Putting it all Together

A comprehensive final project
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Two main ideas

Statistics is not a discrete collection of formulas and techniques – it is a disciplined method of using data to gain insight.

Students will be exposed to information of varying levels of quality throughout their studies and throughout their lives – our job includes a mandate to help them appraise it.
Northwest College is a small college in Powell, WY.

By small, I mean

- Headcount (2019) is 1440
- FTE (2019) is 1256
- Powell only has 6314 residents.
More Background

• NWC officially offers two statistics classes
  • STAT 2050 – Fundamentals of Statistics
  • STAT 2070 – Introduction to Statistics for the Social Sciences

• However, in Wyoming, these courses largely overlap.
• These courses are cross-listed as a single course.
The students

• Very wide range of majors and mathematical backgrounds are present.
  • Biology and pre-professional students often have pre-calculus or a semester of calculus before taking statistics.
  • Some of our psychology students have only taken our MATH 1000 – Problem Solving.

• However, the class is a sophomore level course – students are not new to college. Have some pertinent skill, maybe just not math.
The course outline:

- Statistical practice/research design
- Summarizing data graphically and numerically
- Correlation
- Probability
- Inferential statistics
Assessment

• Homework (either textbook or an online homework system affiliated with the text)

• Labs (to be completed in a very common statistical software package)

• Tests
The BIG Picture
Keeping the big picture in mind

• It is the first thing that I put on the board in any statistics class.

• I redraw at the beginning of every chapter and discuss how everything we’re doing relates to it.

• However, I wanted a little more.
The Assignment!
Full Year Project

The students work in groups to

• Select statistically answerable questions – form hypotheses
• Research the topic
• Gather data
• Summarize the data
• Perform statistical inference
• Present the results in writing and in presentation form.
How were they steered?

- From the beginning, every topic was framed in terms of how it might be done in practice.
- Early on, we discussed the sort of questions that the inferential techniques we would learn could be used on.
  - No more than two groups.
  - What sort of data would be expected?
  - Student’s t-test, Mann-Whitney U-test, chi-squared, linear regression
How were they steered?

• Two library instruction days to cover finding and evaluating sources.

• Shown some examples of discussion sections of sample lab reports about how the authors might proceed differently.

• Lots of in class discussion about projects and their execution.
How did they gather data?

• They had access to the school’s survey administration service account.

• Some had positions on campus which allowed them greater access to the student body.

• Some used additional methods – had access to similar students at other schools.
What was turned in?

• Full write-up explaining background, research, data collection, findings and analysis.

• Spreadsheet of data analysis.

• Presentation to their class during the final exam time.
How was it evaluated?

- 40% - data collection and write up – a rubric was provided to the students describing the elements I considered important.

- 40% - data analysis – correct choices, correct use of software, etc.

- 20% - Presentation – both the format of the paper and the in class presentation.
An objection!
The main objection to this practice

The students are going to be stuck making a convenience sample and are going to be analyzing meaningless data and getting meaningless results.
My response

- I do believe that statistics students often risk missing the forest for the trees.
- I do try to minimize the “convenience” in their samples.
- Students are going to be seeing flawed data throughout their lives. They can only learn to engage with data if they are taught – and the easiest way to get started is to let them see the data from the inside.
Outcomes
Have I Achieved My Goals?

• Anecdotally, yes.

• I have really struggled to get good data out of my students.
  - Grades are good, overall.
  - Students, when prompted, give feedback, but not usually terribly deep.
  - I need to develop a more formal questionnaire.
Signs of hope

• Some students have done some truly remarkable work.
• Some have worked with businesses, schools, etc. to create some truly meaningful studies.
• Some have revisited the project from several different angles in different research classes and have developed capstone like projects on it.
• Students are working in groups and having meaningful conversations about how best to capture the data they want.
Disappointments

• Any time there is group work, there is a possibility that some students do not contribute, or even worse, stop attending the class.

• Students who do not regularly meet with me risk going off in an unworkable direction.
Thank you for attention!

• Feel free to ask questions!