Statistics Simulations Using Hands-On Manipulatives and CODAP

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Outline

- Why Sampling Distributions?
- Importance of Hands On AND Computer Simulations
- Three Demonstrations of a Hands-On Activity followed by a simulation in CODAP
- Questions
GAISE College Report

• In 2005, the American Statistical Association (ASA) endorsed the *Guidelines for Assessment and Instruction in Statistics Education* (GAISE) College Report.
• The GAISE College Report was updated in 2015, ten years from its inception
• Impact made on the teaching of introductory statistics courses in two and four year institutions.
Six Recommendation from GAISE

1. Teach statistical thinking.
2. Focus on conceptual understanding.
3. Integrate real data with a context and purpose.
4. Foster active learning.
5. Use technology to explore concepts and analyze data.
6. Use assessments to improve and evaluate student learning.
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Goal for Students in Introductory Statistics

Goal 4: Students should recognize and be able to explain the central role of *variability* in the field of statistics.

At the introductory level, this includes an understanding of univariate (and perhaps bivariate) sampling distribution and/or randomization distribution models, and the role of features such as sample size, variability in the statistics, and distributional shape in these models. Understanding how results vary from sample to sample is a challenging topic for many students.

GAISE College Report, 2015, p. 10
Sampling with Computers

• Computer simulations have made it easier for students to visualize truly random samples (Cobb, 2007; Chance & Rossman, 2006).

• Though the use of computer simulated randomization is widely used there is also research showing that students might not understand what the computer is showing if they do not first try the sampling on their own (Garfield & Ben-Zvi, 2007; Rossman & Chance, 2014).
CODAP

- codap.concord.org
- “CODAP is free educational software for data analysis. This web-based data science tool is designed as a platform for developers and as an application for students in grades 6-14.”
- Developed by Concord Consortium, led by Bill Finzer, the developer of Fathom
Cane Toad Activity
Cane Toad Sample

- Come to the front of the class and take a sample of 50 cane toads. Count the number of female toads (red beads).
- Record your proportion at this link: go.ncsu.edu/toadsample
- Based on the samples of our class, what do you think the true proportion of female cane toads is in the wild?

*Complete task can be found on Sched*
CODAP Simulation

Go to the following link

https://go.ncsu.edu/canetoads
An airline has finished training 24 junior pilots - 15 male and 9 female. Airline managers will use a lottery system to randomly choose 8 captains from these 24 pilots.

Managers announce that of the 8 captains chosen, 5 are female and 3 are male. The managers are blamed for discrimination. Is it possible (or believable) that these results happened by chance?
Pilot Hiring Discrimination Activity

• For this activity students get 24 raffle tickets, 9 yellow tickets represent the 9 females and 15 red tickets represent 15 males. They randomly choose a sample of size 8 and compare their results with the class.
• CODAP Simulation
  – https://go.ncsu.edu/pilotactivity
Penny Age Activity

• Penny data can be found on Sched
• How to do a simulation in CODAP
• Sample Size
  – Mean
  – Variation
Questions?

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References


