

Course Modality and Student Outcomes: The Mediating Role of Connection

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Abstract

During the Covid-19 pandemic, institutions of higher education were required to use multiple teaching modalities, often in the same course, to facilitate student learning, giving students the option of attending face-to-face, attending live over zoom, or watching the recorded lecture videos asynchronously. Simultaneously, some students were forced to enroll in courses with modalities that did not align with what they believed to be most effective for them. This study examines the relationship between accounting students' perceptions of learning in each

modality and course outcomes. Students from nine introductory accounting classes were surveyed on several dimensions of the learning environment. Results demonstrate that the correlation between synchronous attendance (alignment of modality) and course grades is mediated (partially mediated) by students' connection to their professor. Connection to their professor also fully and directly mediates synchronous attendance on satisfaction and, through sequential mediation in combination with student engagement, also fully mediates alignment of modality on student satisfaction. Regardless of modality (synchronous or asynchronous), or students' ability to attend the modality that is most effective for their learning, students and professors can improve course outcomes (course grades and course satisfaction) by increasing student-professor connection.

Keywords: course modality, asynchronous vs. synchronous, student-professor connection, student grades, student satisfaction

1. Introduction

During the Covid-19 pandemic, institutions of higher education were required to use multiple teaching modalities, often in the same course, to perpetuate student learning. This provided an environment in which students had the option of attending face-to-face, attending live over zoom, or watching the recorded lecture videos asynchronously. Simultaneously, more students were forced to enroll in courses with modalities that did not align with what they believed to be most effective for them.

Using survey responses from students in nine introductory accounting classes, this study examines how course modality, student alignment (whether students' enrollment choice agrees with their perception of modality effectiveness), and student engagement are related to course outcomes. Importantly, we document the role of student-instructor connection in mediating the relationship between course outcomes and modality, alignment, and engagement.

We find that students who attend asynchronously have higher course grades and more satisfaction with the course when they are aligned. We also find that when students' attendance does not align with the course modality they believe to be most effective, course outcomes are higher with synchronous course delivery.

However, our main contribution to the literature is the result found when analyzing potential mediation variables. Students' connection to their professor fully and directly mediates synchronous attendance on satisfaction and mediates the indirect effect of synchronous attendance on course grades. In addition, through sequential mediation in combination with student engagement, students' connection to their professor partially mediates alignment of modality on course grades and fully mediates alignment of modality on student satisfaction.

Our findings highlight the importance of connection between students and instructors. These results contribute to the extant literature by providing a possible explanation for mixed results of prior studies comparing asynchronous and synchronous teaching methods. Additionally, regardless of modality, we find that professors can help improve course outcomes by fostering greater connection with their students.

1.1 Background

University instruction in the past three decades has moved well beyond traditional face-to-face (F2F) instruction (synchronous course delivery) and correspondence courses (asynchronous course delivery) to include asynchronous online, synchronous remote, and hybrid/blended instruction. Synchronous remote course delivery, in which students and instructors interact in real time from various locations, has existed for many years in the form of webinars and distance learning in some professional programs such as medicine (He et al., 2021). Abou El-Naga & Abdulla (2015) provide a roadmap for transforming from F2F to online instruction. However, online instruction increased dramatically during the covid-19 pandemic giving more students instructional modality choice: synchronous (F2F *and* virtual/remote options such as Zoom) and asynchronous (watching recorded lectures outside of scheduled class time or typical online courses). Additionally, the covid-19 pandemic created circumstances where students were more likely to choose a course modality other than the modality they believed to be most effective for them personally (Gurung & Stone, 2020).

Research on the effectiveness of the synchronous remote course modality relative to the F2F format is still not fully understood, and further research is needed to understand the benefits it provides. The extant literature provides mixed results. In the healthcare industry, studies found no significant difference in course effectiveness between synchronous remote learning and F2F modalities (Robson et al., 2022). Ebner & Gegenfurtner (2019), on the other hand, provide descriptive evidence that webinars, a form of synchronous remote learning, are more effective for promoting knowledge than asynchronous or F2F instruction. They show, in terms of student satisfaction, that students have greater satisfaction in webinars than asynchronous learning but lower satisfaction relative to F2F.

In addition to studying the connection between synchronous remote learning and course outcomes, Stuart et al. (2022) document a moderating effect from students' self-reported levels of connectedness to the university showing higher GPA and satisfaction when students reported higher levels of connectedness to the university.

An additional factor that could affect course outcomes is the alignment between students' chosen modality and their belief of modality effectiveness. Gurung & Stone (2020) document no difference in exam scores between aligned (students whose indicated preference for course modality was also the modality they indicated learning best in) and misaligned student groups (those who were not aligned). They did, however, find a significant difference between aligned students and students' indications of learning content, skills, and attitudes.

1.2 Research Questions

Given the significant increase in asynchronous instruction and the number of students unable to attend courses in modalities they believe to be most effective, we ask the following research questions:

1. Are student course outcomes different when attending class virtually (synchronous remote), in person (F2F), watching recorded class sessions, or completing the course as an online student (asynchronous remote with no recorded class sessions)?
2. Are student outcomes different when students participate in the modality they believe is most effective for their learning?
3. If student outcomes vary by modality and/or alignment, is the variation in course outcomes due to a mediating influence of engagement, connectedness, or both?

2. Data Collection and Methods

2.1 Participants and Procedures

Starting in the Fall 2020 semester, students at a regional public university in the western United States had the option to enroll in two types of courses: face-to-face (F2F) or online. Participants in this study consisted of 229 students enrolled in nine sections of an Accounting Principles course at this public university in Fall 2020. The courses were taught by three different professors and included both F2F and online sections. Students who enrolled F2F had the choice to attend in person, synchronously via Zoom, or not to attend. All students had recordings of the lectures available to view asynchronously throughout the semester. Students who chose to take the course online had only asynchronous recordings available to them that were not recordings of F2F lectures. Students participated in the survey at the end of the semester to examine their perceptions and performance in this new hybrid learning environment. Students were given extra credit for their participation in the survey which was reviewed and deemed exempt by the University Institutional Review Board.

The survey was administered through an online platform (Canvas). After students provided consent, they responded to questions designed to determine attendance habits, perceptions of modality effectiveness, connection and engagement, overall satisfaction with the course, and demographic data. Table 1 provides participant demographic information. Of the 229 students who participated in the survey, 10 did not complete all the necessary questions to perform the analysis. We dropped an additional 22 participants from our analysis because their primary method of attendance could not be determined. These participants either indicated that they attended via multiple modalities, but did not attend via any one modality more than 50% of the time, or that they attended both synchronously and asynchronously more than 50% of the time. Of the remaining (197) participants, 147 (75%) were enrolled in the F2F sections of the course and 50 (25%) were enrolled in online sections. Approximately 48% of the participants were male, 80% identified as Caucasian, and 71% were either in their freshman or sophomore year.

Table 1. Demographic Information^a

	F2F	%	Online	%	Total
By Gender					
Male	76	52%	19	38%	95
Female	69	47%	30	60%	99
Other	1	1%			1
Prefer not to respond	1	68%	1	2%	2
Total	147		50		197
By Major ^b					
Accounting	26	16%	14	26%	40
Business Management	34	21%	10	19%	44
Finance	16	10%	9	17%	25
Marketing	21	13%	3	6%	24
Other	62	39%	17	32%	79
Total	159		53		212
By Ethnicity					
White	121	82%	37	74%	158
Hispanic or Latino	10	7%	6	12%	16
Asian/Pacific Islander	5	3%	3	6%	8
Black or African American	5	3%	2	4%	7
American Indian or Alaskan Native			1	2%	
Other	4	3%			4
Prefer not to respond	2	1%	1	2%	3
Total	147		50		197
Year in School					
Freshman	63	43%	12	24%	75
Sophomore	53	36%	11	22%	64
Junior	24	16%	19	38%	43
Senior	7	5%	7	14%	14
Total	147		49		196
First Generation student					
No	104	72%	33	66%	137
Yes	41	28%	17	34%	58
Total	145		50		195
Enrollment status					
Full-time	145	99%	42	86%	187
Part-time	2	1%	7	14%	9
Total	147		49		196
Mean Age	20		23		21
Median Age	20		21		20

^a243 students completed the survey, 229 opted to participate in the study, 5 responses were unusable due to missing key demographic information, 5 responses were unusable due to conflicting responses for modality and 22 didn't participate in a modality >50% of the time, leaving 197 valid responses for the study.

^bMajor includes some double majors

2.2 Measurement of Variables

2.2.1 Dependent Variables

We use two dependent variables in our study: Course Grade and Course Satisfaction. The first dependent variable, Course Grade, was measured using the student's final course grade on the 12-point, 4.0 GPA scale (0.0=F to 4.0=A). Students' grades were exported from Canvas and matched to student participants before being converted to GPA. For our second dependent variable, Course Satisfaction, we used student responses to a survey item that read, "Rate your overall satisfaction with the course" on a 7-point scale (1=Very dissatisfied, 7=Very satisfied).

2.2.2 Independent Variables

The independent variables in the study include Course Modality and Modality Alignment. Course Modality was measured using student responses indicating the percentage of time they spent (0-25%, 26%-50%, 51%-75% and 76%-100%) attending each modality (F2F, watching live on Zoom, or watching recorded videos online). Responses that indicated attendance was greater than 50% in only one of the modalities were coded into the respective modality group: Face-to-face, Synchronous_Zoom, or Asynchronous. Finally, online students that were not registered for the F2F course were coded into the Asynchronous group.

Modality Alignment compares Course Modality to Modality Effectiveness. Modality Effectiveness was measured by students' responses to three questions. Students were asked the extent to which they agreed that 1) Face-to-face, 2) Watching live lectures on Zoom, and 3) Watching recorded videos online was "the most effective method of learning for gaining and retaining information." Student responses were on a 7-point scale (1=Strongly disagree, 7=Strongly agree). The modality with the highest rating was coded 1. If multiple methods had the highest rating for an individual student, then each method received a 1. If students chose to attend the majority of the course via the modality they believed was the most effective for learning (i.e., Course Modality = Modality Effectiveness), students were considered aligned and were coded 1 for Modality Alignment. Students who attended via a modality that did not match the modality they believed was most effective were coded 0 for Modality Alignment.

2.2.3 Mediating Variables

Potential mediating variables included Engagement and two measures for connection. Students responded to questions asking for their level of engagement in F2F lectures, synchronous viewing of lectures on Zoom and recorded videos online. Answers were on a 7-point scale (1=Very disengaged, 7=Very engaged). We used student responses for the modality they attended more than 50% of the time as our measure for Engagement.

Students were also asked about their perceived connection to the professor (Professor Connectedness) and to other students (Student Connectedness) in the course. Answers to these questions were on a 7-point scale (1=Very disconnected, 7=Very connected). We tested student responses to both of these questions for mediation in our analysis.

3. Results

3.1 Combination of Modalities into Synchronous vs Asynchronous

We first tested for differences in our two dependent variables, Course Grade and Course Satisfaction, based on Course Modality. Table 2 shows the means for our dependent variables for each modality type. Initial analyses indicated there was no statistically significant difference between the F2F group and the synchronous Zoom group for either Course Grade ($p=.24$) or Course Satisfaction ($p=.36$), which is consistent with prior literature (Robson et al., 2022). For this reason, we combine the F2F and Synchronous Zoom groups into one modality: Synchronous. In addition, we tested for differences in the Asynchronous group, which includes both online students and F2F students who chose to watch recordings rather than attend F2F or

watch Zoom synchronously. We test for differences in our dependent variables for these two types of students to determine whether these groups can also be combined. Again, we found no significant difference for Course Satisfaction ($p=.26$) but did find a marginally significant difference for Course grade ($p=0.05$). Although there is a marginally significant difference for grades, subsequent analysis does not differ if the F2F students who mostly watched recorded lectures were dropped. Because of these initial findings, we use only two groups for Course Modality in our subsequent analyses: Synchronous and Asynchronous.

Table 2. Descriptive statistics for course grade and course satisfaction by course modality

Modality ^{a,b}	Dependent variable	
	Course Grade	Course Satisfaction
Face-to-face	3.04 (111)	6.42 (109)
Synchronous_Zoom	2.74 (20)	6.2 (20)
Record	2.04 (9)	5.33 (9)
Online	2.79 (50)	5.74 (50)

^aANOVA demonstrates no significant difference between the F2F modality and the Synchronous_Zoom modality for Grades ($p=0.24$) and for Satisfaction ($p=0.36$). ANOVA demonstrates a marginally significant difference between Record and Online for Grades ($p=.05$) and no significant difference for Satisfaction ($p=0.26$). Thus, for further analysis, the modalities will be combined into Synchronous (F2F and Synchronous_Zoom) and Asynchronous (Record and Online). Although there is a marginally significant difference for grades between Record and Online, subsequent analysis does not differ when the F2F students who mostly watched recorded lectures were dropped.

^b 13 Students selected >50% of the time for one or more modalities. For these students, the group selection was based on the modality with the highest percentage. The 7 students with equal percentages were dropped from Table 2 analysis but added back in subsequent analysis since they all fell into the Synchronous group (e.g., >51% F2F and >51% Synchronous_Zoom).

3.2 Interaction of Synchronous and Alignment

To test whether our results are consistent with prior literature and as a precursor for our analysis on mediation, we perform 2x2 tests of ANCOVA using our independent variables, Modality and Alignment, their interaction, and several covariates on Course Grade and Course Satisfaction. First Generation was found to be a statistically significant covariate for Course Grade in our analysis; however, statistical results are not significantly changed when First Generation is removed, and all inferences and interpretations of the results remain the same. For simplicity of presentation, we remove First Generation from our analyses and Table 3 reflects values found without this covariate. When testing for predictors of Course Satisfaction, Age was found to be a significant covariate. Removing Age in our analyses did change some of the p-values and, therefore, our inferences when analyzing the effect of our independent variables on Course Satisfaction. Thus, Age is presented as a covariate in all analyses relating to Course Satisfaction.

Table 3, Panel A presents the results of the ANOVA using Course Grade as the dependent

variable. Table 3, Panel B presents the raw means for each group in our 2 x 2 ANOVA. We find that Modality Alignment significantly and positively impacts Course Grade, however we do not find significant results on Course Modality or the interaction. Analysis of simple effects (Table 3, Panel C) provides further insights. These tests show that grades for students who attend class asynchronously are significantly higher when student modality is aligned. In other words, modality alignment is only associated with higher grades when students attend asynchronously, and not for students who attended either F2F or live through Zoom.

Table 3. The effect of Course Modality and Modality Alignment on Course Grade^a

Panel A: Analysis of Variance (ANOVA)					
	SS	Df	MS	F	p
Modality ^b	0.01	1	0.01	0.01	0.92
Alignment ^c	8.53	1	8.53	8.07	<0.01
Modality*Alignment	2.12	1	2.12	2.00	0.16

Panel B: Descriptive statistics: Mean [Standard Deviation]			
Alignment	Modality		Total
	Synchronous	Asynchronous	
Yes	3.04 [0.97] n = 127	3.32 [0.75] n = 18	3.07 [0.95] n = 145
No	2.73 [0.92] n = 11	2.40 [1.29] n = 41	2.47 [1.22] n = 52
Total	3.01 [0.97] n = 138	2.68 [1.22] n = 59	2.91 [1.06] n = 197

Panel C: Simple effects					
Sources of variation	SS	Df	MS	F	p
Effect of Synchronous given no Alignment	0.94	1	0.94	0.89	0.35
Effect of Synchronous given Alignment	1.28	1	1.28	1.21	0.27
Effect of Alignment given Asynchronous	10.69	1	10.69	10.12	<0.01
Effect of Alignment given Synchronous	0.97	1	0.97	0.92	0.34

^aCourse Grade was measured using the student's final course grade on the 12-point, 4.0 GPA scale (0.0=F to 4.0=A)

^bModality=Synchronous when the student attended >50% of the time in the F2F or Live(Zoom) modalities. Modality=Asynchronous when the student attended >50% of the time in the Record or Online modalities.

^cModality Alignment compares Course Modality to Modality Effectiveness. Modality Effectiveness was measured by students' responses to three questions. Students were asked the extent to which they agreed that 1) Face-to-face, 2) Watching live lectures on Zoom, and 3) Watching recorded videos online was "the most effective method of learning for gaining and retaining information." Student responses were on a 7-point scale (0=strongly disagree, 6=strongly agree). The modality with the highest rating was coded 1. If multiple methods had the highest rating for an individual student, then each method received a 1. If students chose to attend the majority of the course via the modality they believed was the most effective for learning (i.e., Course Modality = Modality Effectiveness), students were considered aligned and were coded 1 for Modality Alignment. Students who attended via a modality that did not match the modality they believed was most effective were coded 0 for Modality Alignment.

Table 4, Panel A presents the results of the ANCOVA using Course Satisfaction as the dependent variable and Table 4, Panel B displays the raw means for Course Satisfaction by group. Both Synchronous and Modality Alignment have a significant direct effect on Course

Satisfaction, but the interaction between our independent variables is insignificant. In tests of simple effects, the results of which are presented in Table 4, Panel C, shows that, for students who are not aligned, attending synchronously increases Course Satisfaction. In addition, students who attend asynchronously have higher Course Satisfaction when their Course Modality is aligned with the modality they believe to be most effective (i.e., they believe asynchronous attendance is more effective and are attending asynchronously). This relationship is consistent with the relationship found when testing for Course Grade.

Table 4. The effect of course Modality and modality Alignment on Satisfaction^a

Panel A: Analysis of Covariance (ANCOVA)					
	SS	Df	MS	F	p
Modality ^b	7.61	1	7.61	8.91	<0.01
Alignment ^c	5.76	1	5.76	6.75	0.01
Modality*Alignment	1.72	1	1.72	2.01	0.16
Age	9.11	1	9.11	10.67	<0.01
Panel B: Descriptive statistics: Mean [Standard Deviation] ^d					
	Modality			Total	
	Synchronous	Asynchronous			
<i>Alignment</i>					
Yes	6.40 [0.78] n = 125	6.44 [0.86] n = 18	6.41 [0.79] n = 143		
No	6.18 [0.75] n = 11	5.34 [1.39] n = 41	5.52 [1.32] n = 52		
Total	6.38 [0.78] n = 136	5.68 [1.34] n = 59	6.17 [1.03] n = 195		
Panel C: Simple effects ^e					
Sources of variation	SS	Df	MS	F	p
Effect of Synchronous given no Alignment	7.03	1	7.03	8.23	<0.01
Effect of Synchronous given Alignment	1.39	1	1.39	1.63	0.20
Effect of Alignment given Asynchronous	7.23	1	7.23	8.47	<0.01
Effect of Alignment given Synchronous	0.55	1	0.55	0.65	0.42

^aCourse Satisfaction, we used student responses to a survey item that read, "Rate your overall satisfaction with the course" on a 7-point scale (1=Very dissatisfied, 7=Very satisfied).

^bModality=Synchronous when the student attended >50% of the time in the F2F or Live(Zoom) modalities. Modality=Asynchronous when the student attended >50% of the time in the Record or Online modalities.

^cModality Alignment compares Course Modality to Modality Effectiveness. Modality Effectiveness was measured by students' responses to three questions. Students were asked the extent to which they agreed that 1) Face-to-face, 2) Watching live lectures on Zoom, and 3) Watching recorded videos online was "the most effective method of learning for gaining and retaining information." Student responses were on a 7-point scale (1=Strongly disagree, 7=Strongly agree). The modality with the highest rating was coded 1. If multiple methods had the highest rating for an individual student, then each method received a 1. If students chose to attend the majority of the course via the modality they believed was the most effective for learning (i.e., Course Modality = Modality Effectiveness), students were considered aligned and were coded 1 for Modality Alignment. Students who attended via a modality that did not match the modality they believed was most effective were coded 0 for Modality Alignment.

^dNon-covariate adjusted means are reported in Panel B.

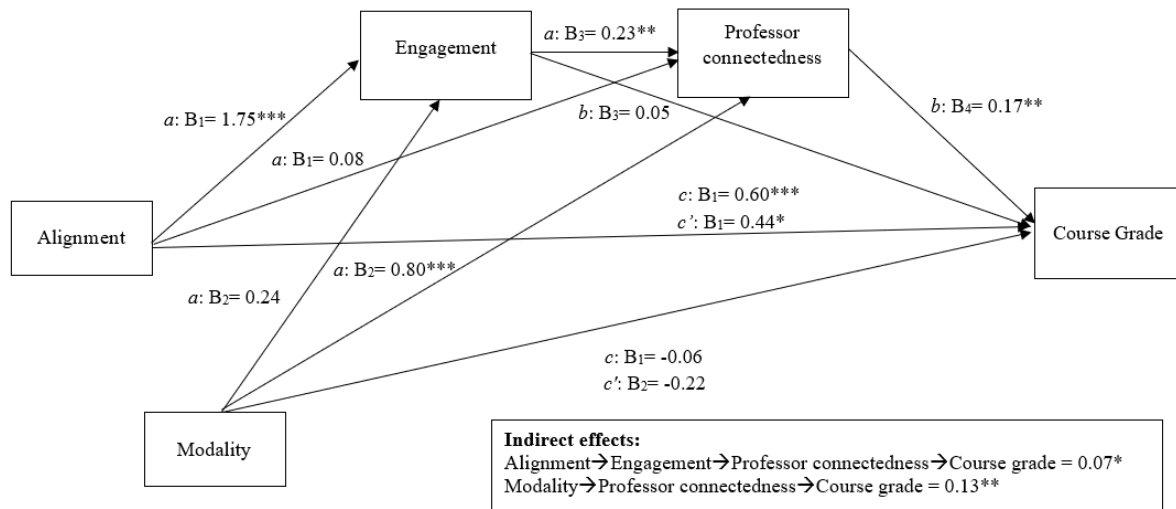
^eCovariate adjusted means are used for simple effects: Synchronous-Alignment (6.45), Synchronous-No Alignment (6.22), Asynchronous-Alignment (6.12), Asynchronous-No Alignment (5.32)

3.3 Mediation Analysis

Next, we use structural equation modeling (SEM) via PROCESS in SPSS Statistics to test our hypothesized mediating variables: Engagement, Professor Connectedness, and Student Connectedness. Student Connectedness is not found to have any mediating effect on the relationship between our independent and dependent variables using either Course Grade or Course Satisfaction. For this reason, we no longer discuss this potential mediating variable in our results for mediation analysis.

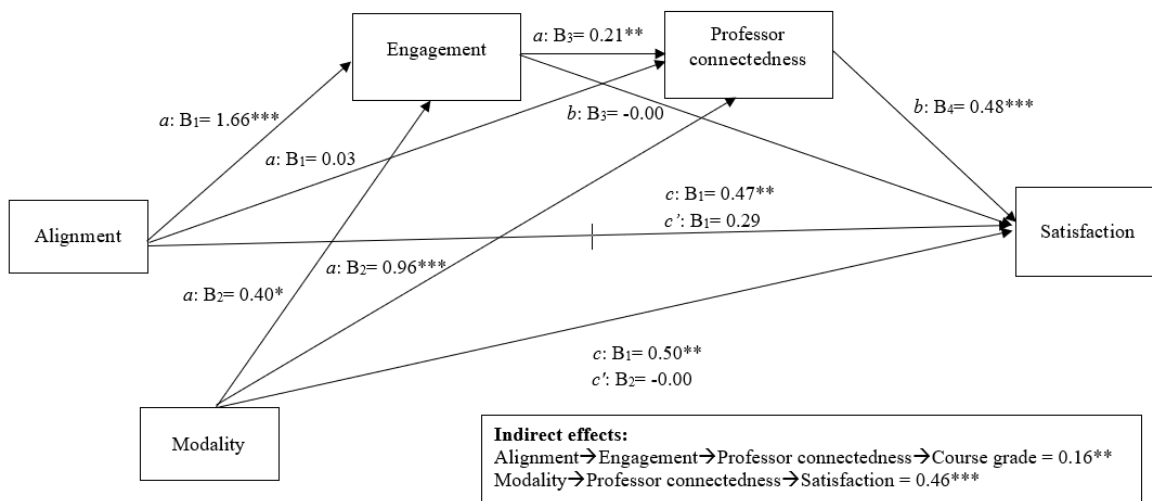
Figure 1 provides a visual representation of the model tested and presents the results of this analysis for Course Grade. We find partial mediation of Modality Alignment using the path: Modality Alignment to Engagement to Professor Connectedness to Course Grade. However, this path is only marginally significant and the coefficient, .07, can be interpreted as having only a very small impact on course grade. We also find that, though Course Modality had no significant direct effect on Course Grade in our original 2 x 2 ANOVA, there is a significant indirect effect of Course Modality on Course Grade through Professor Connectedness. The path tested was Course Modality to Professor Connectedness to Course Grade. This path was significant at the .05 level. Our results provide evidence that the mechanism through which Modality Alignment and Course Modality impact a student's grade is, at least in part, through the student's connection with the professor. We can interpret this as synchronous attendance increasing student performance because it increases the student's connection with the professor. Similarly, Modality Alignment increases grades because students who are aligned are more engaged during lecture, which leads to a belief that connection with the professor has increased.

A visual of the model and results for our mediation test using the dependent variable, Course Satisfaction, is provided in Figure 2. Professor Connectedness alone fully mediates the impact Course Modality has on Course Satisfaction and this path is significant at the .01 level. Professor Connectedness also fully mediates, through sequential mediation in combination with Engagement, the relationship between Modality Alignment and Course Satisfaction. We find that the full path for this sequential mediation is significant at the .05 level and explains how Modality Alignment affects Course Satisfaction through student engagement in lectures and student's connection with their professor.



The above figure depicts the coefficients of the conditional indirect effects of Alignment and Modality on Course Grade via the participants' Engagement and Professor Connectedness. The coefficients for the paths labeled *a* are from the following regressions: $Engagement = \alpha + \beta_1 Alignment + \beta_2 Modality + \epsilon$. $Professor\ Connectedness = \alpha + \beta_1 Alignment + \beta_2 Modality + \beta_3 Engagement + \epsilon$. The coefficients for the paths labeled *b* and *c'* are from the following regression: $Course\ Grade = \alpha + \beta_1 Alignment + \beta_2 Modality + \beta_3 Professor\ Connectedness + \epsilon$. The coefficients for the path labeled *c* is from the following regression: $Course\ Grade = \alpha + \beta_1 Alignment + \beta_2 Modality + \beta_3 Alignment * Modality + \epsilon$. Significance: 0.1=*, 0.05=**, 0.01=***.

Figure 1. Mediation analysis for Course Grade



The above figure depicts the coefficients of the conditional indirect effects of Alignment and Modality on Course Grade via the participants' Engagement and Professor Connectedness. The coefficients for the paths labeled *a* are from the following regressions: $Engagement = \alpha + \beta_1 Alignment + \beta_2 Modality + \beta_3 Age + \epsilon$. $Professor\ Connectedness = \alpha + \beta_1 Alignment + \beta_2 Modality + \beta_3 Engagement + \beta_4 Age + \epsilon$. The coefficients for the paths labeled *b* and *c'* are from the following regression: $Course\ Grade = \alpha + \beta_1 Alignment + \beta_2 Modality + \beta_3 Engagement + \beta_4 Professor\ Connectedness + \beta_5 Age + \epsilon$. The coefficients for the path labeled *c* is from the following regression: $Course\ Grade = \alpha + \beta_1 Alignment + \beta_2 Modality + \beta_3 Alignment * Modality + \beta_5 Age + \epsilon$. Significance: 0.1=*, 0.05=**, 0.01=***.

Figure 2. Mediation analysis for Satisfaction

4. Discussion and Conclusion

Our study examines several important predictors of student course outcomes. These predictors include the impact of synchronous versus asynchronous learning, attendance in the modality students believe to be most effective for themselves, engagement in lectures, and the perceived

connection they have to the professor. We test for direct effects of these variables on course outcomes and find results similar to those in other studies, specifically that synchronous learning and attendance alignment with the modality believed to be most effective both impact course grades and satisfaction.

However, our main contribution to the literature is the result found when analyzing potential mediation variables. Students' connection to their professor fully and directly mediates synchronous attendance on course satisfaction and, through sequential mediation in combination with student engagement, also fully mediates alignment of modality on course satisfaction and partially mediates alignment of modality on student grades. The positive correlation between connection to the professor and student grades and satisfaction and its mediating relationship with other explanatory variables could account for results in prior literature that show student satisfaction is lower in larger class sizes (Partners, 2020; Gurung & Stone, 2020) and that students who were required to attend in a modality they did not prefer showed more negative attitudes and study behaviors (Gurung & Stone 2020).

Our study is limited by the fact that (for good reason) we are not allowed to randomly assign students to different course modalities or alignment conditions and perform a true controlled experiment. While we believe our results to be informative for all topic areas, we realize that accounting students and accounting courses may have unique differences that limit the generalizability of our findings. We also recognize that students' beliefs about which modality is most effective for them may not be accurate, but we believe that perceived alignment is also interesting and important.

Regardless of modality (synchronous or asynchronous), or students' ability to attend the modality that is most effective for their learning, students and professors can improve course outcomes (course grades and course satisfaction) by increasing student-professor connection.

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Authors contributions

All authors contributed equally and were involved with study design, data collection and manuscript preparation. All authors read and approved the final manuscript.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Obtained.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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