Getting CS undergraduates to write

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Contexts

Computer Science

- Über-nerd culture: we write programs, not English
  - That's how we were taught!!
- Real world does not work that way
- Current generation less willing to put up with it
  - Geeks are not what they used to be :-)

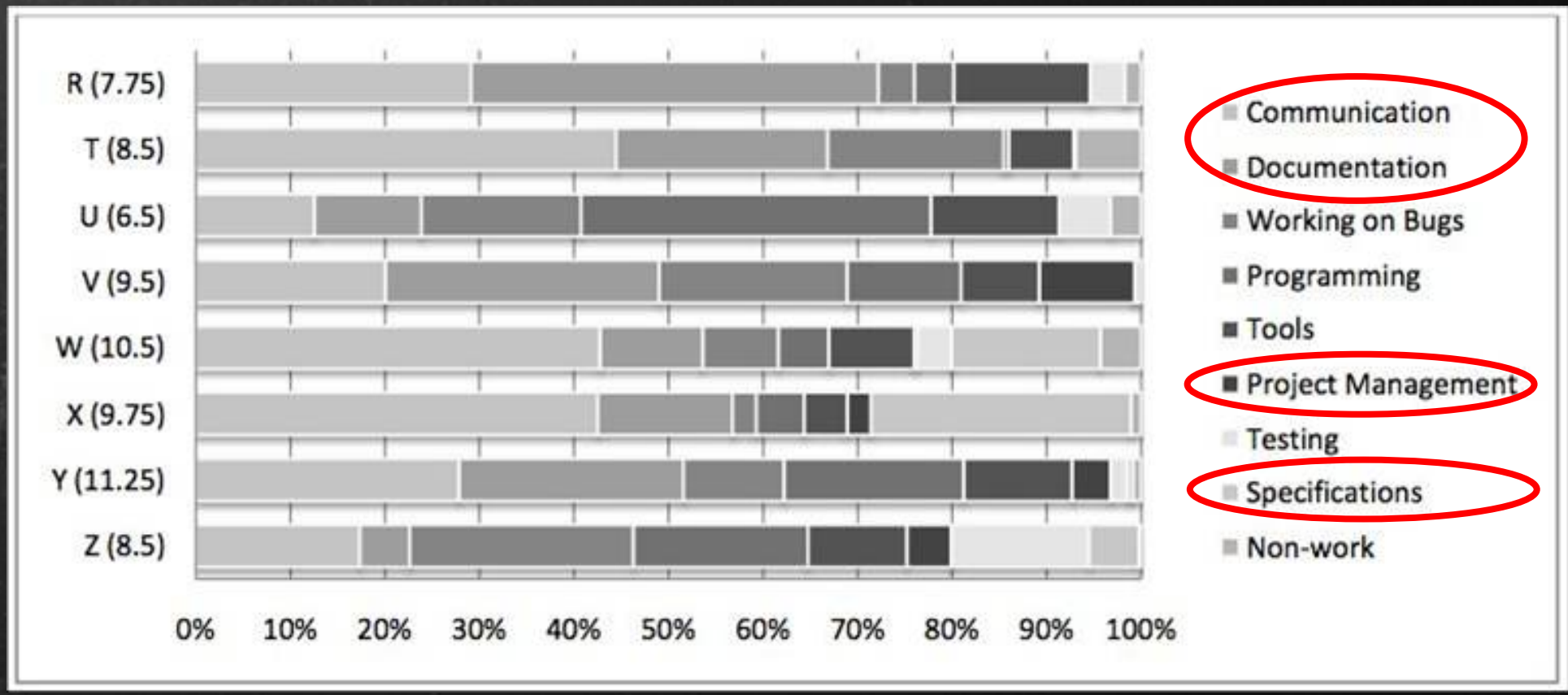
Qatar

- Less of a writing culture

2010

- (SMS), Twitter, YouTube, ...

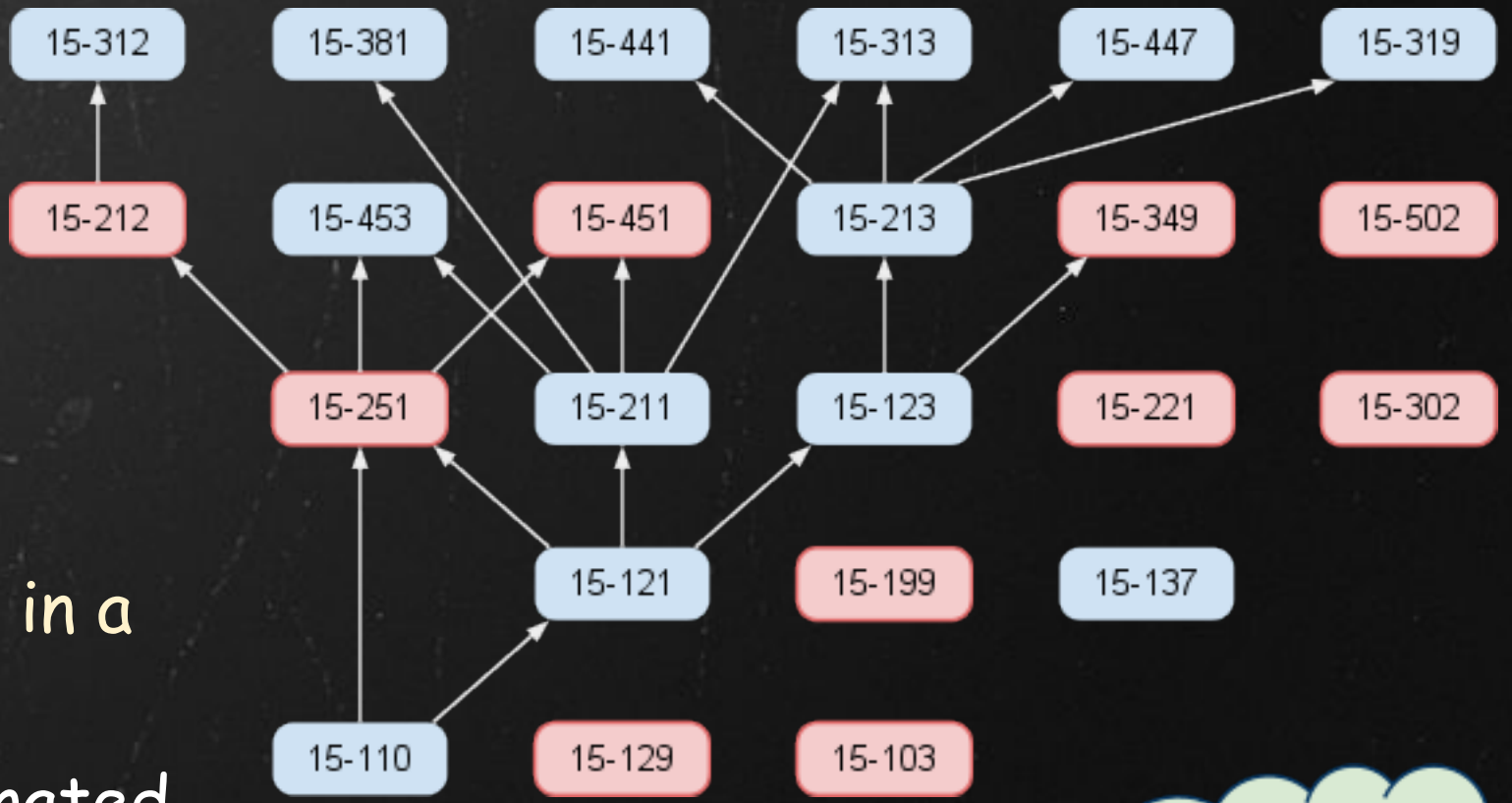
Why does it matter?



How junior software developers spend their time at Microsoft

Andrew Begel (Microsoft Research) and Beth Simon (UCSD): Novice Software developers, all over again, International Computing Education Research Workshop, 2008.

Getting them to write at CMU-Q



Experiments in a few classes

- Uncoordinated
- Possibly other classes too

Help us be more strategic

Our objectives

- Writing to assess reading
  - Understand contents
    - What is being said, not individual words
    - Get better at reading exam questions
- Get students in the habit of writing
  - Reading and writing are important to career

15-129: CS Immigration

Overview

- Expose students to the world of Computer Science
- Help them integrate with the CMU culture

- Revamped on the Qatar campus
  - Better adapted to the background of the student accepted to CS in Qatar
  - This means more work, not less, for the students!
- Pass/Fail based on points collected
  - 8 weeks mini, 2 lectures per week
- Four general components/requirements
  1. Attend 7 CS area talks given by experts
  2. Student presentations on other CS areas
     - Uber-Nerds do not need to present to or even deal with "people"!
  3. Webpage setup and design, with all work conducted uploaded there on time
  4. Other voluntary CMU-based activities for which they obtain extra points

15-129: CS Immigration

Writing

- Used as a means rather than an end
- During expert talks (core of Immigration)
  - Problem: Students have no clue what OS, SE, Networking, AI...etc. are
    - Shy to ask, and can be disconnected
  - Solution: Encourage students to explore the area before listening to talk.
  - Problem: They don't on their own!
  - Solution: Requesting that they
    - research area
    - summarize/paraphrase, insert links
    - 3-5 questions they have
    - upload all this on their webpage
- Unexpected outcome: seeing their "natural" form of writing which sheds light on the more basic capabilities (without help) that students possess

15-103: Principles of Computation

Overview

Introduce freshmen to the basic pillars of CS (7 week mini)

- Data representation
- Algorithms as the unifying concept
- Algorithmic paradigms/parallelism
- Logic/correctness/verification of algorithms
- Analysis of algorithms: empirical and theoretical models of complexity
- Intractability and uncomputability

- We expect the students to "take home":
  - What Computer Science is about
  - How these pillars are interrelated
  - How the (core) CS curriculum relates to these pillar

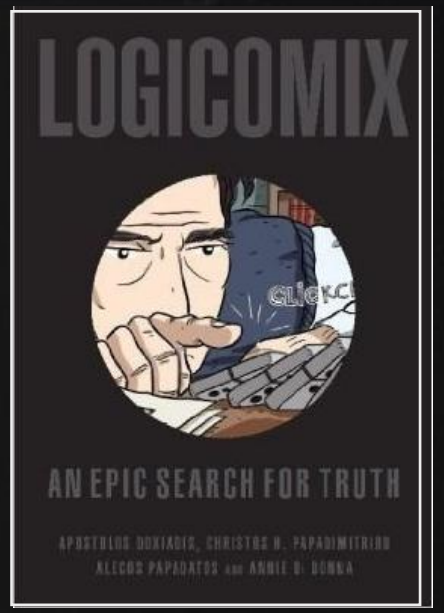
15-103: Principles of Computation

Addressing language issues

- Promote "language precision" and "precise descriptions"
- Relation between language and computation
  - Relation between language and logic
    - Logic as semantics
  - Language as an object of computation
    - Natural language processing
- Read/watch CS-related articles and lay-videos
  - TED videos - 2001 A Space Odyssey
  - Scientific American articles
- 300 word summaries to motivate "deep reading"
  - "Tell a non-CS person", Wikipedia article
- Published on student's web site (from 15-129)

15-199: Discovering Logic

New!



Intro to logic for CS freshmen (7-week mini)

Writing

- Hw 1: read book and write a letter to a friend or Amazon review
- Hw 2-5: small essay questions
- Final paper: reread the book and write a new essay
- (individual presentations)

Outcome

- Writing skills well above expectations
- From beautifully developed essays to shallow/unsupported arguments
  - Seems to be a function of personal maturity
  - Benefit from previous writing-intensive courses (15-129, 15-221)

15-212: Principles of Programming

Advanced problem solving course

- Reading/writing was 20% of each assignment

Reading to connect course topics to real world

- Essays, blogs, light scientific papers, popular science
  - Scientific papers judged "boring"

Writing to assess the reading

- Technical questions, open questions, student's opinion

Assessement

- Does essay make sense? Are answers thoughtful?
- Are arguments well-structured?
- Was any part plagiarized?

15-221: Technical Communication

(Nael's presentation)

15-302: Technology Field Research in Developing Communities

Writing

- Research assignment - researching field research location
- Media plan - plan for dissemination of research results
- Team plan - plan of action for conducting research
- Automated Tutor - analysis of projects via reading

Outcome

- Extensive help and direction needed with first draft
  - Focusing on assignment requirements
- Team collaborative writing

15-502: Tech. & Global Development

Objective: Enhance students' writing and presentation skills

Assignments

- Research - research a proposed project
- Campaign - design and implement plan to promote project
- Capacity building -plan for given projects
- Case study - critically read and analyze a case

Outcomes

- Extensive help needed in addressing assignment requirements (even when rubrics given)
- Extensive help needed reading assignments

Writing development

Stage	Expectations	Acquired skills
Freshmen	Low expectations High variance in capabilities	
Sophomores		
Junior Seniors		

Strategic writing

- We recognize the importance of writing in the CS curriculum
  - We have incorporated writing in our classes
- Now, we need to make it strategic
  - Develop methodology to grade writing productively for students
  - Develop writing exercises that target CS writing genres and skills

Questions?

Comments?

Reactions?