Online/Hybrid Teaching in Statistics and Data Science: Lessons for the Future from a Year of COVID Teaching

SDSS 2021
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Editors of StatTLC blog

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Steve Foti, Biostatistics

- Graduate biostatistics courses
  - MS students majoring primarily in biostatistics
  - Methods, Data Visualization
  - 20-30 students per course
  - Face-to-face (synchronous) and online (asynchronous) sections
- Graduate service course
  - Graduate students from medical sciences (e.g., dental residents)
  - Biostat Literacy
  - 20-30 students
  - synchronous/asynchronous hybrid

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Adam Loy, Mathematics and Statistics

- Highly selective, residential, undergraduate liberal arts school
- Three 10-week terms (i.e., trimester calendar)
- “Traditional” courses
  - Introduction to data science
  - Probability
  - ~30 students/course
  - Asynchronous lectures, synchronous group work and Q&A sessions
- Statistical consulting
  - Project groups of 4-5 students
  - Synchronous weekly meetings - 30 minute blocks
  - Synchronous client meetings

Carleton

Douglas Whitaker, Mathematics and Statistics

- Primarily undergraduate institution
- Spring 2020
  - [face-to-face] Introduction to Statistics I
    - Switched to asynchronous
  - [face-to-face] Introduction to Probability
    - Switched to asynchronous
- Fall 2020
  - [asynchronous] Introduction to Statistics I
  - [asynchronous] Introduction to Nonparametric Statistics
- Spring 2021
  - [asynchronous*] Introduction to Statistics I
  - [blended synchronous/asynchronous] Survey Design

Laura Ziegler, Statistics

- Introductory statistics:
  - Students majoring mostly agriculture, biology, and other sciences
  - Virtual asynchronous lecture videos and virtual synchronous labs with group work
  - 360 students split into 6 sections
- 2nd course in statistics:
  - Students of all majors from biology to education to statistics
  - Choice of virtual or in-person synchronous lectures and virtual synchronous labs with group work
  - 120 students split into 2 sections

Format for this Session

Answer predetermined questions and questions from audience/participants

Participate on Jamboard (where noted)...

Click the Jamboard link to answer question posed.

...Or ask questions using the Q&A window.

Open the Q&A panel by clicking the Q&A button at the bottom.

Jamboard!

https://tinyurl.com/SDSSjamboard

Click on the link to respond to the following question:

How did the last year of teaching go for you?

Green (went well) 

Red (didn’t go well) 

Yellow (neutral, ok) 

What is one aspect of teaching that you had to abruptly change during pandemic teaching?

What teaching tools did you use?

- Zoom/breakout rooms
- Whiteboard solutions
- Slack/Discord/Zulip for Office Hours
- Recording videos

How did you foster student engagement? 

- Active learning
- Learning objectives
- Course structure
- WARNING: Student burnout
- Accessibility
  - CC,
  - right use of colors,
  - multiple ways to engage with the material,
  - internet access or broadband

What are considerations or adjustments you had to make for assessments?

- Ways to minimize cheating
- Assessment types

What is one thing you will continue to use/do in the “new normal”? 

Educational Resources

- Statistics education blogs
  - StatTLC (https://stattlc.com/)
  - Allan Rossman (https://askgoodquestions.blog/)
  - Simulation blog (CAUSEweb) (https://www.causeweb.org/sbi/)
  - Teach DS (https://teachdatascience.com/) - Ran from 2019-2020
- Guidelines
  - GAISE (https://www.amstat.org/asa/education/Guidelines-for-Assessment-and-Instruction-in-Statistics-Education-Reports.aspx)
  - Curriculum Guidelines for Undergraduate Programs in Data Science (https://www.amstat.org/asa/files/pdfs/EDU-DataScienceGuidelines.pdf)
- Upcoming Conferences
  - USCOTS 2021 (https://causeweb.org/cause/uscots/uscots21)

Educational Resources

- Interactive Whiteboards
  - Google Jamboard (jamboard.google.com, free, requires a Google account)
  - Padlet (padlet.com, freemium)
- Presentation/Recording Software
  - OBS Studio (obsproject.com, free/open source video recording software, Win/Mac/Linux)
  - OpenShot (openshot.org, free/open source video editing software [full-featured], Win/Mac/Linux)
  - ShotCut (shotcut.org, free/open source video editing software [simple], Win/Mac/Linux)
  - PenAttention (free/open source cursor highlighting [great during presentations], Win)
  - ScreenFlow (paid video recording/editing, Mac)
  - PanOpto (paid video lecture capture, can embed quizzes, Win/Mac)
- Chat Software
  - Discord (discord.com, free/upgradeable, blog post on use in stat ed)
  - Slack (slack.com, free/upgradeable, blog post on use in stat ed)
  - Zulip (zulip.com, freemium/open source [free upgrades for many educational uses; like Discord/Slack)

What PenAttention does:

Educational Resources

- Statistics Software
  - CODAP (codap.concord.org, free/open source web-based data analysis tool for grades 6-14)
  - JASP (jasp-stats.org, free/open source data analysis software, Win/Mac/Linux)
  - R
- Miscellaneous Software
  - Greenshot (getgreenshot.org, open source screenshot and image annotation tool, Win[free]/Mac[US$1.99])
  - paint.net (getpaint.net, free image editing tool [easier to use than Photoshop/GIMP])
- Course Management Tools
  - Gradescope - great interface for collecting and grading online homework and exams
  - GitHub [for data science]
- Curriculum Resources
  - *Small Teaching Online* by Darby and Lang
  - Resilient Pedagogy from Carleton's Learning and Teaching Center
  - Assigned roles - Cary J. Roseth, Joan B. Garfield & Dani Ben-Zvi (2008) Collaboration in Learning and Teaching Statistics, Journal of Statistics Education, 16:1
  - Nilson, L. B., & Goodson, L. A. (2021). *Online teaching at its best: Merging instructional design with teaching and learning research*. John Wiley & Sons.