

Analyzing How Course Modality Impacts the Learning of Mathematics of Students in a Hispanic Institution

Bryan Barbosa
The University of Texas Rio Grande Valley

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Universities have recently adopted the use of various course modalities to accommodate diverse types of students (e.g., distance-learning). It is important to investigate how the different course modalities affect students' achievement and affect (e.g., motivation, willingness to participate, confidence). Building on prior research that explores the relationships between course modality and student success (e.g., Fischer et al., 2020; Helms, 2014; Kundu et al., 2023), this study investigates how different instructional modalities—Face-to-Face (F2F), Hybrid (H), Online Synchronous (OS), and Online Asynchronous (OA)—affect the learning and motivation of undergraduate mathematics students. This study addresses this research question: How does the modality of undergraduate mathematics courses affect students' academic success?

Data were collected through an anonymous survey administered at the tutoring center of a majority Hispanic institution. This institution offers undergraduate mathematics courses in four modalities: F2F, H, OS, and OA. Survey participants were students in classes ranging from college algebra to ordinary differential equations. A total of 249 responses were analyzed over eight different courses; these responses included Likert-scale questions regarding how course modality affects their motivation to participate, the impact of their final grade due to modality, as well as their final letter grade for each respective class and modality. The data were analyzed using SPSS to compare means and confidence intervals of the survey scores across the four modalities. The means and confidence intervals are shown in Figure 1.

Across all measures, Face-to-Face and Hybrid students outperformed online students (see Figure 1a) and expressed a stronger perception of learning motivation (see Figure 1c).

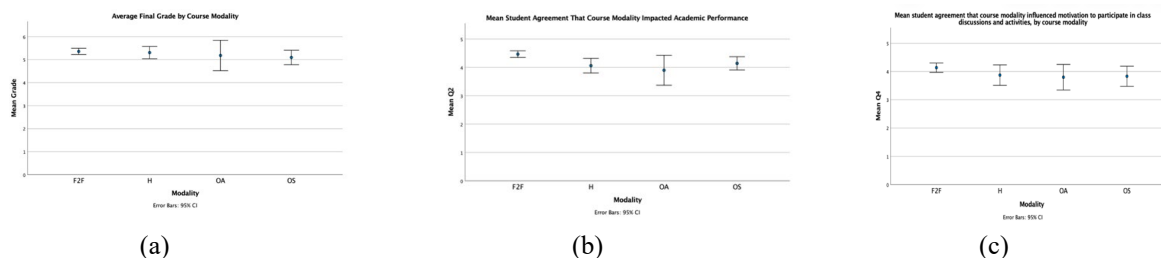


Figure 1. (a) Average final grades across modalities with a 95% confidence interval. (b) Mean agreement that modality impacted academic performance. (c) Mean agreement that modality influenced motivation to participate.

The findings suggest that environments that promote active interaction, such as F2F and H, enhance students' achievement and motivation when it comes to the mathematics classroom. These results align with Kundu et al. (2023), who found that hybrid learning promotes satisfaction and engagement. For struggling students, immediate feedback, collaboration, and guided instruction appear to be crucial for both success and motivation.

References

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