SaveUFCISE: Before, During and Ongoing

• One Crisis/Opportunity with Many Interwoven Backdrops and Narratives

  • Hindrances against organizing Engineering and CS faculty and students
  • New pressures on Higher Ed and Unions in general in right-to-work states
  • New Pressures on STEM higher education, especially the “Non-Lab” (theoretical and computational) compartments
  • Use of social media mixed with on-ground demonstrations in resisting tyrannical actions
SaveUFCISE: Before

- Hindrances to organizing Engineering Faculty and Students
  - “Unions are for underperformers”
  - University needs the Indirect Cost generated by Principal Investigators, i.e., managers (who also happen to teach)
  - No culture of cooperation (only individualized competition), both among students and faculty
  - Boss-Employee relationship between PIs and students who need the research assistantship
SaveUFCISE: Before

New Pressures on CS Higher Ed

Extreme Skills Shortages especially for CS
Push for 2-year polytechnics especially on CS
(online, as cheap as possible)
Engineers (physically based) do not understand
CS (abstract, needs to be separated from the
physical platforms)
Backdrop

• Skills shortages
• College Completion rates
• Cost of higher education
• Peter Thiel and Pink Floyd
Backdrop: Skills shortages

• Blamed on
  – (Lack of) Education
  – (Lack of) Specialized Training
  – Corporate Squeeze
What is Diversity in STEM disciplines?

- STEM labor is increasingly Asian
- H1 B visas in demand
- Over half of Tech Startups by Asians – employ 0.5M (Wadhwa 2006)
Backdrop: Skills shortages

- Blamed on
  - (Lack of) Education
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Backdrop: Skills shortages

- Blamed on
  - (Lack of) Education
  - (Lack of) Specialized Training
  - Corporate Squeeze
  - not hiring; want skilled labor glut;
  - pay too little; H1B or immigrant labor
Backdrop

• **Cost of higher education**
  – Suggested solutions:
  – Vocational diplomas
  – Online diploma
Backdrop: Skills shortages

• Blamed on
  – Education
  – (Lack of)
  – Specialized Training
  – Corporate Squeeze
Backdrop

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Backdrop: Cost of higher education

- Suggested solutions:
  - Vocational diploma mill
Backdrop: Cost of higher education

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Backdrop

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*We don’t need no education… Hey teacher! leave them kids alone* - Pink Floyd, The Wall

I'll pay you to drop out and become a start-up entrepreneur – Peter Thiel
CSTEM Pipeline

- **Computer**
- **Science**
- **Technology**
- **Engineering**
- **Mathematics**

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**STEM Pipeline — Leaking Badly**

In 2001, there were a bit more than 4 million 9th graders. Four years later, 2.8 million of them graduated and 1.9 million went on to two- or four-year college; only 1.3 million were actually ready for college work. Fewer than 300,000 are majoring in STEM fields and only about 167,000 are expected to be STEM college graduates by 2011.

Source: NCES Digest of Education Statistics; Science & Engineering Indicators 2008
Online Education Positives

- Animated textbook
- Exercises as Games
- Increased access to interaction with worldwide peers and experts
- Open/Crowd sourced development and improvement of a searchable database of instructional material for standardized courses of study
- Large scale student response data (in easily analyzable format) for understanding how people learn
- Flipping the classroom
Online Education Types

• Four types
  • Web-based textbooks with web assignments
  • MOOC (Massive Online Open Courseware)
    Coursera, Khan Math, Udacity:
    Noninteractive online content (audio + text/video)
    Interactive robot-graded exercises
    Peer to peer chat forum/discussion board with/without expert moderator
  • MOOC with phone-in instructor help
    Florida virtual school
  • Socratic style interactive distance lectures on chatblazer, delivered by one instructor and two helpers, to a class of 30, and 4 hand-graded project assignments.
    Art of problem solving
Online Education Issues

• *Without* the standard level of support in large face-to-face courses (An expert prof to run the course and one TA for every 30 or so students)
  1. What are the student/content characteristics needed to ensure quality?
  2. How are the students to be authentically evaluated and certified at a distance without a proctor?
Online Education Issues

• Answer to Question 1
  – **Student**: well above average resourcefulness, discipline, self-confidence to self-assess learning effectiveness without hand-holding
  – **Course content**: entry level, not requiring depth of conceptual understanding, course just provides some practice and experience (course not major / minor in)

• Answer to Question 2
  – Difficult, unsolved research problem