Flipped Fridays

Adventures in flipping a cell biology course
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What is flipping?

- Instruction delivered outside of class
- Class time focused on problem-solving

The Inversion

The Traditional Classroom
Teacher’s Role: Sage on the Stage

LECTURE TODAY
Reading and questions due tomorrow

Homework

The Flipped Classroom
Teacher’s Role: Guide on the Side

ACTIVITY TODAY
WATCH lecture online tonight!

http://www.knewton.com/flipped-classroom/
Cell Biology

- Required for Biological Sciences majors
- Required for Chemical Engineering with Biochemical Engineering Emphasis
- Required for Chemistry - Pre-medicine Emphasis
- Sophomore level
- Taught since 2007
Why Flip Cell Bio?

- Students need to be able to apply knowledge, not just memorize

How do we teach our students to think like scientists?
How did I do it?

- eFellows grant Tier 2 awarded 2013 and 2014
- Recorded lectures in eStudio using Camtasia
- Began in summer, continued in Fall
- Twice a week, two hours each day
- Recorded, annotated, and edited videos
- Prepared short quiz for each Friday
- Developed a problem set for classes on Friday
- Piloted Fall 2013
- Spring 2014 editing, evaluating, improving
Flipped Friday Class

- Videos and quiz were posted on Blackboard Wed
- Quiz due by class time Friday
- Students worked in groups on problem set
- I wandered, listened, answered questions, assisted students
- Clickers were used for students to collaborate on answers
- Responses were shown, students discussed and re-pollled
- Similar problems were given in homework and on exams
Did students perform better on higher-level homework questions in Fall 2013 compared to Spring 2013?

- Evaluated students ability to answer ten questions that were the same both semesters.
- These ten questions were application or evaluation level.
- Similar questions were covered either during lecture in Spring 2013 or during Flipped Friday Fall 2013.
- No statistical difference between 9 out of 10 questions, students did better on one question.
Evaluation

Did students perform better on exams in Fall 2013 compared to Spring 2013?

- Student performance on exams was not significantly different between the semesters
Student Comments - Positive

- I liked the consistent routine of each week
- It was very helpful when you walked around the room to see if people had questions
- I like being able to watch the lecture videos more than once
- Getting the opportunity of feedback and explanation with the clicker quizzes is very helpful
- I like the fact that some problems are challenging
- Fun, easy way to work in groups and have a more interesting class
- I learn more from online videos than from lecture
Student Comments-Negative

- I don’t like having to take extra time out of my day to watch the videos
- I just don’t learn much in groups
- Less effective than in class lecture
- If it was shorter I would watch it more and use it to study for the exam
- I feel like I never actually know the way to figure out a problem when I leave
Rate the ability of online Flipped Friday lectures to communicate the material effectively

![Bar Chart]

- Rating 0 to 1: 2 students
- Rating 2: 4 students
- Rating 3: 10 students
- Rating 4: 7 students
Rate the usefulness of working on problems in class on Flipped Fridays as preparation for homework/test questions
How many times did you typically watch a videos, from the time it was posted until the exam?
Average View Drop Off (Percentage of Video Watched)

- Video length in Minutes:
  - 5-less than 10
  - 10 to less 15
  - 15 to 22

- Drop Off Rate:
  - 0.7
  - 0.6
  - 0.5
  - 0.4
  - 0.3
  - 0.2
  - 0.1
  - 0.0
**Average Number of Plays**

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Average Grade on Clicker Quizzes

![Bar graph showing frequency of video views by grade.]

- Always or Usually: 88
- Sometimes: 80
- Rarely: 82
- Never: 78

Frequency of video views
Lessons Learned

- Videos must be short
- Quiz is motivation for students to view videos
- Not all students will watch videos
- Most students watch videos once on Thursday
- Watching videos helps their quiz grade
- Having a schedule is helpful
Benefits of Flipped Classroom

- Active classroom on Fridays
- Self-directed learning
- Increases student-student interaction
- Increases student-faculty interaction
- Higher level questions can be introduced in setting where students can get help
- Students are able to practice the application of knowledge
How to improve?

- Editing
- Strategic choice of topics
- Keep students watching until the end
- Student motivation
- Students should rewatch before exams
On the first exam this semester, students had problems with some material covered in Flipped Friday online lectures.

Exam Grades averaged by # online lecture viewings

- 0-5
- 6 to 9
- 10 or more

□ # online lecture viewings