Efficient Education for Employment

Vivian Fernandez (Yahoo), Rayman Pon (Qualcomm), Subha Rajagopalan (VMWare), Srinivas Ramanadham (WD/SanDisk), Jing Wang (Samsung SSI), Derrick Whittle (Yahoo)

This work was created in an open classroom environment as part of a program within the Sutardja Center for Entrepreneurship & Technology and led by Prof. Ikhlaq Sidhu at UC Berkeley. There should be no proprietary information contained in this paper. No information contained in this paper is intended to affect or influence public relations with any firm affiliated with any of the authors. The views represented are those of the authors alone and do not reflect those of the University of California Berkeley.
What does it cost to earn $118,000 a year?
17 years
Trends Leading to Disruption
Rising Cost of Higher Education

SOURCE: The College Board, Trends in College Pricing 2016, Figure 5
Decreasing Industry Relevance

### 2016 Requirements for BS, Computer Science

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Intro to Programming</td>
<td>• Intro to Computer Systems</td>
</tr>
<tr>
<td>• Intro to Data Structures</td>
<td>• Programming in C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Data Structures &amp; Algorithms</td>
<td>• Programming Paradigms</td>
</tr>
<tr>
<td>• Computer Architecture</td>
<td>• Software Engineering</td>
</tr>
<tr>
<td>• Technical Writing</td>
<td>• Options: Software Project,</td>
</tr>
<tr>
<td>• Operating Systems</td>
<td>Computer Graphics, Bioinformatics,</td>
</tr>
<tr>
<td>• Object-Oriented Design</td>
<td>Compiler Design, Databases,</td>
</tr>
<tr>
<td>• Formal Languages &amp; Computability</td>
<td>Network Management</td>
</tr>
</tbody>
</table>

### $70,000 + 4 Years == Job?

Class of 2015 (Bachelor’s Degrees, all majors)

- 7.2% unemployed
- 14.9% underemployed

Automation

Unbundling
2016 Requirements for BS, Computer Science

Year 1
- Intro to Programming
- Intro to Data Structures
- Discrete Mathematics
- American Civilization I
- English Composition: First Year Writing
- Calculus I
- American Civilization II
- Human Understanding & Development Elective

Year 2
- Intro to Computer Systems
- Programming in C
- Calculus II
- General Physics/Mechanics
- Oral Communication
- General Physics/Electricity & Magnetism
- Life Science Elective
- Arts or Letters Elective
- Critical Thinking & Writing Elective

Year 3
- Data Structures & Algorithms
- Computer Architecture
- Operating Systems
- Object-Oriented Design
- Formal Languages & Computability
- Technical Writing
- Linear Algebra I
- Kinesiology/Physical Education
- Calculus III or Combinatorics or Probability/Statistics
- Computers, Ethics and Society
- Earth & Environment Elective

Year 4
- Programming Paradigms
- Software Engineering
- Kinesiology/Physical Education
- Self, Society & Equality in the U.S. Elective
Emerging Disruptors
Key Characteristics of Efficient Education for Employment

- Industry Relevance
- Affordability
- Speed
- Placement Assistance
Quality Education for Everyone, Everywhere

Wide range of courses; In-demand fields
- Business & Management
- User Experience
- Energy Science

Courses 4-12 weeks
Programs comprise 4-6 courses

$50-500 advanced courses (Aid avail)
Many no cost

XSeries Certificate
Professional Certificate
MicroMasters Certificate

Lacks Employment Assistance

very similar to edX
14 programs (all in tech)
Online, self-paced ($199 per mo.)
<12 months, <$2,000 (typical)
External mentoring available
Job guaranteed w/ Nanodegree+ (for some programs)
Georgia Tech

3 Years

$7,000

Udacity

AT&T
Get Skills

- No Degree Required
- No Cost
- Short Duration

Get Verified

- Build Skills

Get Placed

- 500+ Employers
- Placement Rates 90%

Regional

Highly Manual Placement
“A disruptive company starts by creating a large, new growth opportunity, almost always by allowing a broader group of people to do things that only experts or the wealthy could do in the past…. The new growth opportunities that disruptive companies spawn have historically been a primary source of improved consumer welfare.”

— Clayton Christensen, Sally Aaron, and William Clark (2001)
Discussion
Appendix
Impediments to Disruption

3-sided, interdependent market: **Students × Education Suppliers × Employers**
- Must *simultaneously* change behavior of Students and Employers (hard to change behavior of just one side of the market)
- Employers were Students credentialed by incumbent Education Suppliers (have innate preference for incumbent credentials)

Unique Industry
- 1000s of distributed incumbents (independent yet with overlapping affiliations)
- Deeply embedded in society, individually and as an industry
- Regulated and subsidized by government/public

Last industry-wide disruption was about 500 years ago (printing press)
- *lecture:* from medieval Latin *lectura*, from Latin *lect-* ‘read, chosen,’