Developing an Interactive Statistics Learning Environment Using Computer Simulations

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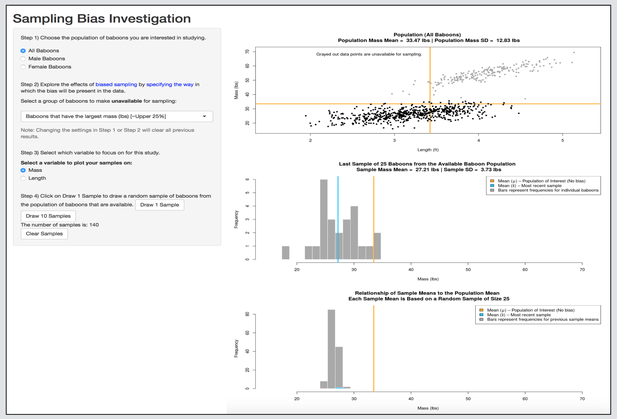
Introduction

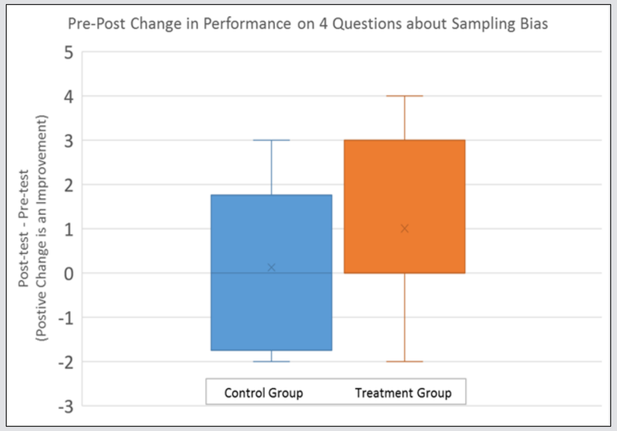
Many students tend to have a difficult time understanding and getting excited about the power of statistics, particularly when it comes to the fundamental concepts in statistics like sampling theory and the impact of bias. This research is to see if using an interactive statistics learning environment will help students engage with the content, explore complex statistical concepts, and better understand statistics as a whole.

Method

1. Develop a diverse set of apps that offer:
    - Dynamic quizzes on concepts so students can practice for as long as they want
    - Reports on trending errors so students will know where to study more
    - Interactive statistical investigations based on established studies
2. Compare results of students on practical tests before and after time spent on the Shiny apps for a significant difference in comprehension. In this small pilot study, 8 students were assigned to a control group, while the remaining 8 students were put in the treatment group.



The application piloted for this study.



Observed change in understanding sampling bias

	Time on App (Minutes)	Bias (Number of selections)	Data Draws (Number of Times)
Median	5:27	4.5	30.5
Min	2:10	1	10
Max	17:56	14	520

Results

In this small pilot study, students in the treatment group tended to perform better than students in the control group when it came to questions on sampling bias. When comparing the differences between the students' pretest and posttest scores, the following results were recorded:

T-Value: 1.712 ; **P-Value:** 0.054

These scores indicate that our results are nearly statistically significant

Future Direction

1. Modify Sampling Bias Investigation based on pilot study feedback.
2. Perform additional testing in classrooms with the new features and guided learning to compare with current results
3. Develop more apps for a wider breadth of statistical concepts

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