From the Virtual Trenches

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<table>
<thead>
<tr>
<th>Cell phones</th>
<th>The miracle of cell phones is that, from almost anywhere in the world, they enable you to be frustrated.</th>
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<tbody>
<tr>
<td>Online education</td>
<td>The miracle of online instruction is that, from almost anywhere in the world, it enables you to work harder for comparable learning outcomes.</td>
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What makes online instruction special?

- videotaped lectures
- remote delivery of documents
- audio/video conferencing
- dynamic, interactive content
- customization/personalization
- analytics
- up-to-date content: can add/edit material and fix errors instantly
- automation of drudgework

Distance learning isn’t new.

But the Internet makes some interesting new things possible—at a cost.
• first online course approved by COCI taught at Berkeley
• intended Business & Economics majors, mostly
• enrollment 200–425, many timezones, including Asia
• hybrid 1997–2006; online 2007–present
• mastery-based: \( \leq 5 \) submissions, \( \geq 80\% \) or no credit
• in-person final (≈50 students take proctored off-campus)
• typically 7 GSIs holding \( \approx 140 \) office hours per week
• “learning preparedness assessment” by phone
Milestones

- text online in 1997, including applets for key concepts, glossary
- online, machine-graded assignments from 1998
- dynamic examples, exercises, individual homework from 2000
- continually add topics, edit, and re-factor to improve UX
- “functional grading” from 2003
- online office hours with whiteboard, etc., from 2007
- online recorded lectures from 2009
- analytics and deep video anchors from 2011
SticiGui interactive “text”

- 222 XHTML files, \( \approx 140,000 \) lines
- 63 Java classes, \( \approx 15,000 \) lines
- 28 JavaScript libraries, \( \approx 16,000 \) lines
- 4 CSS files, \( \approx 2,000 \) lines
- 37 data files, \( \approx 11,000 \) records

Approaching 8000 hours of work.
Onsophic

- platform to discover course materials, assemble and deliver courses, collect analytic data
- built on Sakai (as is bSpace)
- customization for W21: SMS for office hours, heat map granularity, etc.
Analytics in W21

- viewing sections of SticiGui, lectures, podcasts
- viewport events
- following links
- viewing footnotes
- attempting practice problems
- submitting homework

Simple to plumb because of SticiGui architecture: added about 50 lines of JavaScript

Generated about 1.4 million analytic records in summer 2011
Questions analytic data can answer

- Do students who do more self-test exercises do better than those who do fewer?
- Do students who spend the majority of their time watching online lectures do better than those who spend the majority of their time with the text?
- What student actions/behaviors predict mastery?
- Do interventions to promote such behavior increase mastery?
Example: time versus assessment score, Spearman test

- Histograms, data taxonomy: $p \approx 0.8$
- Combinatorics: $p \approx 0.03$
What’s online best for?

- present material in many “modes” to suit different learning styles
- unlimited practice (requires unlimited programming)
- mastery-based grading
- simulations and “discovery experiments”
- geographic flexibility
- analytics
- experimentation/intervention
What’s online worst for?

- human connection, empathy, warmth, civility
- low “bandwidth”: harder to help students interactively
- faculty time:
  - authoring effective, reliable content
  - maintenance
  - being virtually “present” to most students (10h/day?)
- ensuring accessibility: screen readers, etc.
- friction from tech issues:
  - ensuring students have the right tech
  - diagnosing students’ failure to follow instructions
  - browser/OS upgrades during the term?
- how paternalistic or “Big Brother” do we want to be?
- university reward structure does not encourage experimentation
- teaching evaluations
Keep in mind

- big difference between class of 30 and class of 425
  difference is even bigger online
- not suitable for all subjects
- can’t just flip a switch to move a course online, or quality will suffer
- have to tailor pedagogy and content to the medium
- Internet facilitates bad behavior, rudeness, cheating, etc.
- dedicated faculty involvement crucial
  need to know possibilities and limitations of the technology
  hard to offload programming related to pedagogy
- need more office hours online than face to face
- iterative improvement
- continual maintenance
Unintended consequences

- now speak Python, Perl, Java, JavaScript, XHTML, CSS, ...
- know when every browser or operating system has an update—things break
- my teaching evaluations have suffered, partly through low response rate