Successful K-12 Outreach Strategies

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Acknowledgments

This session builds on dozens of discussions with many people over a long period of time. The specific idea for this session grew out of discussions within the AP Computer Science A Development Committee.

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Please fill out evaluation form!!!
Agenda

- Goal: engage in dialog and brainstorming
  - we will talk about some K-12 strategies we know can be successful
  - we also want to brainstorm to learn your ideas

Session Format
- Introduction
- Panelists will start discussion with outreach examples
- Attendees join with panelists for additional examples and continued brainstorming
Introduction

College CS enrollments have been disappointing low in recent years

- HS/incoming college students have many misconceptions
  - CS is thought to involve playing video games, hacking, surfing the Web
  - Computing is thought be solitary, non-creative,
  - Jobs are thought to be mostly outsourced

- Informed college students can be excited by the realities of computing
  - intellectual challenge and problem solving
  - opportunities to contribute to society
  - reality of strong job potential, fine salaries, opportunities for advancement
Introduction, Continued

- Important to generate student interest in HS
  - College Board followed 72,457 incoming students at 27 diverse colleges and universities

<table>
<thead>
<tr>
<th>Student Group</th>
<th>% that take a college CS course</th>
<th>Avg number of college CS courses</th>
<th>% that major in CS, IS, CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-AP</td>
<td>28%</td>
<td>1.0</td>
<td>3%</td>
</tr>
<tr>
<td>AP CS A</td>
<td>58%</td>
<td>3.7</td>
<td>19%</td>
</tr>
<tr>
<td>AP CS AB</td>
<td>56%</td>
<td>4.9</td>
<td>32%</td>
</tr>
</tbody>
</table>

Source: Rick Morgan and John Klaric, "AP Students in College: An analysis of Five-Year Academic Careers", 2007, reported by Trevor Packer, VP College Board
Before getting students involved, administration and higher-ups must be on board.

• Classes should count toward graduation requirements
• Times have changed, students are gaining basic computer skills much earlier in their education careers
• Relevance in today's society
• Cross-curricular computer usage
"Computer Science, which is at the core of the development of new technologies, should be taught to all students. Teaching Computer Science is essential to the development of critical thinking and problem solving skills. Technology is an integral part of life in the 21st century, and our schools have an obligation to prepare our students for the future."

- Patrice Gans

"We believe that all students should have the opportunity to become active creators of tomorrow's technology."

- Google on education
Grants for computer Science Education

Computer Science for High School

IBM Grant Programs

http://www.technologygrantnews.com/grant-index-by-type/k-12-grants.html

and many, many more!!!
"Why should I take Computer Science"
    or
"What's in it for me?"

Let the students answer the questions -

"Everything in the world today is based on computer technology."

"It is the one true completely hands-on course. It is the way education should be."

"It helps me to understand the logic behind games...which I love!"

"I love it!"
Pictures of students in action often helps with outreach.

Females in CS

Guest Speakers

Group Work/Team Building

CS Applications in Engineering

Self-directed Programming

Pictures speak for themselves.
Barb Ericson - Georgia Tech

Director of Computing Outreach since 2004. See http://coweb.cc.gatech.edu/ice-gt/ for more information.

- Computing summer camps for 4th - 12th graders
- Cool Computing for high school students and teachers
- Weekend computing workshops for 4th-12th graders
  - with youth-serving organizations like Girl Scouts
- A lending library of LEGO NXT robots, PicoCrickets, LEGO WeDo kits, and Pleo robots
- Competitions for Scratch, Alice, and Advanced Placement Computer Science
- Workshops for teachers (over 400 teachers)
- Webinars for teachers
Computing Summer Camps

• History
  ◦ Started with 2 weeks for high school in 2004
    ▪ lost money on camps
  ◦ Added middle school camps in 2006
    ▪ 3 weeks originally and broke even
  ◦ Added rising 4th-6th in 2009
    ▪ we now make money on the camps
• We get statistically significant changes in attitudes from the camps
  ◦ increase in confidence and enjoyment
  ◦ decrease in negative perceptions like programming is hard
• We have at least 3 students at Georgia Tech now that attended our computing summer camps
• We have trained and "seeded" 11 other camps in Georgia
Pictures from 2010 Summer Camps
Cool Computing Days

Field trips to Georgia Tech for high school students and teachers

We did two Cool Computing Days in 2010-2011 for over 200 students each day

• Student panels
• Corporate panels
• Talks by professors, research scientists, and grad students
  ○ satisfy outreach requirements for grants
• Hands-on activities
  ○ Pleo robots, PicoCrickets
• Pre survey at event
• Post survey follow-up
Paul Tymann

• High School/College Faculty Group
  ○ Regular meetings
  ○ Discuss Curricular Issues
  ○ Short Workshops

• High School Programming Contests
• Road Shows
• Summer Camps/After School Programs
• Co-PIs/Senior Personnel Grants
Henry Walker: College student — High school student Connections

College students may work with high school students, serving as mentors, role models, facilitators, or tutors.

**Example:** Grinnell Women in Science, GWIS
- Student organization at Grinnell College
- GWIS runs a Saturday morning series to explore the excitement and possibilities of numerous science disciplines, including computer science
- College students may work with science faculty to brainstorm and plan
- GWIS women are the visible leaders during the sessions themselves

**Example:** Tutoring programs for high school students
- College students serve as tutors
- Organized by high school or college
Common goals: Teaching introductory courses; both groups want to
• generate interest
• cover important material
• provide a strong foundation for later work

Common issues: In both environments,
• much discussion regarding the best approaches for creating excitement and introducing students to computing
• address common content
• utilize active pedagogies

College and high school environments have important differences
• special opportunities
• unique constraints
At least two approaches

**Example:** work with a high school teacher for a day
- meet with the teacher's classes
- present enrichment talks
- talk informally with students

**Example:** address a school-wide assembly

**Challenge:** brainstorm with teachers about what themes might be most helpful and then to consider what topics might connect best with high school students
Henry Walker: HS Students Enrolling in Local College

At least two models

1. Dual HS-college enrollment:
   Example: In Iowa, many community colleges collaborate with high schools to offer courses
   - Both schools grant academic credit
   - Course is taught in high school
   - High school teacher may instruct course, after approval by community college
2. Enrollment of HS students in local college:

Example: For many years, with the recommendation of their guidance counselors, high school juniors and seniors in area schools can take up to two courses at Grinnell College at no charge (space permitting).

- promotes conversations between college faculty and the area schools
- allows high school students to take courses that otherwise would not be available with limited high-school staffing
- provides these students with solid college-level experiences as part of their high-school preparation
- in several instances, area students have taken courses in computer science.
Discussion

Need: Increase interest of HS students in computing

Some areas for outreach

- connections between college and high school students
- collaborations between college and high school faculty
- workshops for high school faculty or students
- visits of college faculty to high schools
- enrollment of high school students at local college(s)

Additional Brainstorming?