5 Best Practices of Teaching (5BP)²

- **Learning in Context**
  - Lecture, discussion, and lab content tied to real-life contexts.
- **Group-based learning**
  - Guided Inquiry worksheets to structure TA-led discussions
  - Concept-test “clicker questions” in lecture ask students to turn to neighbors to work through questions
  - Challenge Problem in evening workshops asked students to work together
- **Time on task**
  - Challenge Problems, Guided Inquiry, online homework, interactive lectures all increased time students spent on course material
  - Weekly quizzes were removed to make time for these activities
- **Frequent feedback**
  - Additional exam (worth ½ credit) added in 3rd week (vs. 5th week)
  - “Clicker questions” asked several times each lecture gave immediate feedback to students about how well they tracked material. Also gave immediate feedback to instructors so they could adjust their instruction on-the-fly
- **Positive classroom climate**
  - TA training focused on “guide” role in guided inquiry vs. “sage on the stage”
  - Efforts to relate course content to real-world problems humanized the lectures


### Closing the Achievement Gap in Chem 103

#### Background

Our project is premised on the following findings:

- Targeted students¹ are more likely to receive Ds, Fs, or drop from quantitatively-oriented introductory gateway courses at UW-Madison, such as chemistry and math, producing an “achievement gap” that disproportionally keeps targeted students from pursuing majors, and therefore careers, in the sciences.
- The gap persists across all ACT scores, meaning that regardless of prior preparation, targeted students are still more likely to receive Ds, Fs, or drop these courses.
- Our hypothesis is that these courses can be taught using 5 research-based “teaching best practices” that engage all students more fully, and that will close this achievement gap.

#### Project Goal

By implementing a comprehensive course reform that focuses on five teaching best practices:

1. Close the achievement gap between targeted and non-targeted students
2. Enhance ALL students’ learning

#### Evaluation Method and Findings

**Outcome variables:** course GPA, adverse outcome rates (Ds, Fs, or Drop), retention to the subsequent chemistry course, self-reported attitudes and behaviors regarding the learning of chemistry via online survey.

**Assessment method:** quasi-experimental design comparing outcome variables between 5BP and traditional section.

**Findings:**

- No change in GPA and adverse outcome gap
- On average, students in 5BP section studied about 1hr more per week outside of class
- More students in 5BP section reported working with and discussing course-related ideas with classmates outside of class. Particularly true for targeted students
- Targeted students in 5BP section were more likely to report experiencing a positive classroom climate (felt instructors fostered self-confidence; students felt more comfortable asking others to study with them outside of class)

#### Future Directions

- Although the achievement gap hasn’t closed, and it takes three iterations to see change from comprehensive course reform, these changes have taken place:
  - Some indication that the new ways of teaching are affecting students’ behaviors and perceptions favorably.
  - Entire general chem faculty beginning to adopt some course reforms
  - The centrality of TA’s role to implement group-based learning has emerged as important training issue
  - Plans to disseminate materials across system and through chem education

#### Number of students included to date

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<tr>
<th>5 Best Practices Implemented</th>
<th>Fall 2009</th>
<th>Spring 2010</th>
<th>Fall 2010</th>
<th>Spring 2011</th>
<th>Number of students included to date</th>
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<td>Targeted section for comparison</td>
<td>1 section</td>
<td>1 section</td>
<td>2 sections (5BP partially implemented)</td>
<td>1 section</td>
<td>189 1680</td>
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<td>1 section team taught</td>
<td>1 section</td>
<td>1 section</td>
<td>3 sections</td>
<td>1 section</td>
<td>170 1330</td>
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