Characteristics of Successful Programs In College Calculus
A report on our findings

<table>
<thead>
<tr>
<th>David Bressoud</th>
<th>Marilyn P. Carlson</th>
<th>J. Michael Pearson</th>
<th>Chris Rasmussen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macalester College</td>
<td>Arizona State University</td>
<td>Mathematical Assoc of America</td>
<td>San Diego State University</td>
</tr>
</tbody>
</table>

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PowerPoint available at www.macalester.edu/~bressoud/talks

ICME-12
Seoul, Korea
July 14, 2012
Fall 2010
Phase I: Survey

1. Institutional questionnaire, chair
2. Calculus coordinator questionnaire
3. Instructor pre-term survey
4. Student 2\textsuperscript{nd} to 3\textsuperscript{rd} week survey
5. Student 2\textsuperscript{nd} to 3\textsuperscript{rd} last week survey
6. Instructor post-term survey
7. Collection of final exams and grades
Fall 2012
Phase II: Case Studies

three-person teams, three-day visits

16 colleges and universities
Initial survey responses from
168 colleges and universities
660 instructors representing almost 900 Calculus I classes and over 34,000 students
14,000 students
Dependent Variables

Pre- and post-term surveys:

- I am confident in my mathematical abilities
- If I had a choice, I would continue to take mathematics
- I enjoy doing mathematics
- I intend to take Calc II

Post-term survey only:

- This course has increased my interest in taking more mathematics
Control Variables

Demographics
  Gender, SES, Race/Ethnicity

HS Math
  Math courses taken; if calculus, what kind; if AP exam, which and what score
  Grade in last HS math course
  SAT/ACT scores

College
  Prior college math, year in college, career intention
  Pre-term survey value
Independent Variables

Student supplied:

• Student beliefs and attitudes about learning mathematics
• Study habits
• Level of intellectual engagement with the course
• Experience with technology (graphing calculators and/or computer software)
Independent Variables

Student supplied:

- Student perceptions of instructional practices
- Student perceptions of instructor use of technology
- Student perceptions of assessment practices
- The intellectual community outside of class
Independent Variables

Instructor supplied:
• Class size
• Instructor experience and background
• Instructor beliefs, attitudes, and interests
• Assessment practices
• Out of class interactions with students
• Use of technology including use of web resources
• Textbook as well as additional instructional resources provided for students
Independent Variables

Coordinator supplied:

• Placement procedures
• Technological support
• Institutional support for students
• Institutional support for instructors
### Dependent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>Δ</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence</td>
<td>3.89</td>
<td>1.01</td>
<td>0.02</td>
<td>-0.47</td>
<td>-0.46</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>3.63</td>
<td>1.27</td>
<td>0.02</td>
<td>-0.35</td>
<td>-0.27</td>
</tr>
<tr>
<td>If I had a Choice</td>
<td>1.93</td>
<td>1.02</td>
<td>0.02</td>
<td>-0.09</td>
<td>-0.09</td>
</tr>
<tr>
<td>Calc II</td>
<td>0.81</td>
<td>0.33</td>
<td>0.01</td>
<td>-0.07</td>
<td>-0.20</td>
</tr>
</tbody>
</table>

**Effect Size (change in units of SD of the pretest):**

- Confidence: -0.47
- Enjoyment: -0.35
- If I had a Choice: -0.09
- Calc II: -0.07

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