Connecting Statistics Curriculum to Students’ Curiosity

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Outline

- Problem and Proposed Pilot Program
- Iterative Improvement
- Results
  - Student Survey
  - Impact on Grades
- Lessons Learned

- Play at home game: Jamboard and/or Handout
Problem and Proposed Pilot Program

- STAT 230 is a required second-year introductory course in Probability
  - Taken by all Math students (including Computer Science), typically 500+ class
  - Relevance was not apparent to CS students
  - CS students significantly under-performed

- Proposed Solution: Create CS-focused section
  - Different lectures, more CS content
  - Same tests, quizzes, exams
  - Hope tailored course will improve performance
Think About Your Course

- When you have trouble reaching some of your students
- Is the course...
  - Required, elective, or a mix?
  - Restricted to students in certain programs or open?
  - Relevant to the students’ programs? Their careers? Their personal interests?
  - Related to their other courses, past or future?
Iterative Improvement

- Rather than making giant sweeping changes at once, gradually added components

Step 1
- CS examples
- CS-flavoured questions
- Game of the Week (SWAG)
- R workshop

Step 2
- Restricted enrolment lifted
- More examples
- Add to course notes

Step 3
- Machine Learning Idea of the Week (MLIW)
- Stats in sci-fi
- Ethical use of data
Online Adaptations (unexpected Step 4)

- Assigned all CS students to one instructor for individual questions
- “Thought question” polls on Piazza discussion board
- Weekly livestreams on Twitch for SWAG, MLIW and advanced R code
  - Recorded and posted on course website and freely as YouTube playlist
- Computational assignments to combine theory and R coding
  - Incorporating COVID testing, D&D, GameStop stock fiasco
Think About Your Course

- How can you gradually make additions to your course?
- Write down...
  - One change you can make in your course right away
  - One change you can think about making in the future
Inspiration for Ideas

- Partner and Friends in CS
- Research on CS/Stat education
- Self-education (ML course, Wikipedia)
- What’s in the news
- Memes/reddit
- Popular books, games, movies
- Students themselves!
- Colleagues with expertise in the area
- Students’ hobbies (ask!)
Think About Your Course

- Who or what can you use for inspiration?
- Write down...
  - One person you can go to for ideas
  - One resource you can consult for ideas
Results – Student Survey, Qualitative

- Survey of students after first two terms of CS section pilot
  - “I liked that there was some kind of connection with how stats would be useful to me later on.”
  - “It lets me know people are trying to cater courses to one's degree. That amount of consideration is hard to come by.”
  - “[I liked] the recognition that CS students have different priorities.”
  - “I like how I was surrounded by people who were also in CS. I also found it easier to grasp some of the concepts.”
- Respondents also had lots of great suggestions!
Results – Student Survey, Quantitative

- I found the CS examples/topics interesting
- They helped me learn the course concepts
- They made probability seem more relevant/valuable than I originally thought
- I am considering taking some 300/400-level STAT courses
- I would prefer to have different tests than the non-CS sections
- Being in a CS section positively impacted my learning experience in STAT 230
- The department should continue to offer a CS section of STAT 230
Results – Impact on Student Grades

Terms with NO CS section

- Non-CS Students: Mean = 73.3, Gap = 4.2
  - n = 7412

- CS Students: Mean = 69.1
  - n = 3335

Terms WITH a CS section

- Non-CS Students: Mean = 74.1, Gap = 0.9
  - n = 2471

- CS Students: Mean = 73.2
  - n = 1475
Think About Your Course

- How will you know it is working?
- Write down...
  - One goal you have
  - One idea for measuring the success of your changes
Lessons Learned

- Start small and iteratively improve
- Get feedback and suggestions from students
- Incorporate new material into course so all future students benefit
- Use and share digital assets created for online learning
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