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Delivery Modalities Impact on Student Performance in a Business Communications Course Revisited

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ABSTRACT: *Business Communications, BADM 230, is an undergraduate communications course offered primarily to freshman and sophomore students at a public university in Houston, Texas. This course has been taught as a face-to-face lecture-based course, as an online synchronous course with live lectures and more recently as a hybrid course consisting of a mixture of face-to-face and online lectures. This article updates the impact of differences in the delivery modalities, with the addition of hybrid instruction to face-to-face live and online lectures, on student performance.*

KEYWORDS*: delivery modalities, face-to-face, synchronous, hybrid instruction*

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I. INTRODUCTION

The benefits and limitations of online instruction, when compared to classroom-based face-to-face (F2F) instruction, has been researched and debated for a number of years. There appears to be a blurred dichotomy between the two schools of thought. There are educators who posit that the personal touch of a live instructor and F2F classroom interactions among students is essential to the college learning experience, particularly so for students whose secondary education learning experiences have not fully prepared them for college (Ramsden and Entwistle, 1981). Brown (1996) and Hara and Kling (2000) suggest that students in the online environment may experience isolation, confusion and frustration that adversely affect the efficacy of their learning.

Another school of thought advocates for online instruction suggesting that online participation may be less intimidating to students who tend to be more reserved in a classroom. McLaren (2008) advises that student learning is enhanced by the quality and quantity of interactions, both student to student and student to instructor interactions, which exist in the online environment.

Differences in student performance, in the F2F, hybrid and online environments, have also been well researched without a clear conclusion of which modality is best suited for student learning. Carmel and Gold (2007) advise that there is not a statistically significant difference in student performance between F2F and hybrid modes of instruction. Helms (2014) suggests that online students have significantly lower grade point averages (GPAs) than F2F students. Other authors advise that statistically significant differences existed in student performance between online and traditional courses (Atchley, Wingenbach, and Akers, 2010; Faux and Black-Hughes, 2000; Paden, 2006; Shoenfeld-Tacher, McConnel, and Graham, 2001).

This paper explores the existence of a difference in student performance among students taught F2F, fully online and in a hybrid format, consisting of F2F and online instruction, in an undergraduate Business Communications course. Previously, Superville and Johnson-Weeks (2023) showed that a significant difference did not exist in student performance for student taught in F2F and online modalities. Student performance data from sections of the course offered F2F in Fall 2022, online in Fall 2022 and in a hybrid format in Spring 2023 are used in the analysis. This study assumes that student performance is variable while student knowledge is fixed from semester to semester. Results of this case study may not be extendable to other larger delivery modality studies since the student performance observations in each of the three groups of data are nonrandom.

II. DATA AND GRAPHICS

Business Communications Fall 2022 F2F	Business Communications Fall 2022 Online	Business Communications Spring 2023 Hybrid
69.275	74	75.38
86.28	89.18	70.875
91	77	77.17
82	84.385	78.245
57.33	86.32	79.79
83	60	88.9
87.42	87.155	91.46
90	83.19	55.97
47.375	83.25	90.855
76.225	92.105	57.32
80.005	80	73.275
83	59.23	75.744
71.495	82.37	78.64
88	83.42	87.94
87	85.59	0
86.29	95.145	74.775
91	86	79.667
88.665	88.295	68.415
77.12	64.115	74.423
63	73	86.155
89.24	80	1.7
78	70.29	88.43
93	79.155	81.475
78	91.265	71.27
78.31	86.08	79.392
85.465	87.195	74.459
82	89	82.743
83	77	90.005
89	79.4	87.893
78	79	93.38
90.34	96.625	74.603
70	82.205	18.85
63	88.095	73.685
87.27	74.04	28.06
61.325	92.09	61.777
94.39	82	42.16
82	84.39	66.09
71	80.49	8.175
83	84.06	85.535
	88	

Table 1: Data Sets

Fall 2022 F2F		*Fall 2022 Online*		*Sp2023Hybrid*	
Mean	80.04667	Mean	82.10325	Mean	68.58156
Standard E	1.714229	Standard E	1.334908	Standard E	3.984051
Median	83	Median	83.335	Median	75.38
Mode	83	Mode	77	Mode	#N/A
Standard D	10.70536	Standard D	8.442696	Standard D	24.88039
Sample Va	114.6047	Sample Va	71.27912	Sample Va	619.034
Kurtosis	1.180773	Kurtosis	1.258491	Kurtosis	2.122763
Skewness	-1.18599	Skewness	-1.00853	Skewness	-1.71354
Range	47.015	Range	37.395	Range	93.38
Minimum	47.375	Minimum	59.23	Minimum	0
Maximum	94.39	Maximum	96.625	Maximum	93.38
Sum	3121.82	Sum	3284.13	Sum	2674.681
Count	39	Count	40	Count	39

Table 2: Descriptive Statistics

Table 1 displays student performance scores for sections of the course offered F2F in Fall 2022, online in Fall 2022 and hybrid in Spring 2023. Table 2 shows descriptive statistics for the three groups of student performance scores. Note that the mean and median performance scores for the hybrid group are substantially smaller than those for the F2F and online groups while the variation is significantly larger than the F2F and online groups.

Figure 1 displays a scatterplot of the student performance data. There appears to be a substantial difference in the variation of student performance from the hybrid group when compared to the F2F or online groups. Figure 2 displays a box and whispers plot on the data. The edges of the box represent the lower and upper quartiles. Note that the interquartile range (IQR) is substantially larger for the hybrid group, indicating a possibility of non-homogeneity of the variation among the groups. The initial question to be explored is whether that difference in variation among the groups is statistically significant.

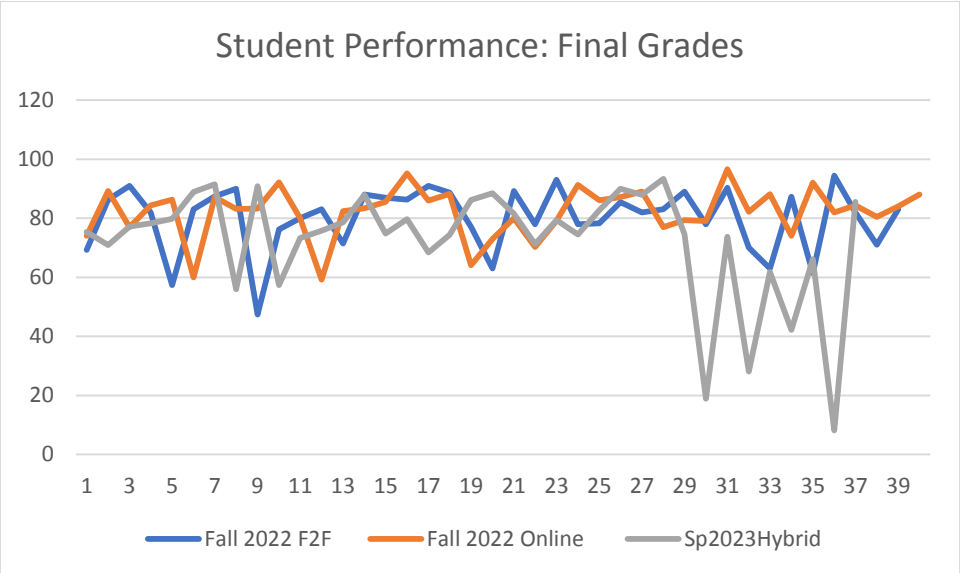

Figure 1: Scatterplot of Student Performance Scores

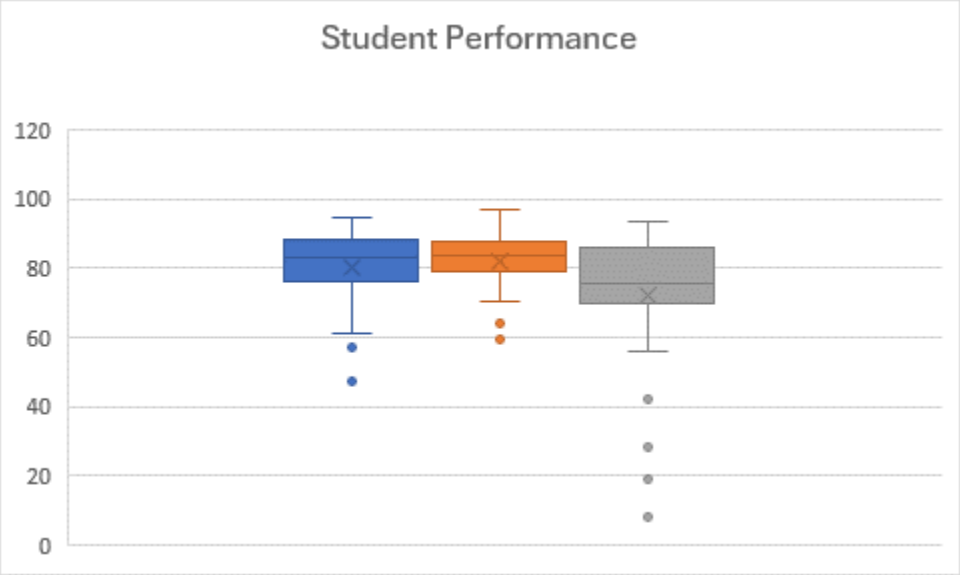

Figure 2: Box and Whiskers Plot of Student Performance Scores

III. DATA ANALYTICS

A difference in variation among groups may be verified by Bartlett's Test. Inserting the data into an online Bartlett's Test Calculator (2024) reveals T= 28.57, df =2 and p = 0.00. At a 5% significance level, the variation among the student performance data groups is significantly different. Typically, a difference in mean performance among F2F, online and hybrid instruction may be detected by a one-way Analysis of Variance (ANOVA) Test. However, a key assumption of ANOVA is the homogeneity of variation among the groups. As Bartlett's Test showed, this assumption would not be valid. A Kruskal-Wallis test, a nonparametric alternative to ANOVA, will be applied to detect a difference in median performance among the three instructional methods.

The key research question of this study is:
Is there a difference in student performance scores of students taught F2F, online and in hybrid modes?
Expressed statistically:
H_O: $M_{F2F} = M_O = M_H$ (median student performance is the same across F2F, online and hybrid delivery modalities)
H_A: at least one M is different (median student performance of at least one delivery modality differs)
The Kruskal-Wallis Test reveals a H statistic = 7.31 (2, N=116) and p = 0.02579. At the 5% significance level, there is a statistically significant difference in the median performance scores of students taught F2F, online and by hybrid modalities. Recall Superville and Johnson-Weeks (2023) showed that at a 5% significance level, a statistically significant difference does not exist between the mean students' scores of students taught F2F and in online modalities.

IV. CONCLUSION

This article has extended the earlier work of Superville and Johnson (2023) by exploring the impact of a difference in delivery modalities, face-to-face, online and hybrid instruction, on student performance in an undergraduate Business Communication course. The results from this case study reveal students taught Business Communications in a hybrid format, performed less well than students taught entirely F2F or entirely online. There was not a significant performance difference in students receiving instruction in a F2F or online modalities. The inconsistency encountered in the hybrid instructional method (switching between F2F and online throughout the semester) appears to result in decreased student performance when compared to consistent F2F or consistent online instruction throughout the semester.

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