant difference in the final grades for the two classes. Since there was no significance between these two classes, the tests were run again with all Eagle Vision and classroom classes. Once again the test showed there was no significant difference in the final grades.

Background

At ERAU we offer several different modalities:

- Face-to-Face
- Online
- Eagle Vision Home
- Eagle Vision Class

The latter is the type of classroom that was used for the flipped class. In the Eagle Vision classes there are several tools at our disposal:

- Whiteboard
- YouTube videos
- Power points
- Chat logs
- Webcam
- Microphones

ERAU terms last 9 weeks and we offer 5 major terms and 7 minor terms during an academic year. Classes are offered all over the United States, Europe, East Asia, and Singapore.

Survey

The flipped class was not just analyzed quantitatively but also qualitatively. The students were asked to fill out a survey when they completed the class. In the survey they were asked questions about their feelings regarding the flipped classroom. Nine students filled out the survey and these are the result:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I enjoy doing different things in class rather than lectures.	11.11% 1	0.00% 0	11.11% 1	44.44% 4	33.33% 3
I learn best by doing rather than by listening.	11.11% 1	0.00% 0	11.11% 1	33.33% 3	44.44% 4
I prefer my grade to be determined by exam scores.	33.33% 3	22.22% 2	33.33% 3	11.11% 1	0.00% 0
I learned a lot from watching the videos.	0.00% 0	22.22% 2	11.11% 1	55.56% 5	11.11% 1
I watched the videos or parts of the videos more than once.	11.11% 1	33.33% 3	0.00% 0	55.56% 5	0.00% 0
I found the videos confusing and not helpful.	11.11% 1	44.44% 4	11.11% 1	33.33% 3	0.00% 0
I enjoyed working on problems in groups in class.	0.00% 0	0.00% 0	33.33% 3	33.33% 3	33.33% 3
Class time did not help my understanding of the material.	55.56% 5	22.22% 2	11.11% 1	11.11% 1	0.00% 0
Overall, I liked the flipped classroom materials.	0.00% 0	0.00% 0	44.44% 4	44.44% 4	11.11% 1
I enjoyed the flipped classroom teaching more than traditional teaching.	0.00% 0	0.00% 0	33.33% 3	55.56% 5	11.11% 1

Conclusions

There may not have been any statistically significant difference in the final grades between the flipped class and the traditional lecture class, but the survey results show something different. In the survey the majority of the students agreed that they enjoyed the flipped course. Since there is no difference in the final grades then the instructor could actually teach the way the students want to learn.

Future flipped classrooms could be taught in the same format but instead of analyzing the final grades the instructor could analyze test scores. The research could also be taken further by increasing the sample size, analyzing the results of several different flipped classes, not just one.

Literature Cited

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