

# Flipping the Classroom

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## Preview

- What is a flipped classroom?
- My flipped classroom and experiences.
- Examples from different disciplines.
- Best practices
  - Coursera collaboration with faculty at top universities: Flipped Classroom Field Guide [http://www.cvm.umn.edu/facstaff/prod/groups/cvm/@pub/@cvm/@facstaff/documents/content/cvm\\_content\\_454476.pdf](http://www.cvm.umn.edu/facstaff/prod/groups/cvm/@pub/@cvm/@facstaff/documents/content/cvm_content_454476.pdf)
- Pros, cons
- Class activity ideas
- Tech, Resources, Danielle Mirliss



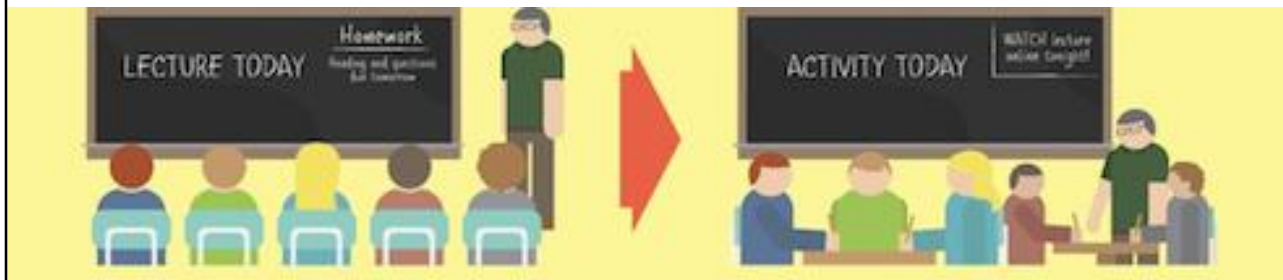
## What Is A Flipped Classroom?

### Traditional Classroom

Lecture in class  
Homework at home

### Flipped Classroom

Online lecture *before* class  
Homework in class



<http://www.knewton.com/blog/education-infographics/flipped-classroom-infographic/>



## Emergence of Flipped Classroom

- 2007 – Jon Bergman and Aaron Sams – high school teachers – captured PowerPoint lectures to deliver online for students who missed class
- Morphed into online lecture delivery, with in-class collaborative work and application.
- Enabling technologies and trends:
  - Lecture-capture technology
  - Already lots of video lessons on web
    - Khan Academy 2400+ lessons
      - [https://www.khanacademy.org/math/probability/descriptive-statistics/central\\_tendency/v/statistics-intro--mean--median-and-mode](https://www.khanacademy.org/math/probability/descriptive-statistics/central_tendency/v/statistics-intro--mean--median-and-mode)
- Pressure on secondary education and post-secondary education to improve student outcomes



## My Slow Adoption of the Flipped Classroom

### Undergraduate

- Elementary Psychological Statistics
- Cognitive Psychology
- Human Neuropsychology



## Flipped Class Example – Introductory Statistics

15 Students

### Outside Class

- Watch 30 minute lecture on central tendency & read text

### Inside Class

- 40 min: individual problem solving with problems in the text
- 25 min: group problem solving (example problem)
- 15 min: group presentation on problem and solution



## Flipped Class Example – Introductory Statistics

### Group Problem Solving Example (3-4 students per group)

Critique the use of descriptive statistics in the article, paying special attention to the use of the mean, median or mode. Is the author using the best measure of central tendency? Why or why not? Is there anything special about the type of data the author discusses that might make one measure of central tendency preferable to another (hint: think about the likely distribution of the data)?

Groups will take turns presenting to the class:

A brief summary of the main point of the article.

The group's critique of the use of measures of central tendency in the article.

New York Times: Student-loan borrowers average \$26,500 in debt

[http://www.nytimes.com/2012/10/18/education/report-says-average-student-loan-debt-is-up-to-26500.html?\\_r=0](http://www.nytimes.com/2012/10/18/education/report-says-average-student-loan-debt-is-up-to-26500.html?_r=0)

New York Times: In average pay, New York workers trail counterparts in several big cities

<http://cityroom.blogs.nytimes.com/2013/01/18/in-average-pay-new-york-workers-trail-counterparts-in-several-big-cities/>

Los Angeles Times: Crime alerts for San Pedro and 3 other L.A. neighborhoods

<http://latimesblogs.latimes.com/lanow/2013/01/la-crime-alerts-821.html>

CNN: Top housing markets

[http://money.cnn.com/pf/features/lists/nar\\_4q/price.html](http://money.cnn.com/pf/features/lists/nar_4q/price.html)



## The Flipped Class is Not ONE Thing

### Different Models of Flipped Classes

- Instructor-led model
  - Instructor drives and decides on in-class activities; decides on timing of movement through activities
- Student-led model
  - Student flexibility in navigating and pacing of course-content.



## Flipped Class Examples

### Circuits and Electronics Course San Jose State University

#### Outside Class

- Online assignments
- Online lecture

#### In Class

10 min: Content warm-up  
 15 min: Just-in-time teaching  
 15 min: group quizzes  
 5 min: quiz review  
 15 min: individual quizzes  
 5 min: quiz review  
 5 min: wrap-up

### Writing Course Stanford University

#### Outside Class

- Online lecture
- Writing assignment

#### In Class

5 min: content warm-up  
 3 min: writing prompt  
 20 min: writing in response to prompt  
 15 min: peer assessment of papers  
 2 min: wrap up

### Engineering Course University of Wisconsin

#### Outside Class

- Online lecture
- Online quiz

#### In Class

5 min: review quiz  
 5 min: announcements  
 70 min: student solve quiz questions in pairs



## You Can Flip Moderately Large Lecture Classes

- 85 students: Child Health And Nutrition
  - Dr. Maya Adam, Stanford
- 150 students: Cryptography (computer science)
  - Dr. Dan Boneh, Stanford
- 76 students: Global History
  - Dr. Philip Zelikow, University of Virginia



# My Completely Flipped Cognitive Psychology Course

Cognitive Psychology  
Seton Hall University

## Student Pre-Class Responsibilities

- Online lecture
- Online pre-quiz

## Instructor: Pre-Class

- Check item-analysis of pre-class quiz to prep just-in-time teaching

## In-Class

10 min: Questions over quiz/lecture  
5-10 min: Just-in-time teaching  
~ 50 min: one or more activities  
5 min: wrap-up & preview next class

Take a look at Blackboard.

Take a look at sample Perception activity.



# Modifying Flipped Class to Suit Needs

## Mid-semester Modification of Statistics Class Based on Student Feedback

Switched to:

- in-class lecture on conceptual material paired with
- in-class, but online video lecture (via headphones), for step-by-step problem solving in Excel
- Individual in-class problem solving



## Potential Benefits of the Flipped Classroom?

- Self-paced learning
  - Useful for managing students of different skill levels
  - Constant access to lectures useful for hardworking, but struggling students
- Opportunity to apply knowledge and problem-solve in presence of instructor\*
- Greater student engagement
- No more “missed” lectures – essentials are recorded in video lecture
- Potential for more targeted lessons (e.g., just-in-time teaching)



## Potential Challenges of the Flipped Classroom?

- It is MORE work for both good students and for instructor
- Constructing in-class activities to well-match online lecture
- Student access to online materials (less problem at SHU)
- Attendance issues
- Students completing out-of-class work
- Really large lectures (e.g., 300+) may be too large for flipping



## Best Practices: In Class

- Class time is highly structured (down to minute)
- Require students to retrieve and apply material through active learning (e.g., quizzing, problem solving, other activities)
- In class activities directly relevant to out-of-class lecture and work
- Students incentivized to attend class

Flipped Classroom Field Guide:

[http://www.cvm.umn.edu/facstaff/prod/groups/cvm/@pub/@cvm/@facstaff/documents/content/cvm\\_content\\_454476.pdf](http://www.cvm.umn.edu/facstaff/prod/groups/cvm/@pub/@cvm/@facstaff/documents/content/cvm_content_454476.pdf)



## Best Practices: Out of Class

- Online video lectures shorter than traditional classroom – focus more tightly on learning objectives
- Incentives for completing out of class activities
- Auto-graded assessment





## Tips from U.S. Department of Education (2010) Executive Summary

### Online and Blended Learning Not Enhanced By

- Videos and online no better than assigning homework
- Group work or group interactions online (improve group interaction, but not content learning)

### Online and Blended Learning ARE Enhanced By

- Media and assignments that prompt learner reflection
- Prompting self-monitoring of individual understanding



## Evidence it Improves Student Outcomes

### U.S. Department of Education (2010) meta-analysis

- 23 studies compared blended with face-to-face instruction
- Found statistically reliable improvement with blended vs. face-to-face instruction
- Average effect size of 0.35 (small to medium effect)
- Translating to percentages: The average student in blended instruction will score higher than 62% of students in face-to-face instruction.

U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies, Washington, D.C., 2010. [www.ed.gov/about/offices/list/oeped/ppss/reports.html](http://www.ed.gov/about/offices/list/oeped/ppss/reports.html)



## Evidence it Improves Student Outcomes

### U.S. Department of Education (2010) meta-analysis

- 23 studies compared blended with face-to-face instruction at college level
- Found statistically reliable improvement with blended vs. face-to-face instruction
- Average effect size of 0.35 (small to medium effect)
- Advantage may stem from additional time spent with classroom material in blended class

U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies, Washington, D.C., 2010. [www.ed.gov/about/offices/list/oeped/ppss/reports.html](http://www.ed.gov/about/offices/list/oeped/ppss/reports.html)



## Ideas for In-Class Activities?

- Individual / group problem solving (think, pair, share)
- Just-in-time teaching
  - 5-10 minute lecture addressing concepts students got wrong on assessment quiz
- Sequence of questions
  - Example:



## Sequence of Questions

- Get students to address a bigger, complex question, by breaking down into sequence of simple questions.

### Example from Literature Class on King Lear:

1. Discuss the topic of literal vision and metaphorical blindness.
2. Analyze the metaphor in the context of one of the characters (e.g., Gloucester).
3. Analyze the metaphor in the context of one of a different character (e.g., Lear).
4. Tie the metaphorical analyses together into unifying theme.



## Ideas for In-Class Activities

- Individual / group problem solving (think, pair, share)
- Just-in-time teaching
  - 5-10 minute lecture addressing concepts students got wrong on assessment quiz
- Sequence of questions
- Application to current events or real or fictional cases.



## Application Activities

Example from Human Neuropsychology class on Language Disorders

“The following are descriptions of patients from the Aphasia Center in St. Petersburg, FL. For each description, diagnose the aphasia. Indicate why you gave the diagnosis you did. What were the key patient characteristics that led you to the diagnosis?”

### Example Patient Description

Patient #1 is 52 years old, and 4.5 years post-stroke. He has a major infarct in the left frontal lobe. With regards to his language abilities, he has non-fluent spontaneous speech, good repetition and near-normal auditory language comprehension.



## Ideas for In-Class Activities

- Individual / group problem solving (think, pair, share)
- Just-in-time teaching
  - 5-10 minute lecture addressing concepts students got wrong on assessment quiz
- Sequence of questions
- Application to current events or real or fictional cases.
- Organized discussion with peer-to-peer exchanges (e.g., convince your neighbor of your answer to a quiz question)
- Students generated content (e.g., blogs, videos, quizzes)
- One-minute paper



## Resource Considerations

- Lecture capture
  - Technologies: iSpring, EchoCenter, doceri
- Lecture storage and delivery issues
  - Technologies: course management system (e.g., Blackboard), Google Hangouts, YouTube
- Student access to technology
- Physical structure of classroom space



## Resources

- Flipped Classroom Field Guide  
[http://www.cvm.umn.edu/facstaff/prod/groups/cvm/@pub/@cvm/@facstaff/documents/content/cvm\\_content\\_454476.pdf](http://www.cvm.umn.edu/facstaff/prod/groups/cvm/@pub/@cvm/@facstaff/documents/content/cvm_content_454476.pdf)
- University of Texas, Austin, Quick-Start Guide for Flipping:  
<http://ctl.utexas.edu/ctl/node/426>
- Twitter: #flipclass
- Danielle Mirliss:
  - google doc  
[https://docs.google.com/document/d/1a3d\\_jTmD6l03HXApMLVe0VzK8okoS8yEuedxzPvR1Wg/edit?usp=sharing](https://docs.google.com/document/d/1a3d_jTmD6l03HXApMLVe0VzK8okoS8yEuedxzPvR1Wg/edit?usp=sharing)
  - <https://www.tes.com/lessons/Z-dnVygC-hw9bA/flipped-instruction>



The Following Slides Were Not Part of Presentation,  
but Contain Items from Goedert's Cognitive  
Psychology Syllabus that Some People Requested  
After the Talk



## Description of Class Format on Syllabus

### **CLASS FORMAT – THE FLIPPED CLASSROOM**

I will be using a “flipped class” format for this course. This means that the lecture is delivered via video outside of class and in class we focus on application activities. For most classes, prior to coming to class, you will watch a video lecture, do some reading, and take a class pre-quiz (PQ) on these assigned activities. In class, we will go over the pre-quiz, and will engage in other activities, such as hands-on experiment demonstrations, individual or small-group problem solving, or discussion of an assigned reading. When watching lectures outside of class, take notes as you normally would during a lecture (you are encouraged to do this long-hand rather than on your computer – see Study Tips on Blackboard). When doing your pre-class activities, make note of any questions you have and be sure to bring these up in class. Note that this class format requires you to do substantial work in preparation for each class meeting. This work will help your learning.



## Participation Rubric

Grade	Performance Criteria
A	Student frequently volunteers with answers and with questions; student contributions reflect he/she did the assigned reading; arrived to class on time; exhibited only positive participation behaviors (asking clarifying questions, bringing up relevant examples, making meaningful contributions that reflect a careful reading of the assignments)
B	Student volunteers, but not frequently; student contributions reflect he/she did the assigned reading; arrived to class on time; exhibited only positive participation behaviors (asking clarifying questions, bringing up relevant examples, making meaningful contributions that reflect a careful reading of the assignments)
C	Student does not volunteer, but only responds when called on; student contributions suggest he/she did not do the assigned reading; arrived late to class, or exhibited negative participation behaviors such as inappropriate use of technology, off-topic talking with neighbors, or sleeping
D	Student does not volunteer and does not respond when called on, or arrived late to class, or exhibited negative participation behaviors such as inappropriate use of technology, off-topic talking with neighbors, or sleeping
F	Student did not attend class.



### Course Schedule – Overview

**Note:** PQ = pre-quiz due prior to class start. Items preceded by PQ are ones you are responsible for prior to class and are covered by the pre-class quiz. Assignment = an assignment is due prior to class start. All assignments and quizzes can be found on Blackboard.

**Final Assignment Due (Uploaded to Blackboard) by 3:30pm on Thursday, December 17<sup>th</sup>.**

Module	Day	Modules & Topics
M1: METHODS IN COGNITION		
1.1	T 9/1	1.1. Introduction to the Course & Defining Cognitive Psychology
1.2	R 9/3	1.2. Information Processing, Process Models & Behavioral Experiments (PQ)
1.3	T 9/8	1.3. Formal Models: Computational Modeling & Connectionism (PQ)
1.4	R 9/10	1.4. The Role of Cognitive Neuroscience in Cognitive Theory (PQ) Module 1 Quiz – cumulative, closed book, in class, on Blackboard, BRING COMPUTER
M2: OBJECT RECOGNITION		
2.1	T 9/15	2.1. Theories of Object Recognition (PQ)
2.2	R 9/17	2.2. Reading Empirical Articles in Cognition: Object Recognition Article (Assignment)
2.3	T 9/22	2.3. Perception for Action & Embodied Cognition / Making Arguments in Cognition (PQ) (In-Class Assignment)
	R 9/24	NO CLASS
2	T 9/29	Questions on Phenotype theory Module 2 Quiz – cumulative, closed book, in class, on Blackboard, BRING COMPUTER
3	R 10/1	M3: Paper #1: Plagiarism, Writing & Sourcing Materials, Citations & References (PQ) Paper #1: Topic to be announced with assignment instructions.
M4: ATTENTION & WORKING MEMORY		
4.1	T 10/5	4.1. Defining, Failures of Selective Attention, Automaticity (PQ)
4.2	R 10/8	4.2. Theories of Attention & What Attention Does for Stimuli (PQ)
	T 10/13	FALL BREAK – NO CLASS
4.3	R 10/15	4.3. Short-term & Working Memory (PQ)
4.4	T 10/20	4.4. Dual-task interference, Executive Attention & Newer Conceptions of Working Memory (PQ) – (Paper #1 Due)
4/5	R 10/22	1 <sup>st</sup> 40min: Module 4 Quiz – cumulative, closed book, in class, on Blackboard, BRING COMPUTER Last 30min: Intro to Paper #2: Can people do 2 things at once?
M6: LONG-TERM MEMORY		
6.1	T 10/27	6.1 Levels of Processing & Encoding Specificity (PQ)
6.2	R 10/29	6.2 Context Effects & Other Effects on Memory (PQ)
6.3	T 11/3	6.3. Complex Memory, Memory Errors & Forgetting (PQ)
6.4	R 11/5	6.4. Memory Systems, Implicit Memory & Amnesia (PQ) – (Paper #2 Due)
7	T 11/10	Module 6 Quiz – cumulative, closed book, in class, on Blackboard, BRING COMPUTER M7: Paper #3: Cognitive Topic of Choice from List (see paper instructions)
M8: CONCEPTS & SEMANTIC MEMORY		
8.1	R 11/12	8.1. Concepts & Categories: Introductory Issues (PQ)
8.2/8.3	T 11/17	8.2. Concepts & Categories: Advanced Debates (PQ) & 8.3 Semantic Memory Organization
8.3	R 11/19	8.3. Semantic Memory Organization (Assignment Due) Module 8 Quiz – cumulative, closed book, in class, on Blackboard, BRING COMPUTER
M9: REASONING, JUDGMENT & DECISION MAKING		
9.1	T 11/24	9.1. Reasoning (PQ)
	R 11/26	THANKSGIVING – NO CLASS
9.2	T 12/1	9.2. Judgment & Decision Making Part I (PQ)
9.3	R 12/3	9.3. Judgment & Decision Making Part II – Empirical Reading (PQ)
9	T 12/8	Questions Module 9 Quiz – cumulative, closed book, in class, on Blackboard, BRING COMPUTER
	R 12/10	Wrap Up & Distribute Final Assignment – (Paper #3 Due)

