PHGN 100 – Introductory Mechanics

• ~500 students/semester, mostly 1st year
• 3-4 faculty; ~30 UTAs
• ~25 topics addressed via:
  Reading, Lecture, Studio, Homework

Rebrand “Lecture” as “Discussion”
• Little content delivery
• I-R-E → Real discussions
• Student expectations = Class reality

Stop requiring a specific reading and grading annotations
• Already familiar with Key Concepts?
• Getting points vs. engaging in learning

Start requiring students to come to Discussion familiar with Key Concepts
• Doing Reading → Valuing Reading
• Extrinsic → Intrinsic

Students will...
• Assess understanding of Key Concepts
• Determine which resources to consult
• Articulate understanding and confusion
• Come to class prepared to engage with challenging material

Associated Course Learning Outcomes
• Identify key concepts and questions from a scientific text and articulate your understanding or reasons for confusion in writing.
• Interact with your peers, TAs, and instructors in a way that facilitates productive learning.
• Believe that you can learn difficult concepts through repeated exposure and deliberate practice.

About the Readings
• Written in-house by Alex Flournoy (Teaching Professor)
• 3-4 pages text/topic
• 1-2 pages examples/topic

About Perusall
• Developed by researchers at Harvard (Eric Mazur, Gary King, Brian Lukoff, Kelly Miller)
• Free to use (besides book purchase)
• ~1,200 comments/assignment in PHGN 100
• 0.25 correlation between final course grade and Perusall participation in PHGN 100

Mid-semster survey results
• How often do you do the reading in advance of Lecture?

<table>
<thead>
<tr>
<th>% of Students Who Read</th>
<th>Spring 15 (N=394)</th>
<th>Fall 15 (N=464)</th>
<th>Spring 16 (N=466)</th>
</tr>
</thead>
<tbody>
<tr>
<td>75-100%</td>
<td>22%</td>
<td>27%</td>
<td>68%</td>
</tr>
<tr>
<td>50-75%</td>
<td>21%</td>
<td>23%</td>
<td>19%</td>
</tr>
<tr>
<td>25-50%</td>
<td>16%</td>
<td>18%</td>
<td>7%</td>
</tr>
<tr>
<td>0-25%</td>
<td>24%</td>
<td>22%</td>
<td>8%</td>
</tr>
<tr>
<td>Never</td>
<td>16%</td>
<td>11%</td>
<td>3%</td>
</tr>
</tbody>
</table>

• How helpful do you find the reading is toward your understanding of the material?

<table>
<thead>
<tr>
<th>% of Students Who Read</th>
<th>Spring 15 (N=394)</th>
<th>Fall 15 (N=464)</th>
<th>Spring 16 (N=466)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very helpful</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Somewhat helpful</td>
<td>47%</td>
<td>54%</td>
<td>44%</td>
</tr>
<tr>
<td>Not that helpful</td>
<td>21%</td>
<td>22%</td>
<td>45%</td>
</tr>
<tr>
<td>No opinion</td>
<td>20%</td>
<td>12%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Open questions
• How can we extrinsically motivate coming to class prepared without disrupting learning for students with a wide range of prior physics experience?
• What assistance will students need to properly assess their understanding of Key Concepts? Will the Reading Guide be necessary/Enough?
• Will effective reading increase engagement in and effectiveness of Discussion, Studio, and Homework tasks?

Availability resources (in Perusall)
• Concise, high-level, course-specific notes/examples
• PER-based introductory textbook
• Topic Learning Outcomes
• Reading Guide

Students: Dissatisfied 😞

Spring 2016: Implemented “Perusall”
• Read/annotate online
• Asynchronous engagement with material
+ 20 other students
• Top 3 annotations graded as 0, 1, or 2
• “Confusion Report” available to faculty

Initial Results
• Increase % read (25% → 65%)
• Lecture faculty: Students recognize what they don’t know 😮
• Students: Dissatisfied 😞

Uncover prior conceptions + Apply concepts + Model problem solving

Higher-order thinking

Increased % read (25% – 65%)

Reading Throughout Spring 2016 Semester

About the Students
• 60% are freshmen
• 50% are women
• The average age is 19

About the Course
• Taught by: Flournoy (T), flournoy@berkeley.edu
• Textbook: Physics for Scientists and Engineers, Zemansky
• Website: http://www.physics.berkeley.edu/education/PHGN100

Kristine Callan, Physics Department, Teaching Associate Professor
Interests: Inclusive Teaching Practices, Secondary Teacher Preparation, Discipline-Based Education Research

June 2016 Cohort