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On the Removal of Motivation and Structural Barriers in the Classroom and across the Mathematics Curriculum

Benjamin Wiles
*Clemson University*

Chantal Levesque-Bristol
*Purdue University*

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Benjamin Wiles

Chantal Levesque-Bristol
We extend knowledge of best practices by defining “active-learning strategies” not in terms of specific methods, but instead by the ability of methods-in-practice to impact motivation in the context of the learning environment and, thereby, promote outcomes.
### Non-Mainstream Calculus Pipeline

**Fall 2008**

- **New Beginners in Relevant Majors:** ALL
  - **Sequence Enrollment:** 6,400
    - **DFW Count:** 1860
    - **DFW Rate:** $1860/6400 = 29\%$
    - **Churn Ratio:** $1860/4469 = 43\%$

- **URM:**
  - **DFW Rate:** $261/627 = 42\%$
  - **Churn Ratio:** $261/338 = 79\%$

**Fall 2016**

- **ALL**
  - **Sequence Enrollment:** 3,992
    - **DFW Count:** 876
    - **DFW Rate:** $876/3992 = 22\%$
    - **Churn Ratio:** $876/4573 = 20\%$

- **URM**
  - **DFW Rate:** $150/586 = 26\%$
  - **Churn Ratio:** $150/480 = 32\%$
<table>
<thead>
<tr>
<th>Group</th>
<th>Pass Rate</th>
<th>Average Course Grade</th>
<th>Motivation/Grade Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lecture</td>
<td>Collaborative</td>
<td>Lecture</td>
</tr>
<tr>
<td>All Domestic</td>
<td>71</td>
<td>78</td>
<td>2.07</td>
</tr>
<tr>
<td>(N=2583;551)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>70</td>
<td>77</td>
<td>2.04</td>
</tr>
<tr>
<td>(N=669;170)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>URM</td>
<td>60</td>
<td>61</td>
<td>1.83</td>
</tr>
<tr>
<td>(N=288;57)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pell</td>
<td>65</td>
<td>75</td>
<td>1.90</td>
</tr>
<tr>
<td>(N=415,97)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Weekly Course Structures**

- **Lecture (50 min)**
  - 250-500 students
  - 1 Faculty

- **Recitation (50 min)**
  - 40 students
  - 1 TA (Grad)

- **Lecture (50 min)**
  - 250-500 students
  - 1 Faculty
  - 50 minutes

- **Recitation (50 min)**
  - 40 students
  - 1 TA (Grad)

- **Lecture (50 min)**
  - 250-500 students
  - 1 Faculty
  - 50 minutes

- **Problem Session (75 min)**
  - 120 students
  - 1 Faculty
  - 6 TA (3 Grad & 3 Undergrad)

- **Collaborative Learn (50 min)**
  - 40 students
  - 2 TAs (1 Grad & 1 Undergrad)

- **Collaborative Learn (50 min)**
  - 40 students
  - 2 TAs (1 Grad & 1 Undergrad)