

Automating Qualitative Assessment with computer-based peer grading

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murmuration #1

emergence and complex systems

- large number of independent elements/agents
- dynamic interactions between agents
- local interactions / unaware of global behavior
- randomness / diversity

modeling emergence

- separation: steer to avoid crowding local flock mates
- alignment: steer towards the average local heading
- cohesion: steer towards the average local position

murmuration #2

Can learning be an emergent behavior?

system features that can lead to “complex outcomes”

- a large number of independent agents
- heterogeneity (diversity, more is different)
- adaption (change based on desires and outcomes)
- local interactions
- feedback (negative and positive)
- external influences (randomness)

I teach a large class (200+ students)

- reading assignment before each lecture
- PowerPoint lectures each class
- all recorded in Tegrity
- online quiz after every class (quantitative)
- in-class essay during every class (qualitative)

Short essay (5 min.)

Put your name and your class id# in the *upper right corner* of your card. Please use the format: **Firstname Lastname id#**



When does “craft” become “art” ?

the question I asked myself

- do we really need to meet?
- *No*...if we can somehow “automate” qualitative assessment
- computer-based peer assessment makes that possible



crowd sourcing (peer-review)

- aggregated reviews (our students already do it)
- ranked
- see also digg.com, amazon.com, American Idol, Facebook (Like), etc

computer-based peer assessment

- qualitative assessment can be automated
- studies show it can be *more effective* than faculty assessment
- now *all* aspects of a course can run automatically
- asynchronous and tightly scheduled
- once the experience is designed, learning can occur without any “teaching” by faculty

Elements of the online learning environment include:

- a faculty designed curriculum
 - readings
 - recorded lectures (media rich)
 - pertinent links, other content
- a student cohort moves as a group through course materials on a regular assignment schedule, handled by the LMS

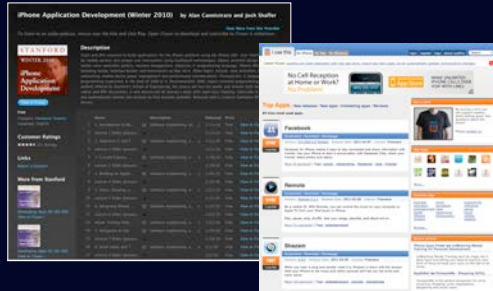
Elements of the online learning environment include:

- regular quizzes (quantitative) graded by LMS
- written assignments (qualitative) using online peer review
- peer-assessments are *randomly and anonymously* assigned
- peer-assessments are also graded using peer-assessment (*meta-assessments*)
- finished assignments are posted, ranked and sorted based on the peer-reviews (collaborative filtering)

Patterns and observations from successful computer-based peer assessment include:

- students learn from being graded by their peers *and from grading their peers*
- peer-review is more effective if done anonymously
- meta-assessments (grading the grading) improve overall quality
- aggregating multiple reviews per project is better than a single assessment (*6 seems to be the magic number*)
- posting assessed work provides useful models of quality for the next assignment (adaption)

content and assessment



Imagine an "Intro to Music" course



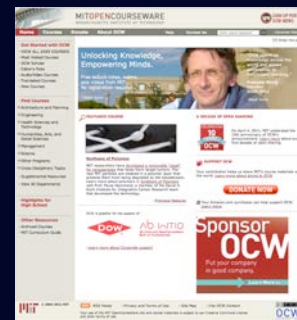
- taught by Wynton Marsalis
- a lecture/documentary series with high production values (\$500,000+)
- all materials are online or on your phone (media rich)
- 5000+ students enrolled as a cohort (a large number of students is a feature, ensuring diversity in the system!)

- a 10x increase in student size, negligible increase in cost
- for-profit universities (capitalism is going to drive this!)
- UA Early College (new kinds of online courses)



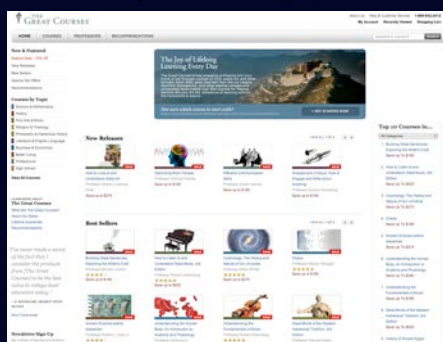
"...allows universities to benchmark teaching."

(uh oh!)



good information/content available

- all that is missing is an assessment wrapper (and a certificate...uh oh...)



Here we go!...

- coursera.org
- udacity.com

some available computer-based peer review systems

- **Calibrated Peer Review (CPR)**
 - UCLA
 - <http://cpr.molsci.ucla.edu/>
- **Scaffolded Writing and Reviewing in the Discipline (SWoRD)**
 - Univ. of Pittsburg
 - <http://sword.lrdc.pitt.edu/>
- **Moodle (Workshop)**
 - <http://www.moodle.org>

it's free, it's effective!!

Moodle 2.0 Workshop module

- open source computer-based peer assessment
- anonymous and aggregated
- faculty defined allocations and rubrics
- grading is graded via algorithms

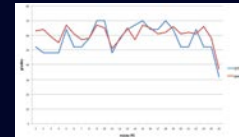
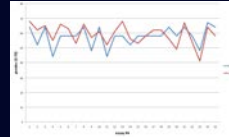
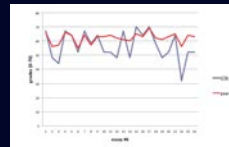
[artMoodle](#)

some observations

- students engage the process easily
- aggregated assessments do work
- trust the system!
- best to hide individual assessments from the students

grading

- GTA vs. peer review
- aggregate of 6 peer reviews
- each student read 6 essays



possible variations

- grade across classes
- grade across institutions
- outsource the grading (Mechanical Turk)
- mix and match



from simple beginnings



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