# Access and Excellence: MOOCs & Online Education at UC Berkeley

Armando Fox, Academic Director,
UC Berkeley MOOCLab

# Goals and Anti-Goals

| | | |
|---|---|---|
| Academic model | Extend & improve existing academic models | Radically new model or "redefinition" of higher ed or UCB identity |
| Technology | Enhance on-campus instruction<br><br>Enable new education research | Constrain instruction to match technology<br>Lower costs |
| Access & Excellence | Sustain mission of *access & excellence*<br>Preserve high standards & proven governance structures | Opportunity at expense of quality or reputation<br>Lower standards for students or instructors |
| Innovation | Encourage experimentation | Impose early standards or make long-term big bets |

Online education is *permanent & strategic:* how to help access & excellence mission?

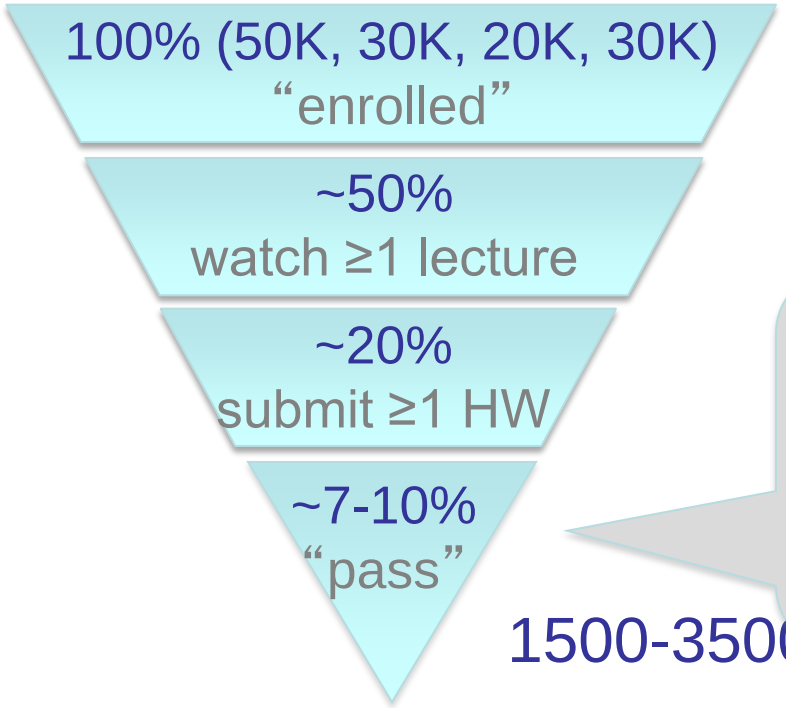
# BerkeleyX

- edX.org, a not-for-profit 501(c)(3)
  - UCB leads X Universities consortium, sits on edX Board, contributes platform technology
- ***Free, noncredit, open*** materials & platform
- Focused on ***high quality***
  - Intellectual ***rigor*** comparable to campus course
  - Recognized ***great teachers*** who are also thought leaders in their fields
- Research to ***enhance campus experience***
- Participation is ***100% voluntary***


# Autograding: Automated Non-Trivial Assessment

- Automated: machine grading (vs. human)
- Nontrivial: deeper feedback (vs. just Yes/No)
- Short answer (multiple choice, numerical, fill in blank)
- Long answer: highly assessment-specific
  - Programming assignments
  - Circuit simulation/Physical simulation
  - Statistics visualizations
  - etc.

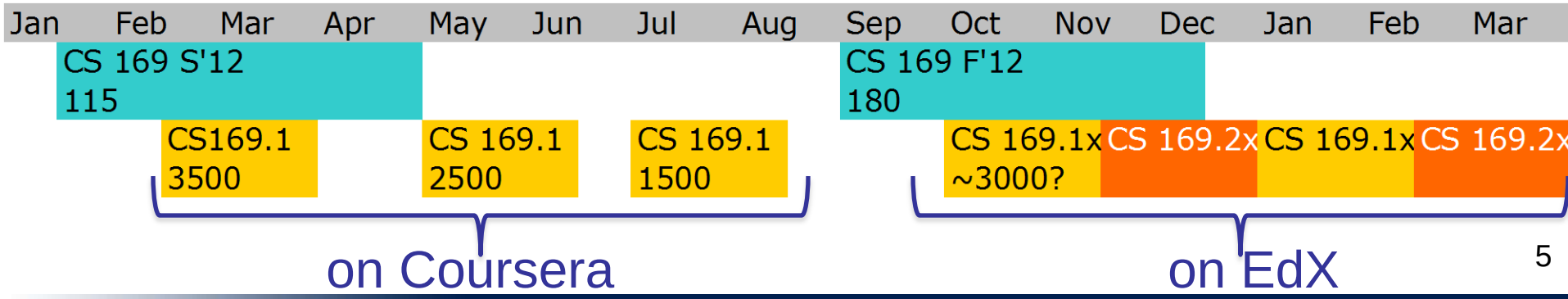
# Scale




- 7k-10k students/year (vs. 250-500)
- Multiple opportunities to

- "I want to help with future offerings"
- "Better than any course available at my university"

1500-3500 students per cohort



Myth :
Since we are already capturing video lectures, we've done most of the work to create a MOOC.

**Reality:** Even an *adequate* MOOC involves *much more* work than just recording the lectures.

# Want to do MOOC yourself?

- Having a Rerun Plan is Better than Being Perfect
  - Needed feedback from MOOC students before we could improve it ourselves
- Consider Delegating
  - MOOC alumni volunteer as “World TAs”
- Dry Run the Technology
  - With 1000s of students, must be perfect
- Divide to Conquer
  - 12 weeks lecture => two 6-week MOOCs

Myth :
Universities will use MOOCs to save money by firing faculty & TAs, sacrificing education quality.

**Reality:** MOOCs can instead save money by improving throughput and *increasing* education quality.

# Universities will save $ by firing faculty ?

- Reality: Save $ by increasing **throughput**
- Berkeley: 4X students in SWE course
- SJSU tried EE MOOC from MIT
  - MOOC homeworks, lectures
  - Same exams as prior SJSU course
  - 5% higher 1st exam, 10% higher 2nd
  - 91% got C or better (59% before)
- Surprise: improve quality **and** throughput

Myth:
MOOCs are not useful because they cannot replicate all aspects of traditional instruction.

**Reality:** MOOC *complements* traditional instruction

# Pitfall: assuming 1-for-1 substitution (vs. “enhance, not replace”)

- “Autograding cannot replace instructor help”
  - Can it level-up student confidence & raise productivity of instructor interactions?
  - Can it improve level of polish of assignments?
- “Online delivery of course X can’t replace classroom discussion”
  - What foundational skills can online strengthen?
- “Online interaction can’t replace face to face”
  - How & why does perceived community in online courses improve student engagement & retention?*

* J.C. Richardson & K. Swan, *Examining Social Presence in Online Courses in Relation to Students' Perceived Learning and Satisfaction,* J. Async. Learning Networks 7, 2003

Myth:
MOOCs distract faculty from focusing on improving their on-campus teaching.

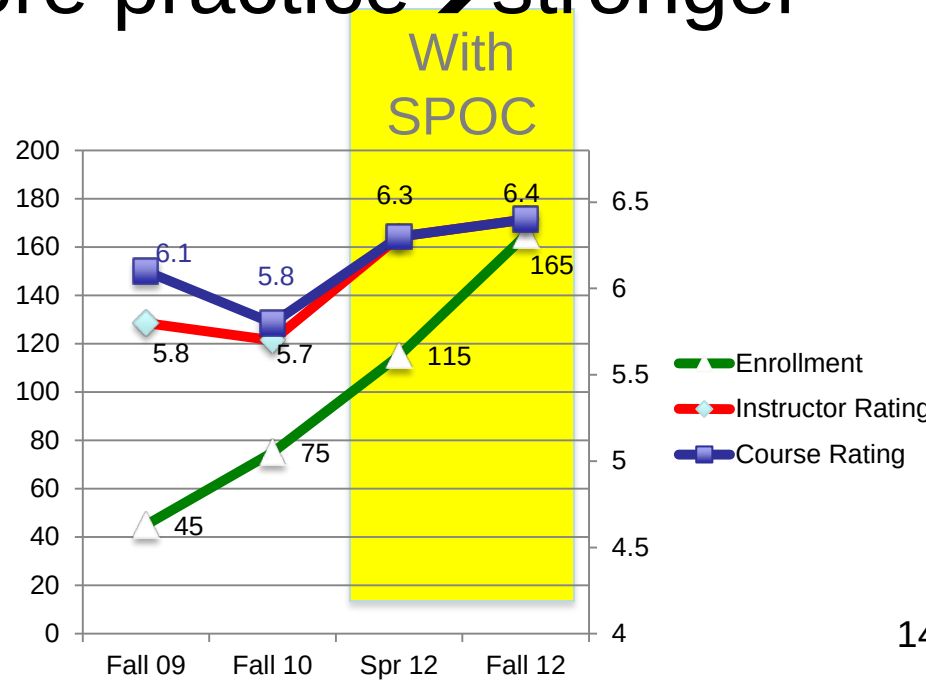
**Reality:** MOOCs can help to improve on-campus courses.

# Distraction from on-campus course?

- Reality: help **improve** on-campus courses
- Berkeley: MOOC improved evaluations (& size)
- Enough students to use inferential statistics
  - *Exploratory factor analysis:* test comparable concepts, vary exams
  - *Item response theory*: which questions more difficult for good students
  - *A/B testing*: which approaches lead to better learning outcomes

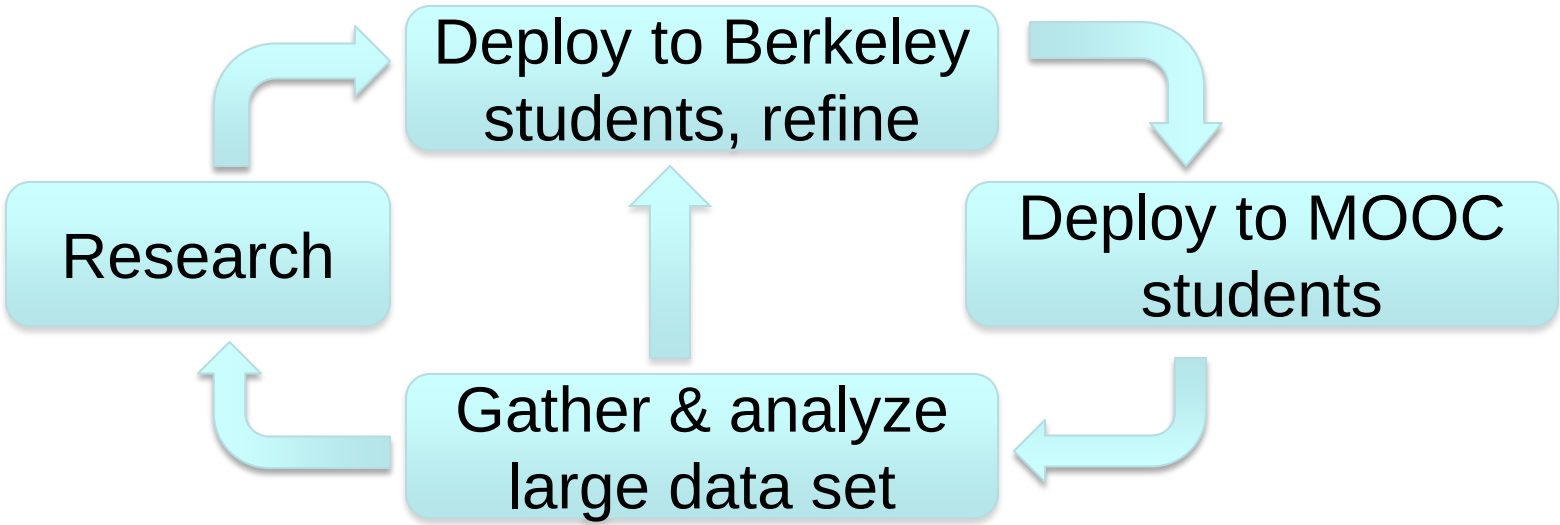
# Classroom + MOOC = SPOC
## (Small Private Online Course)

- Accommodate increased demand in impacted SW Engineering course (by 4x!)
- Autograders improve TA leverage, fulfill student request for more practice➔stronger design projects
- Course ratings up despite larger size
- ~800 instructors passed MOOC; 8 now using SPOC & book



# The MOOCLab

- Support MOOC projects that *enable new research* in online education
- Reduce research results to practice in tools & training offered to instructors



# Summary

- MOOCs can improve access and save money, just not necessarily in the way they are described in the press
  - Synergy between SPOCs and MOOCs
  - Opportunity & obligation to do the research on what works and doesn't in MOOCs
- Maintain Berkeley's excellence in research & teaching
  - Better experience for students
  - More effective tools for instructors
  - Benefit for 100,000s of non-Berkeley learners