Validity of a nontraditional, hybrid learning environment in optometric education

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INTRODUCTION

- Pandemic safety measures (AY20/21) necessitated a change to a nontraditional, hybrid learning environment for many Illinois College of Optometry courses with a return to a new normal post-pandemic (AY21/22) where some changes were maintained.
- Change to the learning environment can contribute to concern and skepticism among the varied stakeholders in optometric education.
- To confirm the validity of changes to the educational modality we sought an objective comparison of academic performance before and during the pandemic, and with the new normal established after the pandemic.

METHODS

- Academic performance of 3 cohorts of optometry students was compared across 3 first-year, winter quarter courses from AY19/20, AY20/21, AY21/22.
- Exact, in-common multiple-choice questions were culled from exams from Geometric and Theoretical Optics-II (58 questions), Applied Ocular Anatomy (101 questions), and Human Physiology (72 questions), and were aggregated to form comparable composite exams (one exam per course per academic year).
- Exam scores and metrics were calculated and compared across cohorts for each course separately.
- To ensure the validity of the comparison, composite exam reliability indices were calculated, and the cohorts' pre-optometric aptitude metrics (TS-OAT) were evaluated.

RESULTS

- Total Science-OAT scores [Figure 1] were chosen as proxy for academic aptitude given the three basic science courses chosen for study. Kruskal-Wallis ANOVA indicated no differences between the 3 cohorts: AY19/20, AY20/21, and AY21/22 ($p = 0.0723$), suggesting comparable cohorts.
- Point biserial correlation exam item outcomes (Kruskal-Wallis tests) and KR-20 exam validity scores (calculated 95% CI) were not significantly different for any course, suggesting similar relationship between material taught and tested for each academic year.
- Differences between AY19/20, AY20/21 and AY21/22 composite exam scores [Figure 2] were statistically significant for ocular anatomy, human physiology, and optics (Kruskal-Wallis, $p < 0.0001$ for each course), especially with paired comparisons with AY20/21.

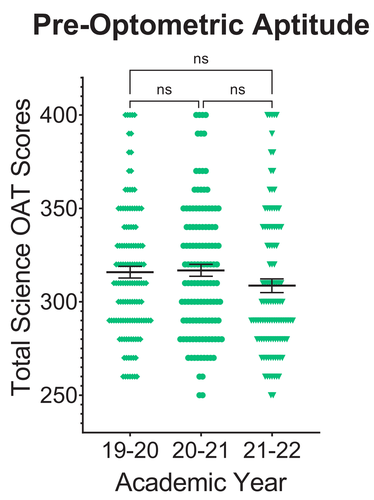

FIGURE 1. Total Science OAT scores with mean and standard error of the mean. No significant differences with individual Kruskal-Wallis comparisons AY19/20 and AY20/21, AY19/20 and AY21/22 and AY20/21.

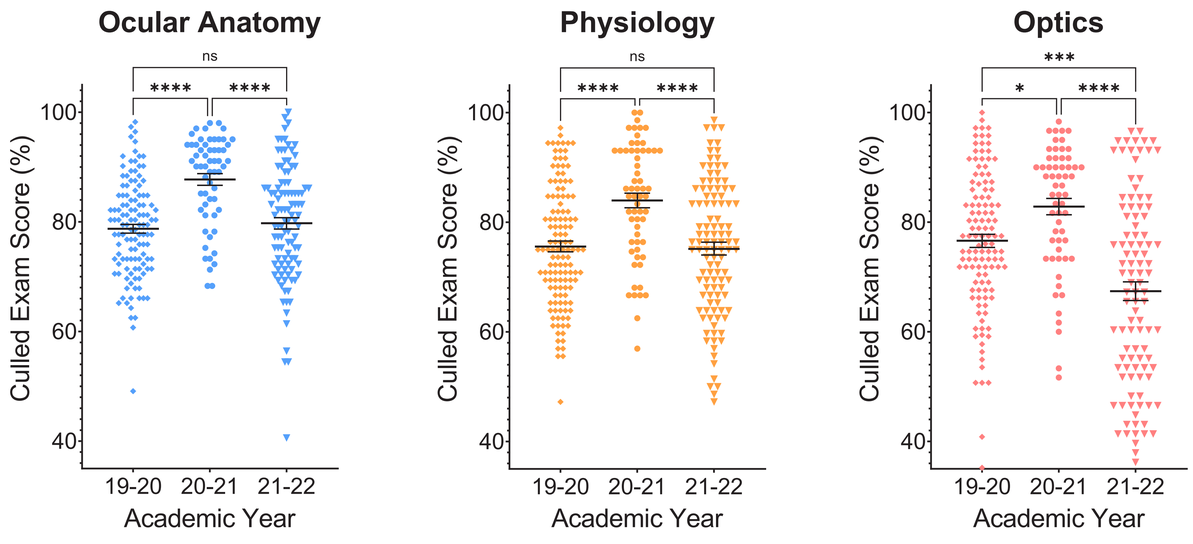

FIGURE 2. Culled exam scores (%) compared across academic years for 3 courses. Asterisks indicate significant differences (Kruskal-Wallis multiple comparisons). Significant differences were found between the AY20/21 cohort and the other two cohorts for all courses and between the AY19/20 and AY21/22 cohorts for Geometric Optics. However, no significant differences were found between AY19/20 and AY21/22 cohorts in Ocular Anatomy and Human Physiology (where the latter cohort, AY21/22, served as an exemplar of the new normal, post-pandemic learning environment.

DISCUSSION

- Results suggest the cohorts in ocular anatomy and human physiology were not disadvantaged during the pandemic or by the "new normal", post-pandemic learning environment (AY21/22).
- A significantly lower culled exam average score in optics in AY21/22 suggests a flexible, hybrid format is not equivalent to the traditional format in all courses.
- Courses, such as optics, that require a higher level of content integration and analysis may also require a higher level of student engagement and accountability.
- These outcomes broaden the possibilities for the future of optometric education but suggest caution as not all classes performed equally well.

CONCLUSION

The hybrid learning modality is a viable alternative for optometric education, but some courses may require a higher level of engagement and accountability.

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