

# EXPERIMENTING WITH A FLIPPED CLASSROOM IN INTRODUCTORY GEOLOGY

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## Abstract

In the fall of 2014 I experimented with a flipped classroom in my general education introductory geology course. I added online lecture videos as homework, along with online quizzes to encourage students to study the videos. In lieu of many lectures, class time was devoted to discussions, interactive quizzes, and activities similar to lab. My intention was to create a challenging and fun course, while still maintaining the coverage of content that I expect in a foundational class. To evaluate these changes, I compare four years of data from previous classes to the fall 2014 class. The data include former exams (which were similar between classes), geo-concept inventory survey results, Likert-style student evaluations, and student feedback on the course design and implementation. The results show that there was no measureable increase in student performance on the exams and other learning assessments. The standard course evaluations by students do not indicate any significant changes in the class compared to prior years. When surveyed specifically about the flipped classroom experience, most students support a hybrid model with both traditional lectures and flipped classroom activities.

## BACKGROUND

### GEOLOGY 110: DYNAMIC EARTH

- General education lab science class
- 30-50 students with 2 lab sections
- Required for Elementary Education majors
- I have taught this class 20+ times over the last 10 years

### The class has received excellent teaching reviews, HOWEVER....

- I feel like the average student should learn more, or does not learn enough.
- I constantly tinker with how I teach the class.

The UWS Center for Excellence in Teaching and Learning offered summer stipends to faculty with teaching related projects. This created an opportunity to experiment with a flipped classroom.

## METHODS

- I created Youtube videos to replace traditional lecture material (usually two videos per lecture, between 5-10 minutes each).
- Each set of videos had lecture notes and was accompanied by a quiz.
- I added a classroom activity for every video lecture and quiz.
- 15 classroom activities total, with more in the beginning of the semester. I would have created more, but I did not have the time.

I compared prior exam and assessment scores to this class to determine if flipping the classroom improved my assessment of student learning. In addition I surveyed students about their experience.

## STUDENT COMMENTS & SURVEYS

### Pro-Flipped

"LOVED the online lectures and quizzes, I felt like I was able to go at my own pace and pause the videos to take notes and be in a quiet environment. I was able to re watch videos to comprehend material better. KEEP DOING THIS!"

"I liked the video lectures, homework assignments, and quizzes. I learn better by doing, so it was helpful."

"I think it's a really good way to learn and take our own responsibilities on learning."

"I really liked the videos and I appreciate the fact that you put so much time into them just so that we don't have to sit through lecture every single class period and instead have some activities so we can understand the concepts better"

"I feel that the video lectures were a big help because they gave me a better understanding of what was covered from the current lesson and gave me a better understanding"

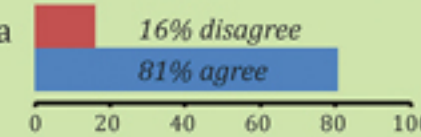
### Opposed

"I think the reverse-classroom idea is nice, but you're such an enthusiastic lecturer that is really nice to listen in class"

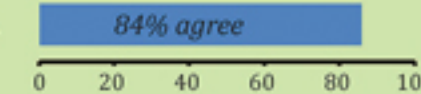
"There should have been more in-class lectures. If I had wanted to take an online class, I would have."

"Some of the videos were quite lengthy, so I would come home from an hour lecture, to have yet another lecture in some cases."

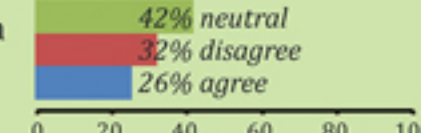
The Youtube video lectures were a useful way to learn information and concepts.



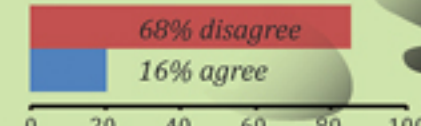
I usually watched the videos multiple times.



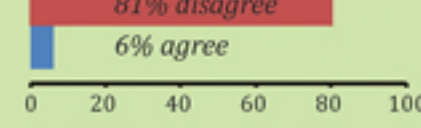
Watching the video lectures was a better way to learn material and concepts than in class lectures.



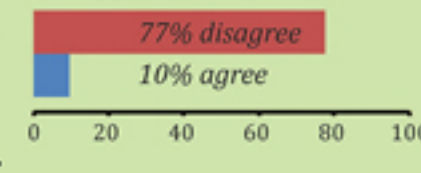
I would rather have no video lectures.



I would rather have no in class activities.



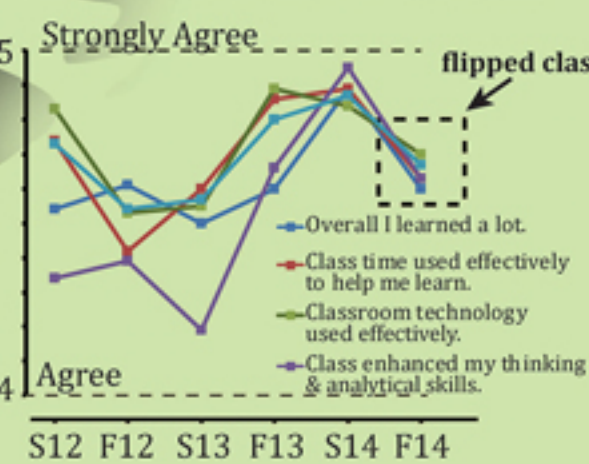
A better class would have no lecture, only activities. The material delivered during lectures would be completed by watching videos.



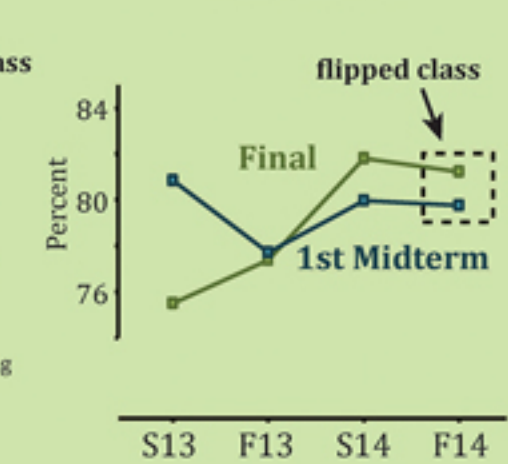
## COURSE EVALUATIONS & EXAMS

There was no statistically significant difference in student learning or student evaluations as a result of the major modifications I made to the class. (I received some negative feedback about class organization, but this is to be expected the first time I run the course.)

### Likert Scale Student Evaluations



### Exam Scores



## DISCUSSION & CONCLUSIONS

- I am a little surprised I could find no metric that suggested this flipped class was different than previous years. It is possible that student response to the flipped experience would become more positive as I improved my technique.
- I think I am a better lecturer than video producer - if my videos were professionally produced, perhaps they would be more effective? There is a lot of time that needs to be invested into making (and improving) these videos.
- The large lecture halls available on our campus are poorly designed for incorporating activities. Classrooms need to have a lot of room and be modular (without fixed desks.) It can also be challenging to keep everyone on task in a large class room.
- I am sure my exams can be improved so that they better assess student learning - I might experiment with so more open ended exams (tell me what you learned about ....). Sometimes students value different aspects of what they learn than what I value.
- I have no plans to totally invert this class - I didn't notice any improvement in learning and lectures can be fun (both for me and the students). So far I have kept some of the videos and in class activities, dropped a few, and have ideas for new activities. My opinion is that the movement to flipped learning sometimes undervalues or misrepresents the learning that can take place during a good lecture.

## ACKNOWLEDGEMENTS

Thank you to all my students who have endured my efforts to figure out what works best (and what does not work well) in my classrooms.

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