Connections Physics Review (CPR) Program

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BACKGROUND

Despite consistent effort, the number of women in engineering remains small. Hence, retention is an important factor in increasing the number of women in engineering. Research has shown that women tend to drop out of engineering earlier and with higher GPA's than men, suggesting a lack of support and confidence. The crucial year appears to be the freshman year when the largest drop in engineering students is seen.

AP EXAMS 2004 - % taken by girls

Biology	**58 %**
Chemistry	**46 %**
Computer Science	**15 %**
Calculus – AB	**48 %**
Calculus – BC	**40 %**
Physics – B	**35 %**
Physics – C	**25 %**

from: College Board Advanced Placement Report to the Nation, 2005

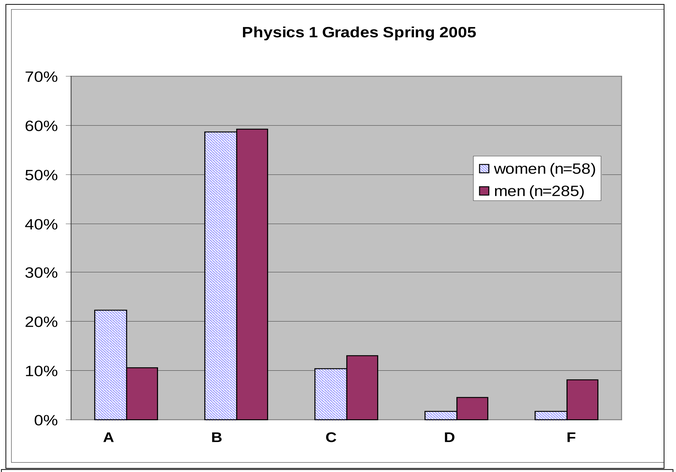
CONNECTIONS consists of a series of programs to strengthen the pathways for women and girls to pursue careers in engineering and science. Connections program components at the college level include scholarships, social programs, a freshman residence LLC (Learning Living Community), outreach programs, academic support, e-mentoring, and career preparation. The Connections Physics Review program was established as an early initiative. Physics was chosen because it's a required 1st year course and because the problem solving skills are essential for future engineering success.

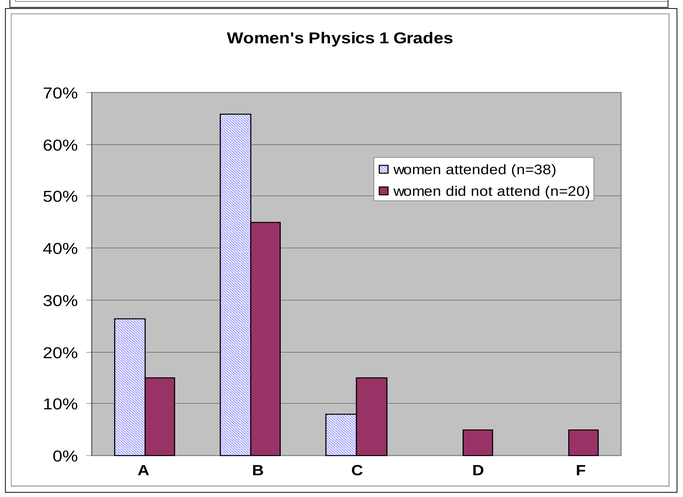
CPR components:

- Weekly sessions to review physics concepts introduced in lecture and to develop problem solving strategies
- Sessions held in evening in freshman residence hall (LLC)
- Upper class women studying engineering (selected as role models) to lead the review sessions
- Heavily advertised by ResLife and College of Engineering
- Free pizza to entice students to all sessions
- Special mid-term and final reviews
- Additional one on one tutoring

RESULTS

- Average freshman physics grades for spring 2005 were **2.587** for men (n=285) vs. **2.982** for women (n=58)
- Women received more A's than men (19% had an A versus 9% of men)
- Women received less F's than men (2% received an F vs. 8% of men)
- 65% of COE fresh-women participated in CPR
- Average number of sessions attended by women was 5.5.
- Women who participated reported an increase in confidence
- Women who withdrew or received D's or F's did not attend any CPR sessions
- Women who didn't participate in CPR had lower grades in physics than women who did attend (average grade of 2.7 versus 3.1).
- Of the women who attended CPR, 26.3% received an A or A-.





SAMPLE REVIEW NOTES

Equations:

$v = v_o + at$

$x = x_o + v_o t + \frac{1}{2} at^2$

$v^2 = v_o^2 + 2a(x - x_o)$

$a_r = v^2/r$ (for circular motion)

Hints:

- can only use when a is constant
- in 2D problems, we solve for both axis (x & y)
  then, $a_x = 0$ & $a_y = -g = 9.8\ m/s^2$
- if thrown at an angle, calculate v_{xo} & v_{yo}

When to Use:

-1 object

- object thrown or dropped
- in 2D, called "projectile motion"
- Givens & unknowns include initial & final position and velocity
- Only for constant acceleration
- Use the radial acceleration for one object moving in a circle or arc

Figure 1

FUTURE PLANS

- Increase awareness of the value of participating in CPR
- Develop process to pass information from year to year
- Planning meetings between the student-teachers
- Increase 1-1 tutoring time

Acknowledgements

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