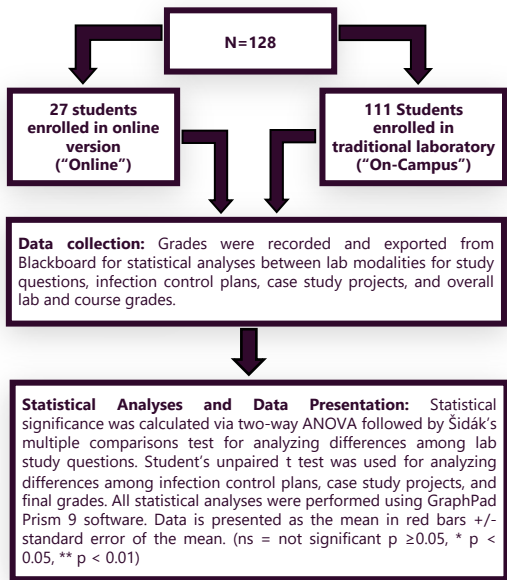




Background

Online options for lab-based courses, particularly in a college of nursing, often leaves concern for equal learning outcomes between the traditional and online versions. This study reflects on the data generated from student performance between a pilot online lab section and four traditional in-person sections of Introduction to Microbiology to gauge overall completion of course learning objectives. The Microbiology in Nursing and Allied Health (MINAH) Undergraduate Curriculum Committee has responded strongly on maintaining microbiology curriculum for undergraduate nursing programs (Norman-McKay *et al.* 2018). However, some in-person lab skills may not be relevant for successful nursing careers. Indeed, a large-scale survey from registered nurses revealed that traditional lab skills such as microscopy and Gram staining were ranked lowest in both personal interest and career relevance (Durrant *et al.* 2017). We performed a retrospective analysis to assess differences on learning outcomes between traditional and online laboratory modalities.

Methods



Conclusions/Future Directions

- Post-hoc analyses were conducted on student laboratory and final course grades to assess learning outcomes between nursing majors in the traditional, on-campus format compared to the online option.
- We found that there were no significant differences in assessment outcomes regardless of modality. The pilot course proved to be a viable alternative to an in-person experience.
- Content developed here can be used to augment future iterations of the in-person course.
- In the future, we will evaluate the results of a Microbiology Concept Inventory administered before and after the course to validate our conclusions.
- End-of-course evaluations will be reviewed to assess student perception of learning relative to course modality.



Assessment of Nursing Student Learning Outcomes in Traditional and Online Modalities for a Microbiology Laboratory Course

Outcome Statement: Students in the online platform performed as well as students in the traditional lab on varied learning assessments.

Assessments:

Study Questions

Learning Objectives:

- Demonstrate knowledge and skills relative to weekly laboratory activity

Figure 1: Example of a concept map from Disease Triangle Activity: In lab exercise 4, online students met via Microsoft Teams to create concept maps demonstrating the interconnected factors that contributed to the 2010 cholera outbreak in Haiti. Students communicated concepts of cause and effect from the perspective of the pathogen (shown here), hosts, and environment. End of course evaluations indicated that this activity enhanced the online experience.

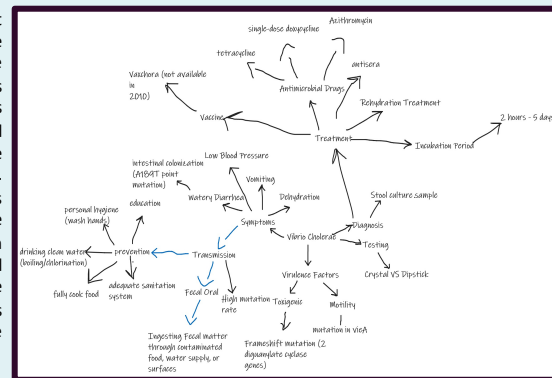
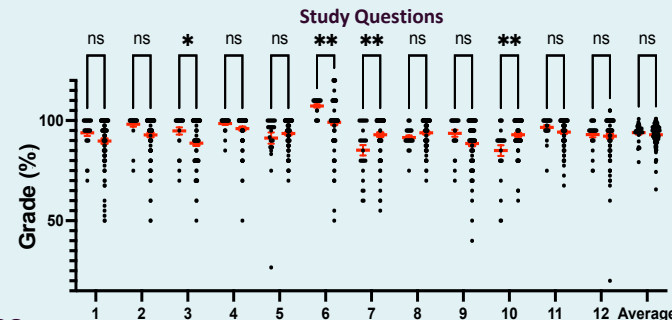


Figure 2: Analysis of Performance on weekly assignments. Online students are presented in the left columns; on-campus students are in the right columns.



References

Durrant RJ, Doig AK, Buxton RL, Fenn JP. 2017 Sep 1. *Microbiology Education in Nursing Practice*. J Microbiol Biol Educ. 18(2).
 Norman-McKay L, ASM MINAH Undergraduate Curriculum Guidelines Committee. 2018 Apr 27. *Microbiology in Nursing and Allied Health (MINAH) Undergraduate Curriculum Guidelines: A Call to Retain Microbiology Lecture and Laboratory Courses in Nursing and Allied Health Programs*. J Microbiol Biol Educ. 19(1).

Infection Control Plan

- Demonstrate and explain proper aseptic technique in the collection of clinical samples to ensure the health and safety of self, other healthcare providers and patients
- Demonstrate proficiency in handling infectious materials to prevent the spread of disease
- Apply the theoretical and practical aspects of physical and chemical methods used to control the growth of infectious agents

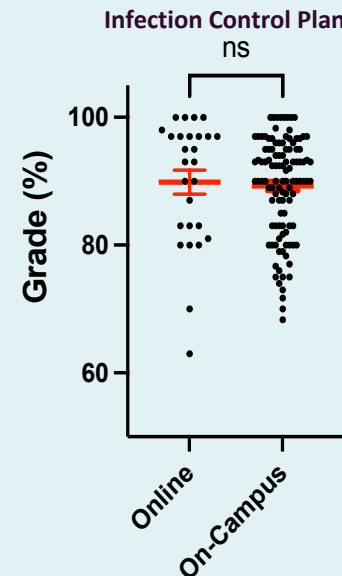


Figure 3: Analysis of Infection Control Plan Performance

Case Study Project

- Demonstrate relevant knowledge and skill in proper specimen collection, diagnosis and patient education for a given condition or disease presentation
- Communicate findings to broad and specific audiences

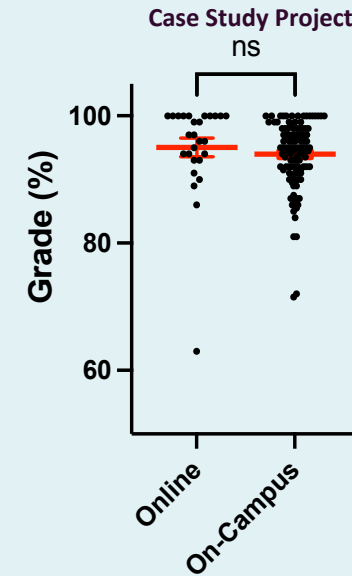


Figure 4: Analysis of Case Study Project performance

Final Lab Grade

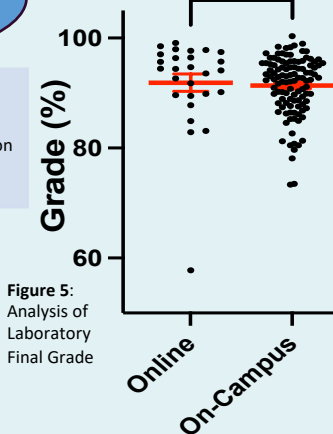


Figure 5: Analysis of Laboratory Final Grade

Final Course Grade

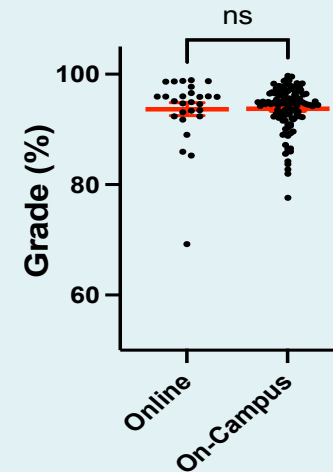


Figure 6: Analysis of Final Course Grade