



Bigger is Better? Using MOOC Technology in a Software Engineering Course

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- Focus: modern software engineering practices
Software as a Service



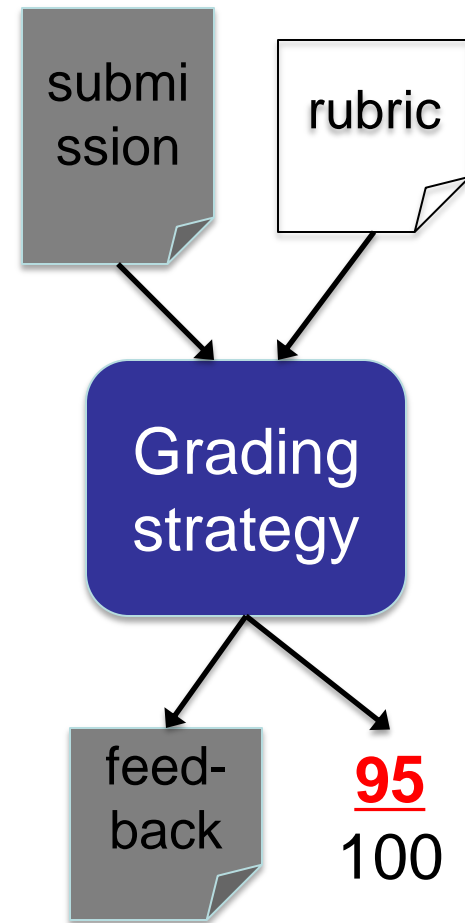
- “Impacted” at upper division
 - Restricted elective w/design component
- Already thinking about autograding, inspired by CS 188 Artificial Intelligence

Adapting for a MOOC

- **Nontrivial autograders** for programming assignments (open source)
- **Adapting lectures** to 7-10 min segment + peer learning/self assessment question
 - 7-10 min segment + peer learning question
 - 8-10 hrs/week ugrad to convert & format videos
- **No design project** in MOOC!
- **Same** HWs, quizzes, deadlines
- Offered 3 times on Coursera, 3 times on EdX, plus new “part II” now on EdX

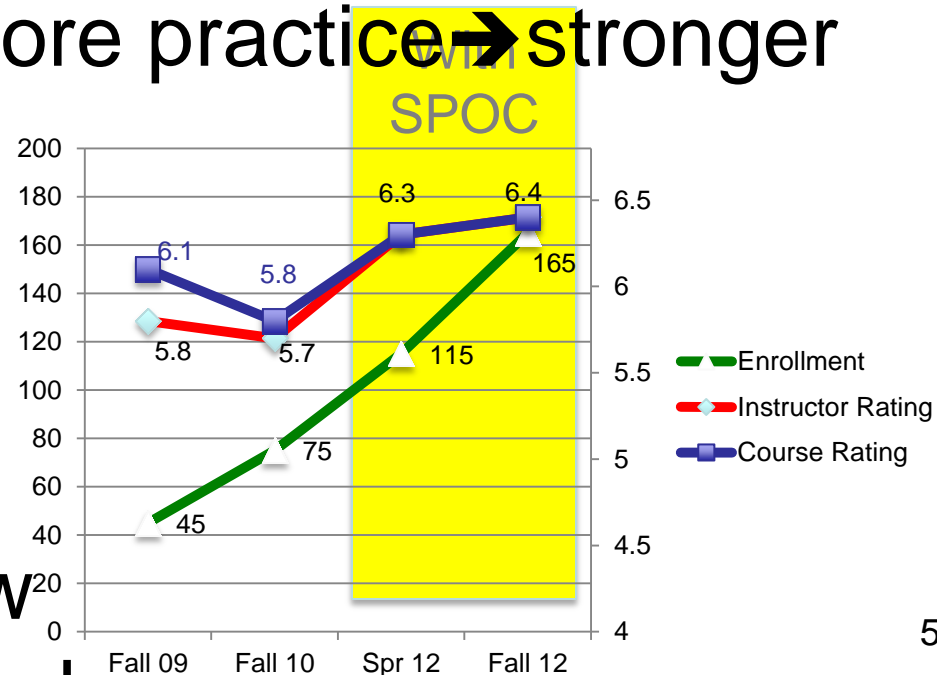
Autograding Strategies

Submission	Grading strategy
Upload code file(s)	<ul style="list-style-type: none"> • RSpec (correctness) • [soon] reek/flay (code style)
Upload test case files	<ul style="list-style-type: none"> • Mutation testing (Amman & Offutt): app with inserted bugs should fail tests
Submit URI of cloud-deployed app (Heroku)	<ul style="list-style-type: none"> • Remote (cloud-based) integration test using Mechanize
Interactive short-answer/multiple-choice	<ul style="list-style-type: none"> • Our tools emit both printed & online-format quizzes



Classroom + MOOC = SPOC (Small Private Online Course)

- Accommodate increased demand (now admit juniors, vs. turning away graduating seniors)
- 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 our SPOC & book



- [I'm going to wing this.]

Takeaway: Extend, Not Replace

- SPOC improved on-campus instruction
 - Instructor leverage, great analytics, students get quick feedback leading to mastery, ...
- Autograders hard to get right, immense amount of work, but amortizable
 - And students react very well to the extra feedback
- We will continue to use this approach even if don't care about MOOC
- Similar story: CS 188 (Artificial