

Variables in the Virtual Classroom: A Content Analysis and Exploration of Online Courses in Biostatistics Syllabi of Master's in Public Health Programs

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The logo for New Mexico State University, featuring the letters "NM" stacked above "STATE" in a serif font, enclosed within a white square that is itself inside a larger maroon square.

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Background

- Biostatistics is a branch of applied statistics focused on the health sciences.
- In Master of Public Health (MPH) programs the introductory biostatistics course may be the only exposure students have to statistics and research.
- Many MPH graduates are expected to understand research that includes statistical results and these graduates will be shaping public health policy in the future (Lawrence, 2016).
- Brearley et al. (2023) suggested that topics such as probability, relative risks, and odds ratios are covered are part of the foundation for biostatistics in the health sciences.

Background

- Krasna (2024), performed a study focusing on employer job postings seeking MPH graduates and the required skills in these advertisings.
 - Computer skills such as Microsoft Excel, Statistical Analysis System (SAS), and R (programing language) were among the top computer skills mentioned in the job postings examined.
- In the health sciences, specialized topics such as probability, relative risks, and odds ratios are often covered (Brearley et al., 2023).
- Hayat et al., (2017) examined the most frequently used statistical analyses used in top tier public health journals such as American Journal of Public Health (AJPH) and American Journal of Preventive Medicine (AJPM)
 - Logistic regression and Cox Proportional Hazards Regression among the top statistical models used.
 - Factor Analyses and Generalized Linear Mixed Modeling.

Data Collection

- A Non-Human Subjects Institutional Review Board was approved for this study (#2506193186).
- With the purpose of understanding pedagogy and creating a snapshot of what is being taught to MPH students in this study, we explore N = 38 syllabi of introductory statistics in MPH programs across the United States.
- We “collected data” in different ways:
 - Google Search
 - Emailing programs
 - Through the CAUSE listserv

Inclusion/Exclusion Criteria

- We were interested in syllabi during the post-COVID era, thus the syllabi included in this study dated from 2020 to 2025.
- We focused on introductory biostatistics courses that were part of MPH programs.
- We removed $n = 19$ syllabi after examining the documents and though the course was named biostatistics these syllabi belonged to Biology or Medical departments.
- Our final sample included $N = 38$ syllabi.
- For this poster we focused on **$n = 14$ syllabi** that explicitly stated the course was taught online synchronously or asynchronously.

Research Question

- **RQ: What are the online course design trends among the syllabi collected?**

Data Analysis

- We used Fischer et al. (2022) rubric for assessing the online course design of science syllabi.
 - The rubric has four main categories: technology, course organization, learning objective and alignment, and interpersonal interactions.
 - We used the open-source software R, and the package “irr” to calculate the interrater agreement using ICC (Gamer et al., 2012, 2019; R Core Team, 2013).
 - The average agreement between the raters was considered good (ICC = .812, 95% CI [.515, .924]; Koo & Li, 2016).

Results: Course Organization

- Course materials were stored across multiple learning systems (LMS) such as Canvas and Sakai.
- The presentation of the components was clear for 85.7% of the syllabi.
 - Syllabi included a detailed calendar, grading structure, expectations for assignments and resources.
 - These components were still missing for six of the syllabi.
- Most of the syllabi did not offer extra credit opportunities (85.7%) or redo opportunities (80.9%).

Results: Learning objectives and alignment.

- The majority of the syllabi discussed higher level objectives, often with regard with CEPH objectives and competencies (80.9%).
- Course navigation (how to complete assignments, in what order the assignments need to be completed) was low with only (69.0%) of the syllabi describing this component.

Results: Technology

- Few syllabi included additional support in response to challenges and affordances of online learning (61.9%).
- Fischer et al.'s (2022) rubric “punishes” the syllabi if it indicates the use of multiple software or technology (giving it the lowest possible score, a one).

Results: Interpersonal Interactions

- Syllabi did not encourage peer-to-peer interaction with the scores ranging from 33.3% to 42.8%.
- The syllabi also scored low (35.7%) in preparing students for potentially sensitive topics.

Textbook Name	Counts	% of Total
None	6	42.90%
Biostatistics for the Biological and Health Sciences	2	14.30%
Essentials of Biostatistics for Public Health	2	14.30%
Biostatistics for Clinical and Public Health Research	1	7.10%
Biostatistics: A Foundation for Analysis in the Health Sciences	1	7.10%
OpenIntro Statistics	1	7.10%
Principles of Biostatistics	1	7.10%

Software	Counts	% of Total
SPSS	4	28.60%
SAS	3	21.40%
R/R Studio	2	14.30%
No Software	2	14.30%
R/R Studio, STATA	1	7.10%
STATA	1	7.10%
Excel	1	7.10%

Selected References

- Fischer, C., McPartlan, P., Orona, G. A., Yu, R., Xu, D., & Warschauer, M. (2022). Salient syllabi: Examining design characteristics of science online courses in higher education. *PloS one*, 17(11), e0276839.
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- Sullivan, L. M., Hooper, L., & Begg, M. D. (2014). On Academics Effective Practices for Teaching the Biostatistics Core Course for the MPH Using a Competency-Based Approach. *Public Health Reports*®, 129(4), 381–392. <https://doi.org/10.1177/003335491412900415>



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THANK YOU!