Physics Learning Assistants at Georgia State University

STEM Initiative Goal: Enhancing the Undergraduate Experience

Brian D. Thoms – Physics & Astronomy
Calculus-Based Physics Courses

- 50% Computer Science majors, 20% Chemistry majors, 10% Physics majors.
- Three hours of lecture plus one three hour laboratory per week.
Principles of Physics Course Redesign

- Three-hour traditional experiments led by Graduate Teaching Assistants
- One-hour tutorial led by Undergraduate Learning Assistants
- Two-hour inquiry-based experiments led by Graduate Teaching Assistants

Confirmation of Theory

LA’s job
- To facilitate group discussion
- To ask leading questions
- To help students to work through difficulties in their own thinking

Two-hour inquiry-based experiments led by Graduate Teaching Assistants
- Prompt thinking as a group
- Make predictions
- Test their predictions to discover underlying ideas
Undergraduate Learning Assistants (UC Boulder model)

- Chosen from successful students in previous semesters
- Univ. of Washington Tutorials: research-based instructional strategy
- Practice tutorials as a group each week
- Professor models role of LA during practice session
- LAs take a physics pedagogy course the first time they are an LA
- LA leads 3 tutorial sections each week and is paid $1120/semester
- To continue as LAs they must move down path to becoming teachers
- Proven technique to produce more high school physics teachers
## Force Concept Inventory Results

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>FCI Pre (%)</th>
<th>FCI Post (%)</th>
<th>(&lt; g )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys2211 w/ Traditional Labs</td>
<td>218</td>
<td>36.3</td>
<td>54.8</td>
<td>0.30</td>
</tr>
<tr>
<td>Phys2211 w/ Redesigned Labs</td>
<td>227</td>
<td>36.6</td>
<td>61.0</td>
<td>0.40</td>
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</tbody>
</table>
The Effect on Success Rates and Withdrawal Rates

<table>
<thead>
<tr>
<th>Course</th>
<th>N</th>
<th>GPA</th>
<th>ABC</th>
<th>DWF</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys2211 w/ Traditional Labs</td>
<td>421</td>
<td>3.12</td>
<td>86.0%</td>
<td>14.0%</td>
<td>8.8%</td>
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<tr>
<td>Phys2211 w/ Redesigned Labs</td>
<td>521</td>
<td>3.29</td>
<td>91.2%</td>
<td>8.8%</td>
<td>4.6%</td>
</tr>
<tr>
<td>Phys2212 w/ Traditional Labs</td>
<td>325</td>
<td>3.00</td>
<td>85.8%</td>
<td>14.2%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Phys2212 w/ Redesigned Labs</td>
<td>399</td>
<td>3.08</td>
<td>90.7%</td>
<td>9.3%</td>
<td>3.8%</td>
</tr>
</tbody>
</table>
Enrollments and Assessments

Phys2211 – Principles of Physics I

Phys2212 – Principles of Physics II
New Addition: Active Learning Laboratory