STEPing up Graduation Rates – the Phy131 Pilot Courses

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The STEP NSF grant at Cal Poly

PIs: Ed Walton, Barbara Burke, Winny Dong

- Goal: Increase graduation and retention rates in STEM
- Chemistry, Math, Physics, Engineering involved
- In Physics:
  - Main Problem: Vectors
  - Pilot Re-design of Phy131 (Peter Siegel & Barbara Hoeling)

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Special features of Phy131 STEP Pilot FQ2011 section compared to regular sections:

- ALEKS online math system implemented before start of quarter (at no cost for students)
- **New ordering of topics: Statics (including torque) first**
- **Strong emphasis on Vectors (geo-triangles)**
- **Lab & Lecture connected: Students must register for lecture/lab together**
- Lecture (50 students, MWF 11-11:50am) co-taught by Peter and Barbara
- Two labs on Fridays (about 25 students each), one taught by Barbara (morning) and one by Peter (afternoon)
- **Fewer experiments (inquiry!) => time for problem solving in lab**
- Online Integer Problems (created by Peter)
- **Group work required**: One problem every week requires group solution, no individual credit is given
- Group formation facilitated by learning assistants (LAs) => better **community building**
- LAs help out in lab

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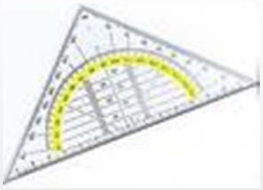
Second Pilot Phy131 Course WQ2012

- 50 students (1 lecture, 2 labs)
- lecture: BMH, both labs: PBS
- ALEKS dropped
- all other elements retained



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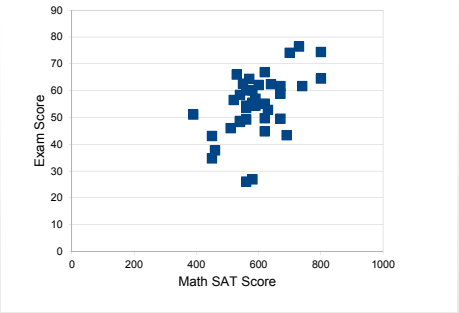
Assessment Results

- Learning assessment FCI: 40% normalized gain
- STEP career Survey given at start of FQ2011
- Mid-quarter Survey
- End-of-quarter Survey
- Correlations between math SATs and exam grades investigated



Correlation between Exam scores and Math SAT scores for Phy131 STEP pilot section FQ2011.

Results of Student Surveys

- The homework study groups are useful for my learning.
- **Strongly agree/agree: 31% / 51% (mid)**
  41% / 49% (end)
- The lab experiments support and complement the lectures.
- **Strongly agree/agree: 46% / 40%**
- Meeting my class mates both in lecture and lab helped me to get to know them better than if I had met them only in lecture or only in lab.
- **Strongly agree/agree: 63% / 24%**
- Knowing my class mates both from lecture and lab helped me succeed in this class.
- **Strongly agree/agree: 39% / 32%**

"I'd like to see more classes structured like this current physics 131 class i'm taking. Especially in engineering. This class is fun, easy to understand, doesn't have that anxious vibe, the professors are very nice. And best of all the lecture must be paired up with the lab that is being taught by the same professor. And that lab is right after lecture so it feels like a full experience of physics in one day, for about 4 hours, all related because the professor is the same."

Data to be gathered:

- Students' math SAT, MDT, and HS GPA
- Control group of 50 students

- Tracking of students throughout their career at CPP.
  - Where do they fail: Phy133? ME214?
  - Why do they leave STEM?

=> Longitudinal Study over several years