



A Clean Slate Approach to High School CS

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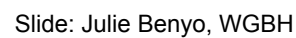


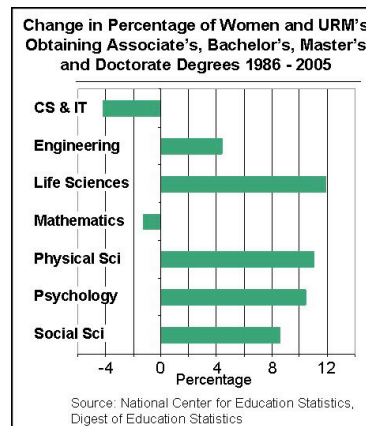
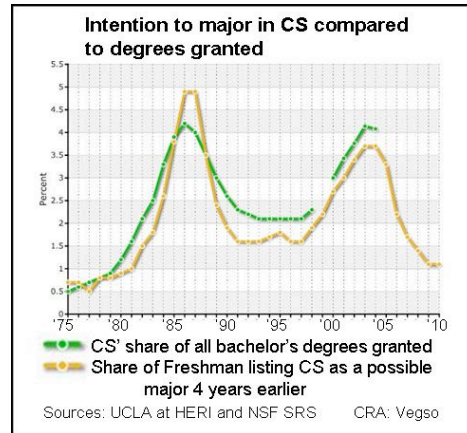
Why High School?

Where the girls are



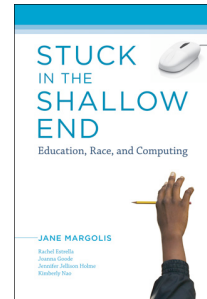
Where the boys are





Why High School?

1. Things are really bad there.
2. Without the HS piece, anything we do for middle school will be lost.
3. Without the HS piece, anything we do at the college level will be insufficient.



Why focus on AP?



- Often the only CS course that carries college prep credit
- Attractive to students & schools
- 2,000 CB-audited teachers
- Single point of national leverage



What's wrong with the current AP course?



- Doesn't appeal to many students (particularly women and minorities)



AP test takers (2008)

- 14,529 students took AP CS A
 - 204,564 Calculus AB
 - 141,321 Bio
 - 96,282 Statistics
- AP CS had the worst gender balance of any of the AP tests
 - 18.3% CS A
 - 48.7% Calculus AB
 - 50.2% Statistics



What's wrong with the current AP course?



- Doesn't appeal to many students (particularly women and minorities)
- Inaccessible to students without previous experience
- Fails to introduce the fundamental concepts of CT
- Doesn't teach the breadth of application or "magic" of computing



What do we need?

- A new HS curriculum
 - PreAP course
 - New, Gold-Standard AP course (AP GSC)
 - Existing (maybe modified) AP CS A
- 10,000 teachers
- Entrée into schools (especially under-resourced schools)



AP GSC

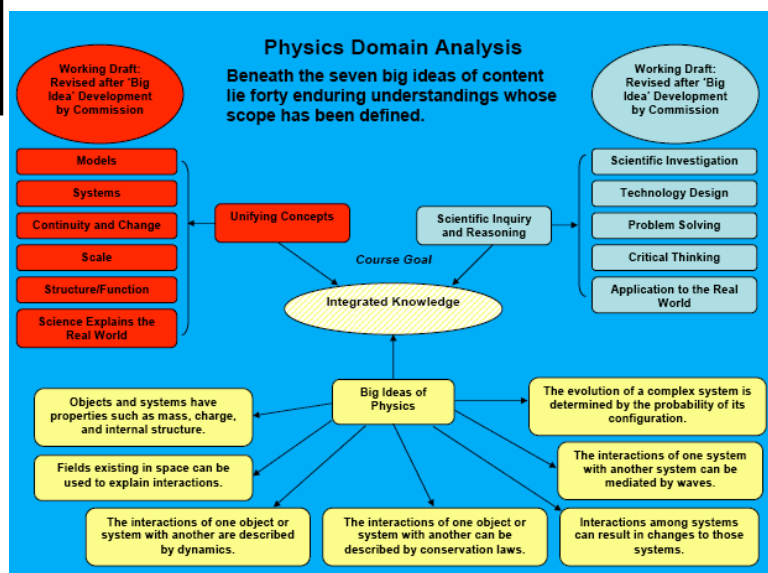
- Engaging, accessible, inspiring, rigorous
- Focused on the fundamental concepts of computing (CT)
- A target for K-12 course development
- An impetus for college curriculum reform
- Available nationwide (IB as well)



Math and Science in U.S. High Schools (NRC, 2002)

- AP courses should
 - Reflect what we know about how students learn
 - Build students' transferable, conceptual understanding and inquiry skills
 - Convey the content and unifying concepts of a discipline
- AP courses should not be designed solely to replicate introductory college courses (which are not typically exemplary models)

Chemistry, Biology, Physics, and
Environmental Science are leading the
way. ESI-0525575





AP Commission:
Owen Astrachan

AP Advisory
Group

Deepak Kumar (Bryn Mawr)
Tom Cortina (CMU)
Mark Guzdial (GA Tech)
Wanda Dann (Ithaca)
Larry Snyder (UW)
Eric Roberts (Stanford)
Gail Chapman
Rich Kick
Susanne Hambruch (Purdue)
Michelle Hutton
Juan Gilbert (Auburn)
Stephen Edwards (VA Tech)
Duane Bailey (Williams College)
Richard Pattis (UC Irvine)
Cameron Wilson (ACM)



AP GSC's Big Ideas

95/5% Rule

1. Computing is a creative activity that draws on a wide variety of fields, such as natural sciences, mathematics, engineering, social sciences, business, and the arts.
2. Abstraction is a central problem-solving technique in computer science.
3. Algorithms are the essence of computational problem solving.



AP GSC's Big Ideas (cont.)

4. Writing programs is an integral part of solving computational problems.
5. Theoretical and practical limitations affect what can be solved computationally.
6. Computing enables and empowers innovation, exploration, and creation of knowledge.
7. Computing drives and is driven by economics, culture, society, and ethics.

95/5% Rule



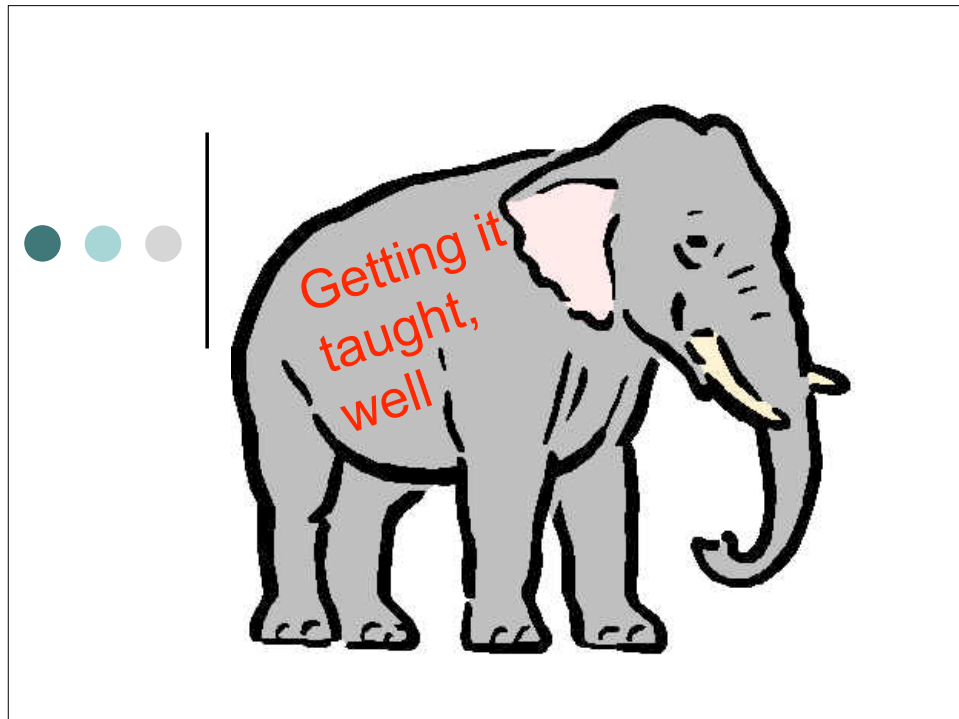
How far have we gotten?

In progress:

- Framework: First two levels (Big ideas & Key concepts)

Still to come:

- Framework: Third level (Enduring understandings)
- Curriculum/Materials
- Test



● ● ● | 10,000 Teachers / 10,000 Schools

- In-service preparation
- Pre-service preparation
- Ongoing professional development
- Entrée into schools




In-Service Preparation

- Significant and intensive training (stipends)
- High quality on-line options
- Partnerships with universities
- Recruiting, Classroom assistance
- Build on state-wide infrastructure: Train the trainers, Master teachers, Community
- Collaborations with other STEM programs e.g. MSP



Pre-service preparation

- Traditional and alternative certification
- Partnerships between CS & Ed Schools
- Computing methods courses
- Teacher Residency Programs
- UTEACH, TFA, MFA, Teaching Fellows, Transitions to Teaching (Troops to Teachers) ...



On-going professional development

- CSTA
- National Writing Project-like, National Computing Project
- Coaching & mentoring for novice teachers (Teacher Residency Programs)
- In class assistance: GK-12, SLC-like Computing Corps, Retirees, Faculty (Adopt a Classroom), CS4HS
- Collaborate with mathematics teachers associations




Entrée into the schools

- Hardware, Software, Connectivity, & Tech Support
- Extended hours & Out of school hours availability
- Help with teacher salaries / Stipends
- AP Incentives
- Manuever patchwork of state standards, credit issues, certification requirements, etc.



Entrée into the schools

Good News: There are school districts that
REALLY want us.



Clean slate ...
but we can't blow it.

We need the computing
community to step up.