Flipping the Dice:
An active-learning, tech-enhanced, up-to-date 18.05 (Introduction to Probability and Statistics)

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April 7, 2014

Overview

1. What we inherited

2. What we've created

3. What we've learned

What we inherited

18.05: Introduction to probability and statistics.

- Traditional lecture class for non-math majors
- Dwindling enrollment

An interest in new approaches.

- Active learning (Haynes Miller)
- Online learning (everyone)

Transition

- New curriculum (not the focus of this talk)
- New pedagogy
- New classroom
- New technology

Active learning, flipped classroom

- Meet 3 x 80min in TEAL room
- 60 students, 2 teachers, 3 assistants

- Reading / reading questions on MITx
- Minimal lecturing
- Group problem solving at boards
- Whole class and table discussions
- Clicker questions
- Computer-based studio using R
- Traditional psets and pset checker

Bayesian dice

Active learning versus traditional lecture

- Standing up is beneficial
- Physical space is critical
- Peer and teacher instruction
- Student self-assessment
- Teacher formative assessment

Technology and flipped classroom

- Reading questions
- Clickers and attendance
- Pset checker

Common questions

How much work was all this?

- A tremendous amount because we changed so many things at once.

How much are you able to cover?

- More material with greater understanding.

Other observations

- Active learning is more fun
- Co-teaching is more fun
- Students like getting to know their teachers
- Students like targeted reading more than lecture video
- Students love the pset checker

Looking forward

- Ongoing study by Glenda Stump of the MIT Teaching and Learning Laboratory
- OpenCourseWare and OCW Educator this summer
- Transition to standard staffing and the next teacher

Thank you

Come visit!

Course Arc

- Probability:
  (uncertain world, perfect knowledge of the uncertainty)
  - Basics of probability: counting, independence, conditional probability
- Statistics I: pure applied probability:
  (data in an uncertain world, perfect knowledge of the uncertainty)
  - Bayesian inference with known priors
- Statistics II: applied probability:
  (data in an uncertain world, imperfect knowledge of the uncertainty)
  - Bayesian inference with unknown priors
  - Frequentist confidence intervals and significance tests
  - Resampling methods: bootstrapping
  - Discussion of scientific papers

- Computation, simulation and visualization using R and applets.

18.05 Introduction to Probability and Statistics
Spring 2014