Elective Recitation Sections in Physics Freshman Service Courses

CAL POLY POMONA

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INTRODUCTION

Students from twenty-three departments on the CPP campus are required to take Freshman Physics service classes. Many of them struggle to succeed. Introductory Physics classes at CPP do not normally include any recitation sections focused on concepts and problem solving skills.

One unit elective credit/no credit recitation class are now available.
Research based curriculum: *"Tutorials in Introductory Physics"**
- Inquiry, discussion & group work
- Focus on concepts
- Socratic method
- Revisiting the material in more relaxed and small group setting
- Less pressure on grades and more emphasis on learning

*L. C. McDermott, P. S. Shaffer and the Physics Education Group at the University of Washington (Pearson Publishing, Inc.)

Impact on Lecture Grades:

8 sections of Phy 131 recitation in this grade analysis: 136 Recitation students; 2722 Control students (in Phy 131 lectures but not in associated recitations).

Who took the PHY 131 Recitations?

Pre-req GPAs:	Math 114 (1st quarter calculus)	% with Math 114*
Recitation (R)	2.50	65
Control (C)	2.45	60

Table 1 Math Backgrounds of Phy 131 students

*students may satisfy pre-req with CPP Math 114, AP calculus or transfer credit

	% of students repeating Phy 131
Recitation (R)	25
Control (C)	15

Table 2 Percentage of students repeating Phy 131

Students who need to repeat Phy 131 are voluntarily signing up for the recitations.

How did Recitation students perform in the associated Phy 131 lectures?

Overall population	131 GPA	% D, F, WU*
Recitation (R)	2.18	20
Control (C)	2.11	25

Table 3 Lecture grades and % D, F, WU

* WU = Unauthorized Withdrawl

Repeating cohort	% D, F, WU
Recitation (R)	30
Control (C)	45

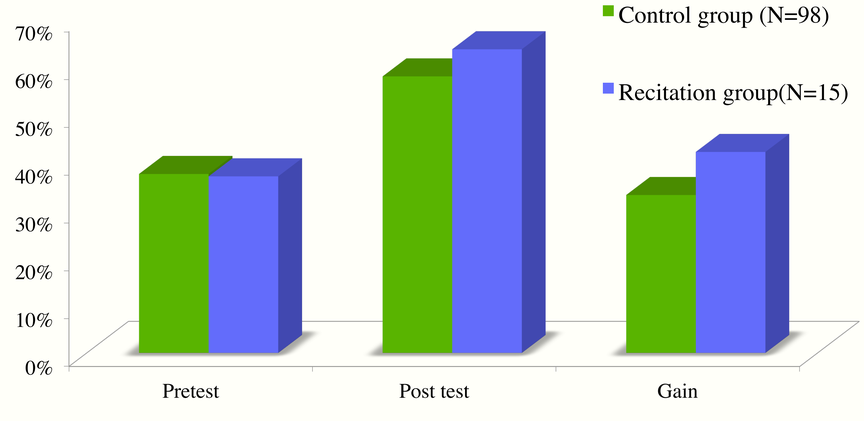
Table 4 D,F, WU rates for repeating cohorts

Among the control population, repeating students have almost a 50% chance of D, F, WU in the lecture on their second attempt. The pass rate is improved for the repeating cohort in the recitations.

Sample FCI data:

Learning gain measured on each topic through calculating normalized gain.
Normalized gain is:

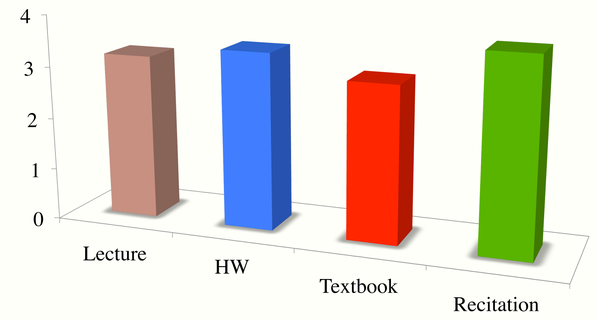
$$\langle g \rangle = \frac{(\text{post test score} - \text{pretest score})\%}{(100\% - \text{pretest score}\%)}$$



	% Pretest	% Posttest	% Gain
Recitation (R)	40	65	42
Control (C)	40	60	33

Table 5 FCI scores and gain

Perceived helpfulness of different course components:



We asked students, in a scale of 1-5, how helpful different course components have been in their learning?
90% ranked recitation "the most helpful" or "very helpful"

According to end of the quarter student surveys, recitations were helpful:
Understanding the concepts (80% agree)
Problem solving ability (85% agree)
100% of the 131 recitation and 90% of the 133 recitation said they would recommend participation in recitations to a friend.

DISCUSSION

We have found that weaker students voluntarily sign up for elective recitation sections. There was no significant improvement in the average lecture grade for the recitation participants. But the pass rates, especially for the students repeating the lecture, increased if they participated in the recitations. Normalized gains on the FCI increased for the recitation students and the students perceived the recitations as helpful.

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