

Attracting and Retaining Under-represented Groups in CS

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A cooperative grant with 7 other schools:

- Beloit
- Duke
- Georgia Tech
- Loyola of Baltimore
- Purdue
- Rutgers
- UW - Milwaukee

Goal:

- Increase women and minority students in undergraduate CS classes and major

Hypothesis:

- Most women and minority students don't consider CS
- If they tried it, many would like it!

Approach:

- Use *active recruiting* to enroll students
- Use *peer-led team learning* to retain them

Build on Success in Math and Chemistry

- Emerging-Scholars Program (ESP)
 - Used in calculus classes
 - Recruit “at-risk” incoming freshmen
 - 6 extra hours per week of problem solving
- Peer-Led Team Learning (PLTL)
 - Used in chemistry classes
 - Offered (or required) of all students
 - 1 extra hour per week of group learning
 - Groups led by undergraduate peers

Measures of Success

- higher grades
- lower drop rates
- more interest in math / science

Our program: WES-CS

- Students enroll in “normal” intro course + WES-CS section, 2 hours per week
- WES-CS = small groups, co-operative problem solving, undergrad Team Leaders
- Special follow-up data structures course in the spring

A Typical WES-CS Session

- Play Games:
 - Guess partner's secret word using String methods (`substring`, `charAt`, etc)
- Simulate Code:
 - Act out operations on a `Car` class
- Solve Logic Puzzles:
 - Sudoku, chess mysteries...
- Write Code

Active Recruiting

- Identify strong incoming freshmen (GPA, SAT/ACT math scores)
- Invite mostly women (+ men from small, rural high schools)
- Invite them to join WES-CS
- Personal contact during summer orientation is important

Fall 2004 Results

- 48 students, 54.2% women
- 54.2% of women would not have enrolled without recruiting
- Drop rates:

	WES	Non-WES
female	13.6%	73.1%
male	5.6%	13.0%

Fall 2004 Results

- Students very positive about WES-CS:

I have [several] lectures that same day, and I originally thought, “Oh my God, by the time this comes around I'm going to be like, get me out of here.” But it's actually really enjoyable. It has to be the fastest two hours of my day

We really help each other out. Some people are better at certain things than others, so when someone has a question someone will step up and explain it. When that person who was originally explaining might have a question on something, another person can explain it to them, so it's really well-rounded in that aspect.

Fall 2004 Results ☹️

- Interest in CS declined in all students
- Only 5 of 19 women went on to take next CS class
- Reasons:
 - Just didn't enjoy it
 - Don't want a job sitting alone in front of a computer all day

Changes

- New instructor (spr 05)
- Hands-on labs (fall 05)
- Outside speakers (fall 05)
 - wide range of interesting jobs
 - not just programming
 - plenty of human interaction

Fall 2005 Results

- 45 students, 31.1% women
- Students very positive about WES-CS
- Drop rates:

	WES	Non-WES
female	7.1%	19.0%
male	3.3%	15.4%

- 5 (of 13) women went on to take next CS course

Conclusions so Far

- Active recruiting works to attract students with no previous interest in CS
- Peer-led team learning works to help students succeed in and enjoy intro CS
- However, a good intro CS experience may not be enough to keep students in CS

Open Questions / Future Directions

- Is a good intro CS experience enough?
- Will giving students more “social context” help convince more to stay in CS?
- Do we need more “entry points” to serve students with a broader range of abilities and experience?
- How does WES-CS approach work at other schools?

