Engaging Computer Science Students Through Cooperative Education

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Definitions

Cooperative education: “a structured method of combining classroom-based education with practical work experience.”

First college program: U. Cincinnati, 1906

Original Goals:
- Make traditional part-time jobs relevant
- Create new educational opportunities not possible in the classroom

Variations:
- Single or multiple employers?
- Begin 1st year, 2nd year, or later?
- Simultaneous work/study, or alternating?
- Paid or unpaid?
- Required, recommended, or optional?

Related concepts:
- Experiential Learning
- Internships
- Service Learning
Benefits for Students

Application of Knowledge
- Putting classroom knowledge to practical use
- Employers expect results … high expectations can drive performance

Confirming Relevancy
- “why do I have to know this?”
- Students see how academic subjects are used in the workplace
- Students discover gaps in their own knowledge, which can motivate further study

Confirming Suitability
- “how do I know I have what it takes?”
- “I don’t want to sit in a cubicle all day”
- Students see they can perform
- Students see that CS is more than cubicles
- Success in the workplace builds confidence; confidence helps retain students
Benefits for Students

- **Paid Employment**
  - Usually, better pay than typical student jobs
  - Pay can build with experience
  - Pay provides a tangible incentive to persevere

- **Documented Work Experience**
  - Resume-building power!
  - Some students stay with employer after graduation: an inside track to that first job

- **Interdisciplinary Applications**
  - The workplace is inherently interdisciplinary; no simulation required!
Benefits for Educators

- **Instructional Relevancy**
  - Students bring back practical experience; they can confirm course relevance
  - Frequent contact between employers and academic program provides more opportunities for comparison

- **Student Maturity**
  - Hard work builds maturity faster; students bring maturity back into classroom
Benefits for Educators

Countering Boom/Bust Myths

– 1999: “lots of jobs; you don’t need a degree”
– 2007: “no jobs at all; they’re all overseas”

– Reality: lots of good jobs, if you’re educated
– Being in the workplace allows students to see that reality for themselves

Assessment

– Program outcomes: “what students are expected to know and be able to do by the time of graduation” (ABET)
– Program objectives: “broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve” (ABET)
– Employers can provide a valuable outsider’s perspective on both
Challenges

**Managing Relationships**
- Students & employers must be matched
- Periodic assessments must be performed (of students, employers, and academics)
- Problems must be resolved
- All of the above requires time & effort

**Micro-Market Forces**
- There may be plenty of jobs nationally ... but that doesn’t help when the mill closes
- “Last hired, first fired”; students most vulnerable to layoffs
- Need to continuously recruit new employers, both for new and existing students
Challenges

**Employer Expectations**
- Employers pay a salary; they expect returns
- Broader education, or technology training?
- Who sets the job responsibilities?
- Will students leave job during school?
- Will students leave job after graduation?

**Student Expectations**
- Is job placement a right, or a privilege?
- How often (if ever) can students change jobs?
- Are students mature enough to handle work?

In both cases, frequent communication is needed to manage expectations
Challenges

Geography
- Students already have two geographical loci: home and school
- Work potentially adds a third locus; it might be the same as home, or school, or neither
- Living at home can save on living and moving expenses, but restricts choice of employers

Calendar
- Cooperative education programs take longer
- Extra time may make it unattractive
- Schedule may not sync well with traditional student calendars (homecoming, study abroad, spring break)
Students in cooperative education programs complete their education through practical application of their skills to real problems; in the process, they can discover how those skills are relevant, and how well-suited (and employable) they are as a computer scientist.

Educators benefit through frequent contact with the discipline at large (through both student and employer interactions), and through the maturity developed by their students while at work.

Academic programs benefit by receiving frequent external validation regarding the relevance of their curricula, and the abilities of their students upon graduation.

While significant challenges exist in running a successful program, the benefits received by students, employers, and academic institutions alike can make such programs worthwhile for all participants.