Rethink Teaching with a Flipped Classroom
Traditional Lecture Format

Bloom’s Taxonomy
Levels of Intellectual Learning

Knowledge – Remember
Understand
Apply
Analyze
Evaluate
Create

Deep Knowledge

Surface Knowledge

Susan Wilson, IDS, CSUSM
11/5/2014
Traditional Lecture Format

Bloom’s Taxonomy
Levels of Intellectual Learning
Flipped Course Elements

- First exposure at home
- Personalized pace
- Explained in multiple ways

Videos of lecture content
Flipped Course Elements

- First exposure at home
- Personalized pace
- Explained in multiple ways

Videos of lecture content

Incentivize preparation for class

- Points for: quizzes, worksheets, short writing assignments, blogging, forums, etc.
Flipped Course Elements

- First exposure at home
- Personalized pace
- Explained in multiple ways

- Points for: quizzes, worksheets, worked examples, short writings, blogging, forums, etc.

- Instructor identifies misunderstandings
- Students self assess

- Incentivize preparation for class
- Assess understanding

- Videos of lecture content
Flipped Course Elements

- Just-in-time teaching
- Challenging problems or examples - clickers
- Authentic research
- Experiments
- Discussion
- Debate
- Case-studies
- Group projects

- First exposure at home
- Personalized pace
- Explained in multiple ways

Class – focus on higher level cognitive activities

Videos of lecture content

Assess understanding

Incentivize preparation for class

- Points associated with: quizzes, worksheets, worked examples, notes, short writings, forums,

- Instructor identifies misconceptions & misunderstandings
- Students self assess

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Considerations & Concerns

- Your learners
- Course content and place in the curriculum
- Why am I lecturing?
- Breadth vs. depth of content coverage
- What about readings?
- How much – start small or go all in?
Considerations & Concerns

- Change in teaching style
- Requires careful preparation
- Preparing students to be active participants

Student pushback

“If I’m paying for a class and a professor to teach me, then I do not want to teach myself for homework and have homework for class.”
Survey of flipped class studies (11) Bishop and Verleger, 2013

“Despite differences among studies, general reports of student perceptions were relatively consistent. Opinions tended to be positive, but there were invariably a few students who strongly disliked the change.”

Clarisa Bercovitch Guelman’s flipped class

“Very hands on. Awesome! Videos are a lot of help because I can watch them multiple times.”

“The “Reverse” layout kept important learning time in the class with examples instead of covering material. The questions and activities solidified concepts for me.”

“I also liked the group learning structure that this class used. I learned much more from my fellow students because of this.”
Who is Doing it?

- CSU Chico - Accounting, Political Science
- CSU Northridge – Multimedia Design
- CSU Los Angeles – Management
- CSU Long Beach - Anatomy
- Cal Poly Pomona- Physics
- SDSU – Pre-calculus
- SJSU – Engineering Electronics and Circuits
- Colorado State University at Pueblo – World History
- UC Irvine – Biology
- U. of Colorado at Boulder – Ecology and Evolutionary Bio
- Miami U. – Microeconomics and Software Engineering
Getting Started

Technology, Process and Examples
Before the Classroom

- Lecture Content Videos:
  - Tools:
    - TechSmith Relay, Camtasia Studio, SoftChalk, YouTube, Screencast.com, Jing
    - Tablets, iPad with apps like Doceri
- Open Educational Resources (OER)
- Publishers online products
- Incentivize preparation & assess understanding
  - Cougar Courses activities:
    - quizzes, forums, assignments, database, glossary
  - Publishers online exercises
Active Learning Techniques & Activities

- Peer Instruction
- Team Based Learning
- Structured Debates
- Problem based learning
- Case study/mini-case study
- Simulations, Experiments, Labs
- Jigsaw Group Projects

Student Engagement Techniques: A Handbook for College Faculty, by Elizabeth Barkley

Learner Centered Teaching; Putting the Research on Learning into Practice, by Doyle, Terry, Zakrajsek Todd
Case 1: Peer Instruction – Physics, before class

Information
- View 2-3 mini-lectures – 1 objective each related to Newton’s 3rd law of motion (1. Force, 2 Contact vs. Long Range, 3 Gravity)
  - Include worked examples and explanation eg. net force

Understand
- Students:
  - Take readiness quiz – multiple attempts, adaptive.
  - Submit a few problems, based on the some worked examples with fading

Review and Clarification
- Students:
  - Q & A forum
    - Explain the concepts in their own words (What is Newton’s 3rd law of motion?)
  - Pose a question
    - Clarification
    - Request more Information
- Instructor
  - Reviews before class
  - Review/collects questions
Case 1: Peer Instruction – a Playlist

View playlist
Case 2: Structured Controversy in Accounting

- Topics are aligned with core text. (Corporate social responsibility, Sustainability of Euro, International Taxation, etc.)
- Teams of 4, further broken into pairs.
- Topics assigned/selected
- Team identifies the controversial issue(s) within topic.
- Each pair takes one side and develops position.
- Present to whole class
- Team merges opposing perspectives into cohesive, reasoned position
Case 2: Structured Controversy - Before Class

Information

All students
• Use group self-selection
• Read text

Specified team
• Read/view/listen to numerous posted resources

Understand

Teams
• Using chat, forum, or BBB identify areas of controversy
• Agree on debate topic.
• Submit via online text assignment for approval

Apply/Analyze

Pairs
• Develop argument using a Wiki

All students
• Complete pre-debate opinion survey using feedback
Case 2: Structured Controversy - Before Class

Pre-Debate Opinion survey

*1
Sustainability of the Euro 1
Should Greece leave the Euro currency system?
 ○ Yes ○ No

*2
Sustainability of the Euro 2
If Greece is required (or chooses) to exit the Euro currency system, do you believe it should leave immediately (as opposed to a phased departure over time)?
 ○ Yes ○ No

*3
International Taxation 1
Do you believe that tax competition, as it stands, is fair?
 ○ Yes ○ No

*4
International Taxation 2
Do you believe that tax competition can be effectively regulated?
 ○ Yes ○ No

*5
Sustainable Capitalism 1
Does the government have the tools and resources for a transition to a new sustainable model of capitalism?
## Case 2: Structured Controversy - In Class

**Controversial Issues Report Survey**

1. Rate the effectiveness of five minute presentations to clearly explain the positions taken by groups in debate on a scale of 0-100.

2. Rate the effectiveness of rebuttal/critique responses to address concerns or issues identified on a scale of 0-100.

3. Rate the relevance of questions asked by groups in the debate on a scale of 0-100.

4. Rate the level of knowledge of controversial issue covered by the team in the debate on a scale of 0-100.

5. Rate the enthusiasm for discussion of controversial issue by debate participants on a scale of 0-100.
Case 2: Structured Controversy - After Class

**Sustainability of the Euro 1**
Should Greece leave the Euro currency system?

<table>
<thead>
<tr>
<th>Response</th>
<th>Average</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>46%</td>
<td>13</td>
</tr>
<tr>
<td>No</td>
<td>54%</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>28/28</td>
</tr>
</tbody>
</table>

**Sustainability of the Euro 2**
If Greece is required (or chooses) to exit the Euro currency system, do you believe it should leave immediately (as opposed to a phased departure over time)?

<table>
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<tr>
<th>Response</th>
<th>Average</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>25%</td>
<td>7</td>
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<tr>
<td>No</td>
<td>75%</td>
<td>21</td>
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<tr>
<td>Total</td>
<td>100%</td>
<td>28/28</td>
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</tbody>
</table>

Repeat the feedback survey, students can view results.

**Note:**
- **Pre-debate:** Students participate in discussions and prepare arguments.
- **Post-debate:** Feedback survey is conducted to assess the impact of the debate on students' opinions.
- **Instructor utilizes:**
  - Wikis for individual contributions to team/partner work.
  - Student feedback ratings on debates and team reports.
  - Class participation.
  - Individual response to exam essays.

Post-debate feedback survey results are provided to the team.
Case 3: Lab Course, Before Class

**Information & Exploration**
- Read chapters
- View website from National Heart Lung Blood Institute
- View online animations
- Listen to abnormal heart sounds
- Watch video on YouTube about how heart works

**Understand**

**Students:**
- Take readiness quiz
- Multiple attempts, score only.
  - Delay between attempts
  - Random from testbank

**Instructor**
- Reviews to identify most common incorrect answers

**Review and Clarification**

**Students:**
- After a passing quiz score, the students can view a demonstration of the lab
- Q & A forum
  - Explain the concepts in their own words
  - Pose a question
  - Clarification
  - More Information

**Instructor** reviews and collects questions

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Case 3: Lab Course, In Class

**Review and Clarification**

**Students:**
- Ask any additional questions

**Instructor:**
- Short review of material/demo of the lab
- Reviews common misconceptions or errors from quiz results and forums
- Answers or poses forum questions to the class

**Apply**

**Individual/Teams**
- Use a wiki page template as a lab sheet

**Instructor**
- Leads whole class review.
Case 3: Lab Course, After Class

**Apply**
- Group
  - Contribute to a glossary of terms incorporating multimedia when possible

**Analyze**
- Group
  - Discuss on a forum questions for further exploration
  - Individually they review the data from the lab sheet and write a summary paper.

**Evaluate**
- Individuals
  - Students write a reflection of their lab experience
  - What would they do different?

Instructor:
- Grades both team solution and individual summary
Summary

- Videos are Information Transfer
  - Short, tightly focused
  - Use Cougar Courses to support and encourage viewing.
- Utilize open education resources

- Optimize use of classroom time – higher order thinking
  - Student-centered activities
  - Practice, active guidance and feedback
  - Individual support just- in- time
- Use Cougar Courses after class for reflection, demonstrated learning, sharing projects, etc.
Does it Work?

What does the Research Indicate?

Students in PI courses showed learning gains ranging from 0.49 to 0.74 over eight years of assessment at Harvard University.

Two physics classes taught by traditional methods during the assessment period show much lower learning gains (0.25 in a calculus-based course in 1990 and 0.40 in an algebra-based course in 1999).

- 2 sections of large enrollment physics, both taught via “interactive lecture”
- Week 12, flipped 1 section,
- Engagement increased from 45 +/- 5% to 85 +/- 5MC test
- Ave quiz score 74 in flipped vs. 41 in control.
Davies & Ball (BYU) – Compared 3 approaches to teaching a spreadsheet class

- Large lecture
- Independent study with My IT Lab videos and sims
- videos/simulations and optional flipped class

Active Learning

- Leads to better student attitudes, and improvements in thinking and writing. (Bonwell and Eison, 1991)
- Collaborative learning improves learning outcomes relative to individual work.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Learning Outcome</th>
<th>Effect Size</th>
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<tbody>
<tr>
<td>Johnson, Johnson and Smith [12]</td>
<td>Improved academic achievement</td>
<td>0.64</td>
</tr>
<tr>
<td>Meta-study 90 years of research</td>
<td>Improved quality of interpersonal interactions</td>
<td>0.60</td>
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<tr>
<td></td>
<td>Improved self-esteem</td>
<td>0.44</td>
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<tr>
<td></td>
<td>Improved perceptions of greater social support</td>
<td>0.70</td>
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<tr>
<td>Johnson, Johnson and Smith [13]</td>
<td>Improved academic achievement</td>
<td>0.53</td>
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<tr>
<td>Updated – 168 studies from 1924-1997</td>
<td>Improved liking among students</td>
<td>0.55</td>
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<tr>
<td></td>
<td>Improved self-esteem</td>
<td>0.29</td>
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<tr>
<td></td>
<td>Improved perceptions of greater social support</td>
<td>0.51</td>
</tr>
<tr>
<td>Springer et al. [43]</td>
<td>Improved academic achievement</td>
<td>0.51</td>
</tr>
<tr>
<td>37 studies in STEM courses</td>
<td>Improved student attitudes</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Improved retention in academic programs</td>
<td>0.46</td>
</tr>
</tbody>
</table>

References and Additional Resources
For More Information:

Use the QR code at left for:

- research on:
  - Flipped Courses
  - Active Learning
  - Use of lecture capture/video
- a compilation of Active Learning techniques

www.csusm.edu/ids >> Course Design & Instruction >> Flipped Class