NOT ON THE SHELVES

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Once Upon a Time...

- Support programmer in university computing center
- Saw smart people stumble because ***no one taught them basic skills***

- First Software Carpentry class ran at LANL in 1998

Time Passes...

- Book review editor for *Doctor Dobb's Journal*
- Hundreds of textbooks on compilers, but ***no textbooks on debuggers or debugging***
- Or build tools, or package managers, or...

More Time Passes...

- Asked to teach a course on software architecture
- Looked at two dozen books and other people's courses...
- ...but ***no textbooks describe actual architectures***

How Learning Works

- Started reading the education literature in 2011
- We know a lot about learning and teaching
- But ***most faculty have never been taught how to teach***

We Can't Get There From Here

- "Programming for all" is a great rallying cry...
- ...but ***most programmers have never been taught how to teach*** either

Computer ~~Science~~ Strong Opinion

- We know a lot about software and how it's built
- But ***students aren't taught empirical methods***
  - Biologists spend 6 hours/week in the lab
  - CS students do one experiment in four years

Even though many of their professors
devote their careers
to empirical research

Machines Learn What We Teach Them

- "Machine learning is money laundering for bias"
- Because ***bias isn't part of the discussion of algorithms***
- Just as ***harassment isn't part of the discussion of distributed systems***
- Same cause: ***programmers aren't taught empathy***

What's the Pattern?

One-way flow of information

"We" will talk, "they" will listen

(for many values of "they")

Proposal #1: Teach Critical Analysis

- Software engineering courses don't take advantage of the billions of lines of software that are now openly available
- Or capitalize on the current craze for data science

So let's do that.

Proposal #1: Teach Critical Analysis

Given version control repositories for six software projects, determine whether long functions and methods are more likely to be buggy than short ones.

- Requires tool use, model building, and statistics
- Encourages students to *do*, so they *understand and value*, so they *engage*
- Fits into existing curriculum
- And it's *culturally defensible*

Proposal #2: Teach Teaching

- Create programs in CS education modelled on those in math and physics education
- Create the teachers our schools need…
- …and the students we wish we had

But who will teach the teachers?

Proposal #2 (revised): Teach Teaching

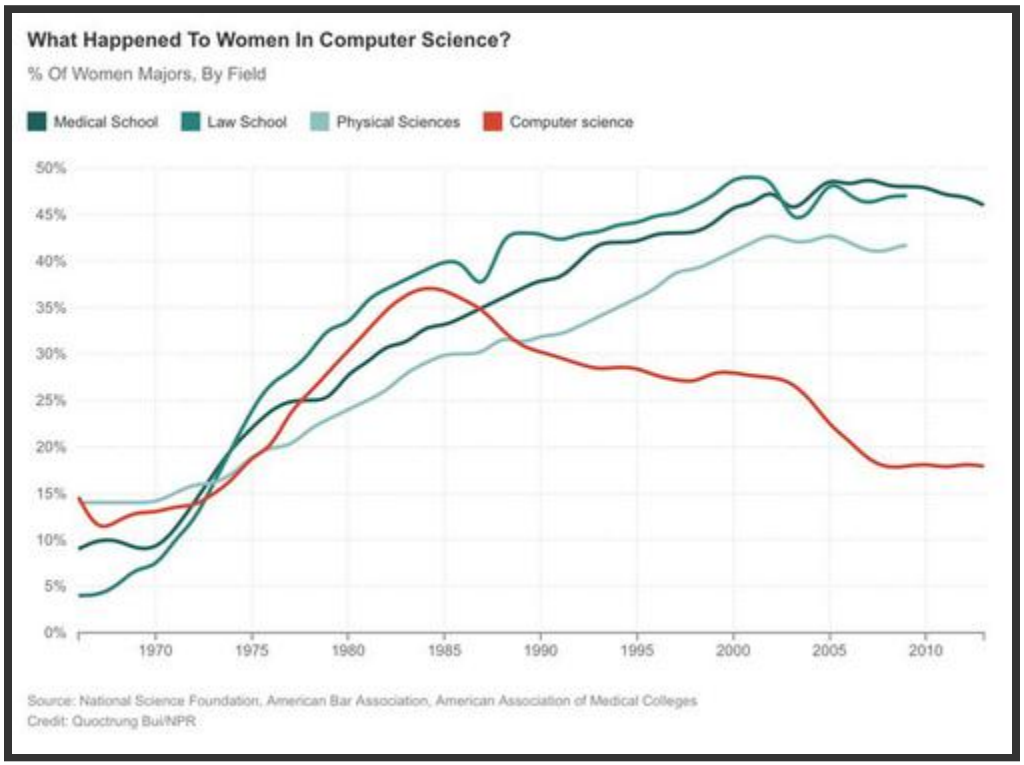
Start with a single course

- Ambrose et al: *How Learning Works*
- Lemov: *Teach Like a Champion*
- Guzdial: *Learner-Centered Design of Computing Education*
- ...and dozens of papers from the last thirty years

They'll be doing science in this course too.

Teach ~~Teaching~~ Empathy

- I no longer believe that we will fix this



- But we can raise a generation that will

Teach ~~Teaching~~ Empathy

- Margolis and Fisher: *Unlocking the Clubhouse*
- Margolis: *Stuck in the Shallow End*
- Schneier: *Data and Goliath*
- Jeong: *The Internet of Garbage*

And everything else that we pretend isn't our responsibility

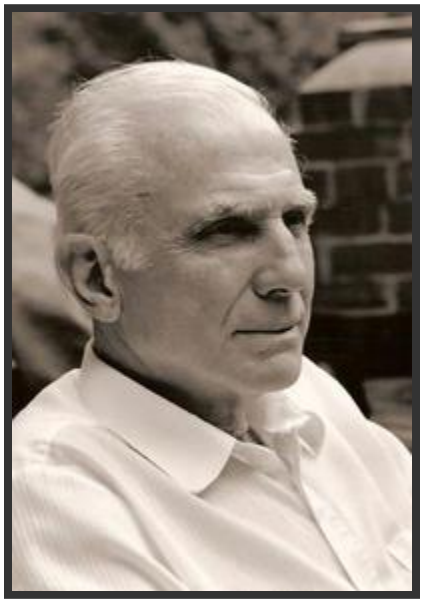
Teach Empathy

1. *People of East Asian or South Asian ancestry make up 8% of the general population, but 60-75% of undergraduates in Computer Science at major universities. Write 500 words pro and con the proposition that this proves people of European descent are naturally less capable of abstract reasoning than their Asian counterparts.*
2. *Compare and contrast your arguments with those made about gender imbalance in computing.*

A Sudden Sense of Urgency

Volume 5: What Everyone In Tech Absolutely, Positively Must Know About Racism, Sexism, Homophobia, Poverty, Harassment, Privacy, and How Our Political, Economic, and Legal Systems Actually Work

Want to contribute? gvwilson@third-bit.com



Thank you

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