

Pedagogical considerations for simulation-based inference in a large-enrollment introductory biostatistics course.

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Outline:

- ▶ Brief Course Description
- ▶ Pedagogical opportunities
 - ▶ Simulation-based inference (SBI)
 - ▶ Large enrollment
 - ▶ Intersection of SBI & large enrollment
- ▶ Compare/contrast approaches (i.e. informal discussion)

Brief Course Description

- ▶ STAT 250: Introduction to Biostatistics
- ▶ 225 students enroll each semester
- ▶ Lecture Mon & Fri (50 min; all students)
- ▶ Lab Wed (50 min; 3 sections x 75 students)
- ▶ Design
 - ▶ Question of the day (life science; sometimes PSU rsh)
 - ▶ StatKey + Minitab
 - ▶ In-class exams

Pedagogical opportunities: SBI

- ▶ Tangible machinery (Ernst 2004; Rossman, 2008)
- ▶ Intuition built on frequencies (Gigerenzer & Hoffrage, 1995)
- ▶ Permutation distr. segue (Ernst, 2004)
- ▶ Introduce key concepts with SBI; revisit with non-SBI
 - ▶ Lock et al. (2017)
 - ▶ Tintle et al. (2016)
 - ▶ Zieffler et al. (2012)

Pedagogical opportunities: Large enrollment

- ▶ Large sample size for student generated data (GAISE, 2016)
 - ▶ reliable demonstrations of asymptotic properties (e.g. CLT) using data generated in-class
 - ▶ even anomalies are useful (e.g. outliers from wrong units & typos vs. legitimate extreme obs.)
- ▶ (Anonymous) Engagement
 - ▶ Crowd-sourced Q&A
 - ▶ Live SMS inbox
 - ▶ Clickers
 - ▶ instant feedback
 - ▶ instant run-off

Pedagogical opportunities: Intersection of SBI & large enrollment

- ▶ Example: m&m activity in lecture
 - ▶ Live capture in Google Sheet
 - ▶ class builds sampling distribution
 - ▶ student builds bootstrap distribution
 - ▶ tangible comparison of sampling dist & bootstrap dist
- ▶ Example: StatKey on smart phones (during lecture)
 - ▶ accessible & scalable technology integration
 - ▶ partner work (one run the app; one take notes)

References

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Compare/contrast approaches (i.e. informal discussant)