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Student Preferences and Decisions for Online or In-Person Class Sessions in Blended Learning

James Max Christensen

A dissertation submitted to the faculty of Brigham Young University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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Online learning sessions are becoming increasingly common. In this study, we reviewed over 150 studies of online and blended learning, revealing that the factors that affect student preferences for online or in-person learning vary widely and compiled a table of these factors. They can be categorized as either learning preferences or current lifestyle conditions. To better understand these preferences, we implemented an intervention in which college-level engineering students were given the choice to attend either an online or in-person session for a class they normally attended in a different modality. We compared college students’ stated preferences with demonstrated attendance for online or in-person instruction. We surveyed approximately 150 undergraduate students from two different courses in engineering who participated in both in-person and online learning experiences. We conducted a pre and post survey, created based on the categories formed from our literature review. Data were analyzed using a paired sample t-test, Phi correlations, and structural equation modeling in order to determine the most salient combination of preferences that affect students’ choice to attend either an online or in-person class. Furthermore, this research specifically sought to understand why students’ stated preferences may or may not align with their demonstrated attendance for online or in-person learning.

Based on survey results, we used targeted interviews to understand student choices from 13 students whose choices did not match their stated preferences. We found that most students in our context of a typical in-person university prefer in-person instruction, but they also want some online class sessions if it is more convenient for them at the time. Through applying The Reasoned Action Approach and Model, we analyzed students’ stated preferences and compared these with their demonstrated actions. The analysis revealed that students’ self-prediction via a survey about whether or not they would attend an online class session was statistically significant at predicting their actual attendance, whereas stated preference for some online class sessions were not predictive. This finding suggests that preference-based surveys may not reliably predict students’ actions in regards to attending online or in-person class sessions. Instead, we recommend using a survey with an appropriate predictive question, which will allow universities and professors to determine if it will be worth investing the time and resources in to creating online class sessions.

Keywords: student preferences, intentions, behavior, blended learning, online learning
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TABLE OF CONTENTS

TITLE PAGE .................................................................................................................................. i
ABSTRACT .................................................................................................................................... ii
ACKNOWLEDGMENTS ............................................................................................................. iii
TABLE OF CONTENTS ............................................................................................................... iv
LIST OF FIGURES ....................................................................................................................... vi
LIST OF TABLES ........................................................................................................................ vii
CHAPTER 1: Introduction ............................................................................................................. 1
  Research Questions ..................................................................................................................... 4
  Definition of Terms ..................................................................................................................... 4
    Stated vs. Demonstrated Preferences ...................................................................................... 5
    Student Behavior ..................................................................................................................... 5
CHAPTER 2: Review of Literature ................................................................................................. 6
  Literature Review Methods ......................................................................................................... 8
  Literature Review Findings ......................................................................................................... 9
    Reasons Students Prefer In-Person Instruction .................................................................... 10
    Reasons Students Prefer Online Instruction ....................................................................... 13
    Prefer a Variety of Online and In-Person for Learning ........................................................ 15
    Student Preferences, Intentions, and Behavior to Attend Blended Online Class Sessions... 21
  Conclusion of Literature Review .............................................................................................. 22
CHAPTER 3: Method .................................................................................................................... 26
  Participants ............................................................................................................................... 27
    Group One ............................................................................................................................ 28
LIST OF FIGURES

Figure 1  Students’ Expressed Preference for Online vs. In-Person Learning (2007) ..............18
Figure 2  Students’ Expressed Preference for Online vs. In-Person Learning (2019) ..............19
Figure 3  Reasoned Action Approach / Theory of Planned Behavior ..............................................26
Figure 4  SEM Diagram Using Standardized Beta Values ..........................................................39
Figure 5  Resultant Reasoned Action Approach / Theory of Planned Behavior .......................61
LIST OF TABLES

Table 1  Factors That Affect Students’ Preference for Online or In-Person Learning ............24
Table 2  Factor Loadings Results From the Final EFA ..........................................................35
Table 3  Results From the Final CFA ................................................................................36
Table 4  Results From the Final SEM ...............................................................................38
Table 5  Phi Coefficient Table of Online vs. In-Person Predicted vs. Actual ..................41
Table 6  Paired Sample T-tests for Pre and Post-Surveys ..................................................43
Table 7  Mean Level of Importance/Impact to Participate Online ..................................45
Table 8  Phi Coefficient Table of Definitions of ‘Online’ Pre-COVID and Post-COVID ......47
Table 9  Phi Coefficient Table of Definitions of ‘Online’ Pre-Survey and Post-Survey .......48
Table 10 Percent of Blend Preferred (N = 50) ...................................................................49
Table 11 Gender and Preferred Online Delivery Method ..................................................50
Table 12 Gender and COVID-19 Impact on Learning Preferences .................................51
Table 13 Crosstab Statistics for Pre and Post-Survey Preferences vs. Attendance ..........53
Table 14 Students Willing to be Interviewed ....................................................................54
CHAPTER 1

Introduction

Blended and online learning enrollments in higher education have steadily increased over a 14-year period (Seaman et al., 2018). For example, Kimmons (2020) reviewed the titles and abstracts of the top 15 educational technology journals since 2015, revealing that online and blended learning was the most prevalent topic in the past five years. Online learning has steadily grown in recent years and is poised to potentially become even more prevalent due to conditions spurred by educational responses to the COVID-19 virus (Bai et al., 2020). Consequently, online blended learning may become increasingly common. *Online blended learning* refers to the online portions or sessions of an otherwise blended course. Despite its growing popularity, many professors remain uncertain if online blended learning is as good as in-person learning (Barril, 2017) even when research has demonstrated that online and in-person modalities can be equally effective and satisfaction levels can be similar (Neuhauser, 2002). This remaining uncertainty also drives the question if it would be beneficial and worth the effort to create online class sessions for a typical in-person university, especially with COVID-19 like conditions.

College students have generally been positive toward online learning. Loftus (2013) found that 70 percent of students prefer some online blended class sessions to the traditional all in-person approach (p. 43). Christensen (2016) also found that 75% of students stated that they wanted blended learning with online class sessions. However, despite students’ stated preference to participate in online blended experiences, he found that only a third of students actually followed through on this stated preference for online learning, attending in-person sessions over the offered online blended sessions. Clearly, there are factors at play, such as learner preferences and circumstances, that mitigate students’ decisions to participate in either online or in-person
classes. To meet the growing needs of online and blended learning, understanding students’ preferences toward online blended learning may help universities plan accordingly. If we could predict a students’ participation from their preferences, this could also help professors and universities plan appropriate online learning sessions to meet more students’ preferences.

Preferences are important to understand so that universities can meet the needs of the student population (Jaggars, 2014; Hood, 2013; Waddoups & Howell, 2002). As early as 2002, Waddoups and Howell refer to providing online classes for students to meet their needs. Hood (2013) even advocates the following:

Providing a well-designed blended learning buffet from which students can choose their preferred means of access to different learning activities (e.g., lectures versus tutorials) has the potential to better engage students by providing a better match for their particular approach to learning. (p. 11)

For example, in some cases students want online classes for easier topics, but prefer in-person sessions for more difficult or important subjects (Jaggars, 2014). If a student prefers all in-person or some online class sessions, the university should consider that desire. Similarly, if students prefer online classes, but are not given that option, they may attend another university, which may help explain increases in online enrollments at universities that are completely online as well as the one million drop in on-campus enrollments from 2012 to 2015 (Allen & Seaman, 2017). On a similar note, if students state via a survey that they prefer or are interested in online class sessions, perhaps universities should consider that student preference. However, Christensen (2016) found that students’ stated preferences to online or in-person may not align with their actual attendance even when students are satisfied with the online class session. Hood (2013) also said, “Until more is understood about how student characteristics influence the
choices they make and how they then interact with those choices to affect achievement, blended learning cannot be well implemented” (p. 12). Further, she also added “Future research needs to extend this work to examine these individual characteristics in relation to actual behaviour” (p. 12). If student surveys about preferences, demographics, or characteristics could predict online or in-class attendance (behavior), this could help universities and professors plan accordingly and perhaps implement blended learning even better.

Preferences may be related to motivations, intentions, and ultimately may lead to participation or attendance (Yeung et al., 2016). Preferences may also be related to students’ attitudes, computer self-efficacy, perceived ease of use, quality, and more (Tselios et al., 2011). Research has revealed a significant amount in regards to students’ preferences towards online or blended learning, which our literature review will expound upon below (Abdelmalak, 2014; Clark et al., 2016; Cuthrell & Lyon, 2007; Song, 2004; Tempelaar et al., 2012). Most research on students’ preferences for online blended learning depends on preference surveys but fails to track whether or not students follow through on their preferences. This dissertation sought to better understand how student preferences might provide insights on why a student might express interest and intention to participate in online classes and why a student’s stated preferences for online blended learning may or may not match their demonstrated actions of attendance. To look at that discrepancy, we also reviewed the literature in regard to student preferences to online blended learning and actual demonstrated behavior through attendance.

Student preferences to online versus in-person learning experiences remain largely inconclusive (Barril, 2017). To better understand these preferences, we surveyed students about their preferences for wanting learning in-person or online and then observed if they acted on those preferences as shown by student choice (as demonstrated by actual attendance when both
online and in-person options are available). Furthermore, this study specifically sought to understand why students’ stated preferences may or may not align with their demonstrated preferences toward online or in-person learning and what are the reasons students prefer one delivery method over another. This research allows us to make recommendations to universities on how they might best meet student needs and preferences, both those that are explicitly stated and those that are implicitly acted upon.

**Research Questions**

The following are our three main research questions for this study:

1. What are college students’ stated preferences for online vs. in-person sessions in a blended online course?
2. When students’ actions contradict their stated preferences for choosing online learning, what reasons do students give for this contrary action and can we predict it?
3. Have students’ learning preferences been affected by COVID-19 conditions? If so, how and in what ways?

**Definition of Terms**

Blended learning is defined most commonly in the literature as combining some online learning with offline or in-person learning (Boelens et al., 2015). That definition will be used for the context of this paper while looking at blended learning, both the in-person and online aspects. *Online blended learning* will refer to the online aspect of blended learning for a mix of class sessions with in-person instruction as well. For the purposes of this study and to achieve depth on student preferences, we examined students’ preferences for both online blended learning and pure online learning in our summary of findings in Table 1 below. Our definition of online means that students can attend the class session remotely (not in-person), which could be
synchronous or asynchronous. That being said, we understand that an online Massive Open Online Course (MOOC) is very different than a blended online class session, but preferences of students could overlap in both contexts. A completely online course is also very different than a blended online class session. We also recognize that online learning can be delivered either asynchronously (on-demand) or synchronously (live). In our surveys, questions, and interviews, we made those distinctions clear.

**Stated vs. Demonstrated Preferences**

For the purposes of this paper, when we refer to ‘student preferences’ or ‘stated preferences’ we mean students’ preference for online or in-person classes as they reported via surveys, which might also be titled student interest. In contrast, ‘demonstrated preference’ or ‘actual attendance’ refers to the actions that the student took by participating in either an online or in-person class session.

**Student Behavior**

In the context of this paper, the term ‘behavior’ refers specifically to the acted-on choice based on demonstrated preference via attendance of either the online or in-person offering. We are not referring to any other behaviors other than the behavior of attending the course (the demonstrated act thereof).
CHAPTER 2

Review of Literature

Stated preferences may be a good indicator of student interest. Knowing student behavior toward stated preferences in online and blended learning versus in-person learning allows universities to deliver content in modalities that students want in terms of online or blended learning. For example, “With 10-15% of undergraduate engineering courses in a blended teaching format, Dr. Cramer at UW, Madison has found that 70 percent of his students prefer the blended to the traditional approach” (Loftus, 2013, p. 43). Christensen (2016) gathered similar data via surveys, finding 75% of engineering students stated that they would prefer some blended online class sessions.

To better understand the relationship between student preference (interest) and the way they act on that preference (behavior), this review examined why students participate in and may say they prefer online and blended learning even if they may not choose it when given the option. Additionally, since sometimes students do not act on their stated preferences, this review explored what research states about why students prefer or choose online over in-person learning. In this literature review, we discuss student preferences and experiences of blended and online learning, including what they like and dislike, and why students may or may not choose blended or online courses. Additionally, we looked at intentions and behavior in relation to online and blended learning attendance. There is a lack of literature that distinguishes between people’s preferences for online blended learning versus the in-person learning done in a blended class. Therefore, to inform more broadly, we looked at preferences for online only and in-person only courses. We acknowledge that this may not be a perfect representation, but recognize that
information about students’ preferences for completely online courses may provide valid
information about which preferences most impact students’ decisions to learn online.

We also recognize that online, in-person, and blended learning can be just as good in
terms of satisfaction and assessment, but also varies in the literature with some saying one is not
as good and others saying another is better, which may be related to the actual design and is not a
focus of this research (Owston & York, 2018; Castaño-Muñoz et al., 2014). For example,
Castaño-Muñoz et al. (2014), found that it might be the interactive aspects of online sessions that
made the blended course more effective. Finding the perfect balance of online and in-person for
a blended course is also not the main focus of this research; however, Owston and York (2018)
found that even across a wide range of subjects students’ perceptions and performance were
improved with a specific balance of at least one-third to one-half of the in-person time being
replaced with online activities. Owston and York (2018) also said the following:

Simply devoting more time to online activities in and of itself will not necessarily result
in improved perceptions and performance. The activities must be designed so that they
promote student-to-student and instructor-to-student interactions if the affordances of
blended learning are to be realized. (p. 31)

Deciding whether to blend in-person courses with online class sessions is an important question
when designing blended learning. Our research is primarily focused on if one should create
blended instruction based on student preferences and intentions for a traditional in-person
university with a focus on why students may or may not attend an online class session. For the
intention aspect of the literature, we also looked at student preferences, intentions, and behaviors
toward blended learning.
Literature Review Methods

To identify why students might choose online or in-person courses, we took a multi-phased approach. We first searched “student demonstrated preference to blended learning” and then “demonstrated preference” AND “blended learning” on the ERIC database, which both yielded zero results. To widen the review of the literature and focus specifically on preferences first, we searched the ERIC database for “student preferences to blended learning,” which returned nine results, all of which we reviewed. We also searched ERIC for “student preference” and “blended learning,” which we limited to 2014 through 2020 for recency and relevancy since online learning has changed significantly and it yielded 52 results all of which we reviewed. We also used the ERIC thesaurus to replace the word “preferences.” The thesaurus provided one relevant term that was similar to student preferences, which was “positive attitudes.” When searching for “student positive attitudes to blended learning,” four additional results were yielded, which we included in the review. We searched “student attitude” AND “blended learning,” which yielded 1570 results. To narrow that search because most of the topics were not relevant, we then searched “student attitudes to blended learning” and found another 27 results, which we included in the review. Additionally, we widened our search to “student preferences” AND “online learning,” which yielded 359 results. To narrow that search we focused on the search “students preferences to online learning” and found 67 articles. We limited this last search of 67 articles to a narrower subset based on dates from 2014 through 2020 for recency and relevancy because online learning has changed significantly over the last several years. This resulted in 22 articles, for a running total of 114 articles that we included in this review.

At this point, we were reaching a point of saturation finding the same results in regards to student preferences toward online and blended learning (Bowen, 2008). During this review, we
used Bowen’s (2008) definition of saturation and made a list of preferences and categorized them in Table 1. If we could not find any evidence of student preferences in the introduction or conclusion, we also used the search/find feature to look for the word “preference” throughout the paper and examined the extent to which this referred to the modality of instruction.

In the process of reviewing the literature, we realized it might be useful to look at student intention and preferences in regards to participating in online blended learning. Therefore, we further reviewed the literature on student preferences, intentions, and behavior to blended learning. Since we found zero results, as mentioned above, when searching for “demonstrated preference” AND “blended learning,” we also wanted to review the literature in more depth and looked at other terms related to students’ intention and behavior to blended learning, especially in relation to student preferences. We searched ERIC for “preference” AND “intention” AND “blended learning,” which yielded three results. Then, we searched ERIC for “preference” AND “behavior” AND “blended learning,” resulting in 14 articles. We continued the review and searched ERIC for “intention” AND “behavior” AND “blended learning,” which yielded another 14 results. We also searched ERIC for “preference” AND “attendance” AND “intention” AND “online,” which resulted in five articles that we reviewed. This resulted in 36 additional results (a few of which were the same articles), for a combined total of approximately 150 results that we reviewed, which we discuss in the literature review findings section below.

**Literature Review Findings**

In this findings section, we address student preferences to blended online learning and student choices related to online learning writ large. Some of the findings also come from studies that are completely online courses as they were in the results and seemed relevant. Additionally, this section provides insights as to why students indicate that they prefer to participate in blended
online learning. We want to highlight that each study’s conception of what constitutes “online learning” may vary widely. Likewise, it may seem unfair to generalize all in-person or online blended learning into a single group. After all, as teachers, instructional designers, and curriculum developers alike will all attest, it is ultimately the design of the course that directs and guides a student’s learning (Castaño-Muñoz et al., 2014). A service-oriented experiential design to in-person learning would be wildly different than a lecture-based design. However, when choosing a course, the design is not often what is presented to learners, but rather its modality. And it may be these descriptions that students base their preferences on.

We recognize that each of the examples below are very context-specific and may vary widely in terms of satisfaction, assessment, design and delivery method; however, we still find it useful to identify examples of a broad range of student preferences for online class sessions. We organized this review into three sections: (a) reasons students prefer in-class learning, (b) reasons students prefer online learning, (c) reasons students prefer both types of instruction, and (d) student intentions and behavior to attend blended online class sessions. Even though we organized our review into these four sections, to provide categories and context, the main purpose of each of these sections was to discuss why they preferred online or in-person and their related preferences that may have impacted their intentions or behavior to attend online or in-person class sessions in a blended environment. Furthermore, as we conducted the review, we compiled a list of all of the reasons as shown in Table 1.

**Reasons Students Prefer In-Person Instruction**

Faculty resistance to offering online learning sessions has been a challenge from a long-held standard of in-person learning (Giannoni & Tesone, 2003). However, Owston and York (2018) have found that students favor blended learning and also perform better with blended
class sessions. Our review of the literature and our research sought to understand what modality students prefer and why. Interestingly, Owston and York (2018) found that students prefer blended learning, which means that students want in-person instruction too.

Several studies in our review found that students largely prefer in-person over online classes. For example, Hamad (2017) found that students preferred in-person over online class sessions in a blended context using Blackboard Collaborate. They found that 12 students preferred traditional class, two students preferred online, and eight were undecided. The quality of the course design could have impacted their responses, but researchers indicated that the students were satisfied with it. Tawil et al. (2013) also found that students in engineering do not prefer e-learning (defined as using mathematics websites) or the online learning system (WILEY-PLUS) they created for blended learning. Tawil et al. did not discuss the main reasons for that other than they prefer many other methods such as reading textbooks, lecture notes, tutorials, exercises, and talking with the lecturer, tutors, or friends more than e-learning. This could have been attributed to the quality of the e-learning, but the article does not talk about quality or satisfaction. In 2018, Alvarado-Alcantar et al. found similar results and examined students’ modality preferences; they noted that blended online was less preferred via student reporting (for both those with and without disabilities). Preference was determined via a student self-reported survey and was not demonstrated and they said it was unclear why. The authors made a call for more research on why online learning was not preferred in a blended course.

Several studies helped shed light on Alvarado-Alcantar et al.’s call. For example, one reason students prefer in-person classes is because they want to feel a connection to campus, to other students, with instructor-student interaction, and with a teacher that is present (Jaggars, 2012). These preferences could apply to online as well, such as wanted teacher presence and
interaction. Students’ preferences could vary by how interested they are in or the importance of the topic to them and therefore could propel them toward believing they would experience a richer in-person experience instead of an online experience (Jaggars, 2012). Personality may be another key factor in modality choice. Kassner (2013) found that extroverts prefer in-person class sessions while introverts prefer online sessions. Kassner also encouraged common-sense approaches to blended online learning, using the best pedagogies for both realms. Some students preferred in-person courses for cooperative learning or for “when learners have to agree on a shared meaning and/or to come up with a joint solution” (Paechter & Maier, 2010, p. 296).

Other factors such as a student’s course load or employment also impact their preferred modality. The increase in the amount of university course credits taken also decreased the likelihood of a student stating they were “very likely” to take an online course; “this result may be related to the amount of employment per week as students with careers may not have as much time to devote to taking classes” (Mann & Henneberry, 2012, p. 7). In other words, those who are not working full-time or at all and are already on a campus can take more credits in-person.

For students who are working full-time or even during COVID-19 situations along with other student circumstances, scheduling flexibility can be very important (Ghazi-Saidi et al., 2020). Ghazi-Saidi et al. (2020) found that synchronous courses can be more convenient and effective because of that flexibility in time and place. Some studies suggest that the synchronous aspects may not be as important as to achieve competencies in online learning (Martin et al., 2020). Martin et al. (2020) found that out of synchronous, asynchronous, or blended modalities, students rated asynchronous as the most important for them in terms of course design, time management, course communication, and technical competence. They also found that students felt the most competent with blended learning as opposed to either completely online with
synchronous or online with asynchronous (Martin et al., 2020). Therefore, the flexibility of asynchronous appears to be very important to students and blended learning is desired.

**Reasons Students Prefer Online Instruction**

Research has likewise revealed various reasons why students prefer online learning over its long-standing counterpart. Factors such as age, time constraints, work, previous experiences, emotions, and many other factors influence whether a student prefers online learning or not. For example, often undergraduate students that are older, in terms of age and not year of school, choose online learning over in-person learning for reasons related to work and family; this is not a cut and dried distinction, however, as other researchers have found that younger students (e.g., freshman and sophomores) may also be “more likely than junior and senior students to select ‘very likely’ with respect to taking an online course, and undergraduate students were more likely than graduate students to select ‘very likely’ with respect to taking an online course” (Mann & Henneberry, 2012, p. 7). For the younger audience, this choice could be driven by younger students thinking that the online courses are easier (Mann & Henneberry, 2012, p. 7). Thus, while both older and younger learners may express a preference for online blended learning, their motives may be entirely different.

Employment constraints reveal that students that work more hours are more likely to take online courses; for example, as students worked closer to 30 hours per week, they were more likely to select ‘very likely’ to take an online course (Mann & Henneberry, 2012). Another study found that students that chose online over traditional courses worked on average 15 hours per week versus six hours per week respectively (Tichavsky et al., 2015). These studies suggest that students who work more hours prefer online learning, presumably because they need greater flexibility because they cannot attend a traditional course during normal working hours.
Many students choose online because they want the flexibility and convenience due to their need to work or care for their children, transportation, less interruptions, no time taken for questions by others, learning preferences, and comfort of being at home (Alzahrani & O'Toole, 2017; Jaggars, 2012). In 2017, Alzharni and O’Toole found that experience variables affected whether students preferred blended online learning. For example, experience such as age, study year, and attitudes towards the Internet had positive attitudes toward blended online learning. This study did not clearly state if it was a voluntary online survey (not demonstrated) and there were no females in this study. This gender skewing was because it was a male school only.

Previous experience and students’ emotional response to this experience is another potential and important influencer. Tempelaar et al. (2012) found that “emotions appear to have a moderately strong effect on a student's preference for online learning” (p. 161). While the authors do not define precisely what they mean by “emotions,” we interpreted this to mean a student’s affective response to in-person or online class sessions. The author did refer to them as learning emotions and achievement emotions as well. If they had a “bad” experience with a course, they were likely to associate that emotion of dislike with online blended learning in general. Not only can emotions have a strong effect, but good experiences with online learning can also impact emotions. For example, “positive learning emotions contribute to becoming an intensive online learner, as do positive effort beliefs, as distal antecedents. Negative learning emotions and negative effort beliefs appear to form significant obstacles for online learning” (Tempelaar et al., 2012, p. 169). Simply stated, a perceived negative experience with online learning in any of its forms may adversely affect students’ preferences toward online learning writ large (Muilenburg & Berge, 2005). Curiously, the same standard may not to apply to in-
person courses. Though most students admit to having a poor prior experience with in-person
learning, they do not generalize all in-person courses to be equally poor.

The overall satisfaction as rated by the student is important for continued use of a
blended learning environment (Seman et al., 2019). Seman et al. (2019) found that instructor
quality and course quality are important predictors of student overall satisfaction. Therefore,
designing a blended course of high quality may have direct effects on students’ perceptions of
online blended learning. In 2009, Toon et al. found that 350 students who took six weeks of
online e-learning preferred a more traditional classroom. Interestingly only 12 of 350 students
were very negative about the online learning. Some thought the purpose of e-learning was to
reduce costs, but that was a misconception. Students expressed that they did not prefer online
learning because “there were not enough exercises…, and worked solutions” (Toon et al., 2009,
p. 235). Students also wanted more lectures and the online study materials were difficult. Just as
with in-person learning, these reasons are directly related to the design and not the modality of
the online course. This highlights the difficulty of comparing grouping all online blended
learning into a single category. However, as Tempelaar et al. (2012) demonstrated, one poorly-
designed online blended experience may prevent students from participating in other more well-
designed online sessions regardless of the fact that they may be designed differently. This may
be a case where perception of past experience influences students’ reality.

**Prefer a Variety of Online and In-Person for Learning**

Fortunately, there is a case to be made for the effective blending of online and in-person
sessions. In regards to the perfect blend of synchronous or asynchronous, multiple studies have
called for this so that universities “can align their strategic goals to be successful at facilitating
al., 2013). Owston and York (2018) have found that students perceive online learning more favorably when between a third to half of the course is offered through online blended learning sessions. That suggests that students want two-thirds to a half of the instruction potentially in-person. As early as 2003, Hatherley-Greene found that of 438 students, or 63% of participants, expressed a preference for both in-person and blended online learning. Owen (2010) added that students feel enthusiastic and empowered from blended online learning. A mixed modality offers flexibility, freedom, and practice.

A principal reason students may prefer a mix of choices of both online or in-class sessions is that blended learning may provide a beneficial way to “accommodate student needs and their life circumstances, increase student access to course content and instruction, differentiate instruction to meet adult students' different learning styles and strategies, and give students a sense of control over their learning” (Abdelmalak, 2014, p. 1). Autonomy can be enabled or disabled by the design and should not be tied to modality, but students not only want autonomy they also prefer a mix of modalities for various reasons as mentioned above. Additionally, students may prefer the mix of both online and in-person class sessions and can “not only make students aware of preferences they hold in instruction, but also raises an awareness of the importance of incorporating all modes of instruction in the classroom” (Cuthrell & Lyon, 2007, p. 361). All modes of instruction are not optimal and the quality of the design is important (Owston & York, 2018). For example, Owston and York (2018) found that students in a 50% blend will perform the best in comparison to three other blends studied.

The literature shows that students at a traditional in-person university prefer blended online learning. For example, Loftus (2013) provided case studies of engineering faculty from Vanderbilt, University of Wisconsin, Madison, Purdue, University of California Irvine, and
Seattle University. He described how they use blended online learning. His focus is positive towards online learning and therefore he may have a bias towards blended online learning. For example, we did not find any counterpoints or negative aspects toward blended online learning in his research. He discussed the positive benefits of blended online learning in these case studies. In one of his case studies, 70% of students preferred blended online (Loftus, 2013). Additionally, other studies report similar findings that 72% of students “expressed a preference for a partially inverted classroom” (Clark et al., 2016, p. 7). An inverted classroom may not be the same as blended learning, but does have some similarities such as online video lectures before class. Ozan (2007) also found that a significant amount of students state that they want and prefer online learning, though there may be more that prefer in-person courses (see Figure 1). A more recent study by Gierdowski (2019) found that 56% of undergraduate students in the United States prefer some online blended (see Figure 2).
Figure 1

Students’ Expressed Preference for Online vs. In-Person Learning (Ozan, 2007)

Student Preferences to online (N ~ 2000)

- 46% Prefer online
- 37% Equal or no preference
- 17% Prefer face-to-face
Many factors determine if students like, love, or dislike blended online learning, including the course design, their own motivation, their own comfort level with online technologies, and their own schedule and time availability (Song, 2004). These aspects may determine the success of their online learning. All of these preferences are expressed via surveys but lack a demonstrated response via choice based on action.

Sometimes previous experiences or emotions may determine a student’s preference. For example, “profiling a learner without taking into account the emotional aspects… may hinder the learner's progress” (Suero Montero & Suhoenen, 2014, p. 165). Koper’s (2015) study found that
students may have other factors that determine their preferences for wanting online or in-person classes including: (a) Collaboration (group work versus self-study), (b) pacing (fixed time schedule versus flexibility in time and tempo), the (c) degree to which the study has a practical orientation (meaning practice or hands-on versus theoretical), (d) the degree of proactive (versus reactive) teaching and a (e) preference for in-depth learning versus superficial learning (p. 307).

Students may also “prefer online learning components for the dissemination of information” (Paechter & Maier, 2010, p. 296). This could be for a variety of reasons and could also be a design decision. It could also be related to being able to learn at one’s own pace according to individual readiness to disseminate information at will. According to Tseng and Walsh (2016), blended online learning potentially supports diverse learning styles (or delivery methods) and can foster social interaction in diverse ways and in both online and in-person contexts. They state that blended online learning is effective and is being adopted. In their study, they had 26 students participate in the in-person course while 26 others participated in the blended online option. They found that those who participated in the blended online learning said they wanted more and that they would recommend it to friends.

One of the arguments in favor of blended online learning is the ability to adapt to individual student needs (Ciani et al., 2008). Some blended online courses that have online aspects of the class have successfully demonstrated that allowing students to choose which elements are blended online benefits this adaptability and increases student motivation (Ciani et al., 2008). We recognize that the modality itself is not the only determining factor but many design decisions come into play. “Both choice and autonomy are important in facilitating students’ intrinsic motivation, supporting Reeve et al.’s (2003) position: ‘[I]n practice, the provision for choice is best considered as one contributing element within a larger autonomy-
supportive … classroom climate” (p. 389)” (Reeve, 2003; Ciani et al., 2008, p. 637). Although design decisions, providing autonomy and choice for blended online learning options could improve intrinsic motivation as Ciana and Reeve state. In addition to choice in offering the blend, in some cases that choice also improved assessment outcomes.

Autonomy and preferences in general as well as satisfaction can determine student choices toward online options. For example, requiring a student to take a course online may make a difference in their satisfaction levels. In one study, if an online course was required, the mean satisfaction was 4.25 out of seven, seven being extremely satisfied. A similar online course designed by the same company was elective (not required), the mean satisfaction was 5.67 out of seven (Smart & Cappel, 2006, p. 209), possibly demonstrating that choice may influence preference. This could support the idea that universities should allow students to choose their modality, online or in-person, but caution must be used when comparing satisfaction levels of a required online course to an optional online course that was different. A serious caveat is that these were different courses and one could have been designed not as well as its counterpart. To summarize our findings as to why students may prefer online or in-person, we categorized them into two groups ‘preferred learning style’ and ‘current lifestyle’ (see Table 1 below).

**Student Preferences, Intentions, and Behavior to Attend Blended Online Class Sessions**

Hood (2013) found that motivation, attitudes, and technological considerations may affect student intentions to attend online or in-person in blended learning. Hood (2013) and Ajzen (2002) also found that intentions are the strongest predictors of behaviors. Her study did not look at actual behavior and she called for future research in this area.

Yeop et al. (2019) looked at faculty intentions and beliefs to predict the actual behavior of implementing blended learning. We also sought to find out why those initial intentions may
not be the same as the actual behavior for students attending online or in-person in a blended course. Yeop et al. (2019) found various beliefs (such as if they think it will be helpful, useful for learning, meet their goals, etc.), significantly affected intention and behavior, with some beliefs and intentions being predictive while others were not predictive depending on years of experience and workload level. One prediction they found was that teachers with more experience with teaching have a higher intention and higher use of actually implementing blended learning. Tangentially, our study seeks to see if student experience (as opposed to teacher experience), such as the hours they currently are working, lifestyle, background, preferences, and intention have an impact on actual attendance (use) of online or in-person class sessions.

**Conclusion of Literature Review**

Ultimately our review of the literature revealed a myriad of reasons why students might prefer one modality over the other, including employment circumstances, age, past experiences, course design, and others. Preference toward a learning modality is a complex confluence of many different factors. Student satisfaction is important and should be considered but must be carefully evaluated on how it is measured, as the degree of choice that students have in choosing the modality significantly affects their perception of the course in that modality. Similarly, caution must be used when reporting student preferences toward blended online learning. Many of the preferences in the studies that we reviewed referred to what might be called instructional design or course quality issues that could affect in-person classes as easily as online classes. Despite this caveat, it is important to attend to students’ preferences to better inform course offerings and design.
While there may be dozens of reasons students express a preference for one modality over the other, we found that these reasons fall into one of two categories: (a) learning preferences or (b) current lifestyle conditions (see Table 1). Learning preferences are varied and entail a variety of factors. These can be further broken into seven different sub-categories: affect, course design, learner preference, personality type, previous experiences, social factors, and technical skill. Current lifestyle conditions deal with the way students live at the moment they take the course. This involves eight different sub-categories: employment considerations, time availability, timing in life, life situations, property availability, financial resources, family circumstances, and social factors. One preference is not limited to a single modality, but a mixture of both appear to influence students’ decisions for any modality they might prefer.
Table 1

Factors That Affect Students’ Preference for Online or In-Person Learning

<table>
<thead>
<tr>
<th>LEARNING PREFERENCE</th>
<th>CURRENT LIFESTYLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Affect (Internal)</strong></td>
<td><strong>Family Circumstances</strong></td>
</tr>
<tr>
<td>Positive learning emotions = intensive online learner</td>
<td>Caring for children</td>
</tr>
<tr>
<td>Negative learning emotions = not online</td>
<td>Children at home</td>
</tr>
<tr>
<td>Emotional states</td>
<td></td>
</tr>
<tr>
<td>Less interruptions (QAs)</td>
<td><strong>Time Availability</strong></td>
</tr>
<tr>
<td>Enjoy QAs of others</td>
<td>Scheduling</td>
</tr>
<tr>
<td></td>
<td>Time availability</td>
</tr>
<tr>
<td></td>
<td>Flexibility in time and tempo (BOTH)</td>
</tr>
<tr>
<td><strong>Course Design (External)</strong></td>
<td><strong>Timing in Life</strong></td>
</tr>
<tr>
<td>Autonomy</td>
<td>Year in school</td>
</tr>
<tr>
<td>Choice</td>
<td>Age</td>
</tr>
<tr>
<td>Proactive vs reactive learning</td>
<td>Older and prefer online</td>
</tr>
<tr>
<td>Adaptivity</td>
<td></td>
</tr>
<tr>
<td>Pacing</td>
<td></td>
</tr>
<tr>
<td>Flexibility in time and tempo (BOTH)</td>
<td></td>
</tr>
<tr>
<td>Dissemination of information</td>
<td></td>
</tr>
<tr>
<td>Required vs choice (if elective = higher satisfaction)</td>
<td></td>
</tr>
<tr>
<td>Videos</td>
<td></td>
</tr>
<tr>
<td>Interactive</td>
<td><strong>Employment Considerations</strong></td>
</tr>
<tr>
<td>Live (synchronous)</td>
<td>Work full-time</td>
</tr>
<tr>
<td>Non-live (asynchronous – on-demand)</td>
<td>Work ¾ time</td>
</tr>
<tr>
<td></td>
<td>Work part-time</td>
</tr>
<tr>
<td></td>
<td>Students who work more = want online</td>
</tr>
<tr>
<td><strong>Learner Strategies (Internal)</strong></td>
<td><strong>Life Situations</strong></td>
</tr>
<tr>
<td>Learning tactics</td>
<td>Life circumstances</td>
</tr>
<tr>
<td>Sense of control</td>
<td>Permanent or chronic health situation</td>
</tr>
<tr>
<td>Motivations</td>
<td>Temporary health situation</td>
</tr>
<tr>
<td>Depends on the topic (prefer richer experience for important topics)</td>
<td>Convenience</td>
</tr>
<tr>
<td>In-depth learning vs superficial learning</td>
<td>Disability</td>
</tr>
<tr>
<td>Some might think online is easier</td>
<td>Languages known</td>
</tr>
<tr>
<td></td>
<td>Environmental factors</td>
</tr>
<tr>
<td></td>
<td>Already on campus</td>
</tr>
<tr>
<td><strong>Personality Type (Internal)</strong></td>
<td><strong>Property Availability</strong></td>
</tr>
<tr>
<td>Introverts prefer online</td>
<td>Transportation</td>
</tr>
<tr>
<td>Extroverts prefer in-person</td>
<td>Comfort of home</td>
</tr>
<tr>
<td><strong>Previous Experiences (Internal)</strong></td>
<td><strong>Financial Resources</strong></td>
</tr>
<tr>
<td>Students may over-generalize all online from one poor online experience</td>
<td>Cost</td>
</tr>
<tr>
<td>Past in-person experience is comfortable because it’s familiar.</td>
<td>Income level</td>
</tr>
<tr>
<td></td>
<td><strong>Social Factors</strong></td>
</tr>
<tr>
<td></td>
<td>Desire to meet people</td>
</tr>
<tr>
<td></td>
<td>Desire for marriage</td>
</tr>
<tr>
<td></td>
<td>Desire to be with people</td>
</tr>
<tr>
<td></td>
<td>Desire to be with professor</td>
</tr>
<tr>
<td><strong>Social Factors (External)</strong></td>
<td></td>
</tr>
<tr>
<td>Collaboration (group work)</td>
<td></td>
</tr>
<tr>
<td>Self-study (not group work)</td>
<td></td>
</tr>
<tr>
<td><strong>Technical Skills (Internal)</strong></td>
<td></td>
</tr>
<tr>
<td>Comfort levels with online technologies</td>
<td></td>
</tr>
<tr>
<td>Personal skills or abilities</td>
<td></td>
</tr>
</tbody>
</table>

This review has revealed a number of factors that course designers might consider when deciding which modality is best for their students. Research indicates that students say that they
want some blended online learning that includes online instruction (Clark et al., 2016; Loftus, 2013). One revealing insight from our investigation into reasons students prefer one learning modality over the other was that the majority of current research only reports a snapshot of preferences but fails to follow these through to student action. Actually measuring student participation levels in a blended online course option where students can choose between online or in-person class sessions could give additional insight into factors that affect which modality students really prefer and which factors are more meaningful than others. Just because a student says they prefer online learning in a survey or are satisfied with it does not mean they will actually choose to attend online sessions when given the option. But to what extent do these preferences play out? And, when they do not, what reasons do students give for acting contrary to their stated preferences?

The purpose of this research was to understand student motivations for choosing a specific blended session modality. Furthermore, we explored why students’ demonstrated preferences to online learning may not align with their stated preference and what factors might cause this dissonance.
CHAPTER 3

Method

The Reasoned Action Approach and Model, formerly the Theory of Planned Behavior (Ajzen, 1991), was used as a lens to understand how students’ intentions may or may not match their final behavior (Fishbein & Ajzen, 2011). This theory, approach, and model, has been applied to many different fields of science (Fishbein & Ajzen, 2011); we applied it to learning as have others in e-learning and MOOCs (Chu & Chen, 2016; Lung-Guang, 2019). Based on an analysis of the methods described in the Reasoned Action Approach and Model, we have derived our own version and created a graphic from their model (Fishbein & Ajzen, 2011) as shown below (see Figure 3).

Figure 3

Reasoned Action Approach / Theory of Planned Behavior
As shown in Figure 3 above, the Reasoned Action Approach shows that perceived norms, background, beliefs, attitudes, and perceived behavioral control can impact a student’s original intention to take an online or in-person class session. Perceived norms could be defined as a normal behavior that is expected. Perceived behavioral control is defined as “people’s perceptions of the degree to which they are capable of, or have control over, performing a given behavior” (Fishbein & Ajzen, 2011, p. 64). This perceived behavior control could change why, at the final behavior, they act different then their original intention. For example, a student might state in the pre-survey that they prefer online due to flexibility with time but when given the option, they actually behave differently and choose to attend the in-person class session because convenience of being on campus already. That decision could have been impacted by a last minute perceived behavioral control. In our research we sought to discover what those reasons are for which a student’s intention might be different than their behavior.

Additionally, as shown and noted in blue in Figure 3, “What changed and why?,” meaning what changed and why from their original intention to their actual behavior? Actual Control including skills, abilities, and environmental factors can also impact that last final behavior that may differ from an original intention. This research allows us to provide recommendations for universities on how they might best meet the needs of the students in blended courses while considering university resources and other constraints.

Participants

To answer our research questions, we followed the students in two different courses for engineering students at a large private university in the Mountain West region of the United States: (a) a 200-level computing course and (b) a 200-level Computer Aided Design (CAD) course. Each semester, approximately 100 students enroll in the computing as mechanical
engineering majors across a few sections. For the CAD course, approximately 50 mechanical engineering students enroll. In our surveys we found that the average age was 18 to 24 and each student took approximately 14 credits during that semester. They rated their technical ability with computers an average of six out of 10. We had 1 freshman, 36 sophomores, 38 juniors, and 1 senior. In terms of relationships, we had 54 single students, 15 married, and 7 were dating or engaged. For employment, 27 students were unemployed, 41 worked part-time, 6 worked between 20 to 29 hours, 0 students worked 30 to 39 hours, and 2 worked full-time. Twenty-three students self-identified as introverts, 39 as extroverts, and 14 as neither introvert or extrovert. Only one student had children out of 76 that answered that question.

**Group One**

Traditionally (pre-COVID), both courses had been offered using an in-person modality only. However, Christensen (2016) worked with the professor (Professor A) of the computing course to develop an online class session for the course that provided students with an adaptive, personalized experience for a programming activity in C++. During this research and because of COVID-19, Professor A offered the class via Zoom synchronously during the semester. He offered one in-person class session simultaneously while offering the online adaptive module created by Christensen. This was the only single class session the course would be offered in-person the entire semester, unlike previous semesters where it was reversed with only one online class session.

**Group Two**

For the CAD course during our research, the professor (Professor B) taught all his course sessions in-person with an online Zoom option simultaneously while primarily focusing only on the in-person students attending. He generously made an asynchronous class session specifically
for an online version of the one class session to replace the standard in-person lecture for this research and for future use. Both offerings were offered the same day. He had told the students that they needed to participate in the online class session at the same time as the in-person session for accountability, which could have impacted online attendance because of lack of typical asynchronous flexibility.

At the beginning of the semester, both professors announced the online offerings and allowed students to choose to attend these class sessions in-person or to choose the online modality for these sessions. They also sent out email reminders prior to the online or in-person offering options that were both available for that single class session.

**Measures**

Our measures include survey and interview data and is based on explanatory mixed methods (Creswell, 2008). For the surveys, during the first week of class, we conducted a pre-survey (see Appendix B) to identify which modality students state they prefer (online or in-person class sessions), as well as the factors affecting this preference. These factors were informed using the categorical findings from the literature review (see Appendix C – question 5K). In addition, due to the way that COVID-19 conditions have affected online learning experiences, we sought to understand if their preferences have been affected by recent experiences or conditions related to these changes.

Given prior experience and from our research above, we expected that some students’ actions would contradict their stated preferences. To better understand these conflicts, we conducted both interviews and surveys to find answers as to why students did not choose to participate in the online class sessions. The surveys used Table 1 and also asked if they would like a mix of the various modalities or if they prefer one modality over another (see Appendix
C). The survey was administered via a Qualtrics link that the professor of the course sent out in both a pre-class session survey and a post-class session survey. The survey was estimated to take approximately 15 minutes to complete each time.

For our three instruments (included in Appendix B-D), they were all approved by the IRB (Institutional Review Board/Human Research Protection Program) as shown in Appendix A. They include the pre-survey, post-survey, and interview protocol and each will be described in more detail below.

**Instrument One**

The pre-survey was built from the literature review and is included in Appendix B. They were not required to answer any of the questions if they chose not to respond to a specific question. We requested their consent to participate and their first and last name, as well as which of the two classes they were in that pertain to this study. We also asked them to rate their technical ability and how many credits they are taking. Additionally, we requested some demographic information such as how many hours they work a week, what year they are in school, their marital/dating status, and if they have children. For definitions of “online,” we asked them what their definition was before and after COVID-19. We also asked if they are an introvert, extrovert, or neither, about previous past experiences with online, and some preferences about online. The last two questions of the survey were designed using Table 1, which was part of the “Reasoned Action Approach” model as described previously. For that model, we also asked the students to predict if they would attend online or in-person for a one-time offering during the course.
Instrument Two

The post-survey is included in Appendix C. This survey was used for multiple purposes to answer our research questions. The primary reasons were to find out which session they attended, compare pre-surveys and post-surveys to run some paired sample t-tests, and see if definitions or preferences changed after participating in the in-person or online class session.

Instrument Three

Appendix D includes a set of questions for the interviews. This provided a qualitative aspect of the research that allows us to provide more depth and context for why a student’s actions may not match their predicted and/or preferred attendance of online or in-person. We also wanted to see if there is something we can do to encourage them more to participate in online class sessions. Lastly, the survey’s final question was to see how COVID-19 impacted their preferences to online class sessions.

Procedures

We conducted one-on-one interviews with students via Zoom and used the automatic transcription feature to analyze each one later. Because COVID-19 has significantly changed the landscape for online learning, we interviewed some students from last year that had these experiences pre-COVID. We found out why they chose not to participate in the online class sessions even though they stated they wanted online class sessions. We realize that memories could be faint or distorted from all of these new online options because of COVID, but COVID has changed online learning significantly. Because of this, we conducted interviews with students from Winter 2021 to compare their modality preferences with past students. The interviews provided in-depth qualitative data that allowed us to ask expounding questions from initial responses.
As part of our interview process we conducted targeted interviewing towards two groups; however, since this is explanatory research these protocols changed slightly based on our findings. The first two groups were those students who said they wanted online modules but chose not to participate both those from this year and those from last year, seven from each year if possible was attempted. The interview protocol is found in Appendix D. We attempted to interview at least 7 students in each group for a total minimum of 14 interviews if possible, which resulted in 13 in the end.

Data Analysis

Once the data was collected, we compiled and analyzed the surveys (Appendices B & C), ran statistical analysis on the data, and interpreted the data. For the statistical analysis, we used linear regression as well as t-tests and descriptive statistics as appropriate. Linear regression allowed us to correlate preferences or attitudes and actual behavior. A paired sample t-test allowed us to see if individual items changed over time. For the a priori lens, we used the Reasoned Action Approach. We also ran a Confirmatory Factor Analysis (CFA), which did not converge so we ran an Exploratory Factor Analysis (EFA) and found a good fit model. Then, we ran a Confirmatory Factor Analysis (CFA) on that EFA model that fit well, followed by a Structural Equation Model (SEM) model.

To analyze the interviews (Appendix D) and qualitative data, we used explanatory mixed methods as described by Creswell (2008) along with some of the aspects of emergent open-coding as described by Rich (2012). Based on that paper, we began with an open-coding process to identify potential classification of codes that were substantiated from students’ experiences. Once we identified initial codes, we constantly compared these results to create categories and sub-categories among the different codes. In the process, we grouped ideas and findings into
categories as well as patterns. Our quantitative survey data informed our interviews and qualitative data. We looked at both, in an explanatory mixed method approach, to understand the full picture in the context.
CHAPTER 4

Results

The results of our research include both a quantitative analysis and a qualitative analysis. The quantitative analysis includes our statistical research starting with a CFA, followed by an EFA, CFA, and SEM with a model and output. Additionally, we ran a phi coefficient analysis and a paired sample t-tests with all of the matching pre and post survey items. The qualitative analysis includes interview data guided from the quantitative data using open coding as described previously in the methods section.

Quantitative Analysis

In order to identify latent variables (i.e., variables not directly observed) of student preferences, we started with a CFA because we had a theoretical background for our model based on the literature review from Chapter 2 of this dissertation. We utilized the Mplus statistical software. Initially, our CFA was not a good fit using the constructs from Table 1 or from all the variables. To prepare for the initial CFA, we ran some of the items as categorical as they ranged from zero to three, all of which had a good spread. We checked for ceilings and floors, which all of the items appeared to avoid. Independence and multicollinearity were met as far as we could determine. Because the data are categorical, linearity and normality were not a concern. We marked missing data as -999 and configured SPSS and Mplus to see -999 as missing data. Then, we ran the initial CFA followed by an EFA testing up to four factors using the constructs from Table 1. This model converged; however, the first run was not a good fit according to the Worthington and Whittaker’s criteria (2006). As Worthington and Whittaker suggest, if factors load on .32 or higher then we consider them further in the EFA. If the items load on the factor at less than .32, we deleted them from the model as recommended. If the items
cross-loaded on two factors at both higher than .32, but less than the .15 difference, we removed them as well. Following those recommended procedures, the first model with one-factor was not a good fit. We were able to find the two-factor model with a good fit that resulted in two latent variables not directly observed related to Table 1 of our findings and synthesis of the literature. We labeled Factor 1 as *Learning Comfort/Preferences to participate in online sessions* and Factor 2 as *Emotional/Social Factors to participate online*. We found the following items loaded well on two factors in Table 2 (RMSEA 0.000, CFI 1.000, TLI 1.000, SRMR 0.056), with no significant cross-loadings.

**Table 2**

*Factor Loadings Results From the Final EFA*

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility in time and tempo (both)</td>
<td>.654*</td>
<td>-.014</td>
</tr>
<tr>
<td>High interactivity</td>
<td>-.376*</td>
<td>.130</td>
</tr>
<tr>
<td>Videos used to teach</td>
<td>.401*</td>
<td>-.058</td>
</tr>
<tr>
<td>Asynchronous</td>
<td>1.002*</td>
<td>.006</td>
</tr>
<tr>
<td>Negative past experiences from online</td>
<td>-.024</td>
<td>.566*</td>
</tr>
<tr>
<td>Positive past experiences from online</td>
<td>.325</td>
<td>.801*</td>
</tr>
<tr>
<td>Being an introvert or extrovert</td>
<td>-.062</td>
<td>.699*</td>
</tr>
<tr>
<td>Affect (e.g., less interruptions)</td>
<td>.137</td>
<td>.418*</td>
</tr>
</tbody>
</table>

*significant at the .05 level

After the successful EFA, we ran the CFA and the model fit as well, as shown on Table 3 (RMSEA 0.000, CFI 1.000, TLI 1.000, SRMR 0.061).
Table 3

Results From the Final CFA

<table>
<thead>
<tr>
<th>Comfort/Preferences to Online</th>
<th>Unstd. Factor Loadings</th>
<th>S.E.</th>
<th>Stnd. Factors Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility in time and tempo (both)</td>
<td>1.000</td>
<td>.000</td>
<td>.661**</td>
</tr>
<tr>
<td>High interactivity</td>
<td>-.548**</td>
<td>.196</td>
<td>-.362**</td>
</tr>
<tr>
<td>Videos used to teach</td>
<td>.561**</td>
<td>-.199</td>
<td>.371**</td>
</tr>
<tr>
<td>Asynchronous</td>
<td>1.530**</td>
<td>.433</td>
<td>1.011**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social/Emotional to Online</th>
<th>Unstd. Factors Loadings</th>
<th>S.E.</th>
<th>Stnd. Factors Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative past experiences from online</td>
<td>1.000</td>
<td>.000</td>
<td>.509**</td>
</tr>
<tr>
<td>Positive past experiences from online</td>
<td>1.837**</td>
<td>.549</td>
<td>.936**</td>
</tr>
<tr>
<td>Being an introvert or extrovert</td>
<td>1.168**</td>
<td>.301</td>
<td>.595**</td>
</tr>
<tr>
<td>Affect (e.g., less interruptions)</td>
<td>0.878**</td>
<td>.263</td>
<td>.447**</td>
</tr>
</tbody>
</table>

Note. *p < .05  **p < .01  p < .001.

With a working model in place, we then wanted to see if those two factors might predict whether a student would attend the online session. To see if the latent variable of Learning Comfort/Preferences to participate in online could predict a student’s self-guess/prediction to attend online, we ran the SEM and the model had a good fit (RMSEA 0.064, CFI 0.939, TLI 0.919, SRMR 0.112), but the p-value of self-prediction on that factor was 0.065. It is close to the .05 cutoff, but barely above and perhaps future studies with a larger sample size might improve the p-value. We additionally ran the SEM model with that same factor along with the online
actual attendance and the model did not converge. It also did not converge with both the self-prediction and the online actual attendance included in the model.

In the penultimate EFA, a few items loaded individually as its own single factor that appeared significant in that model, two of which were “Convenience of Being on Campus” and “Pacing.” We tried these along with others variables of interest in our models and found that “Convenience of Being on Campus” did not have a significant p-value so we removed it. In our final SEM, two variables, in addition to the two factors found in our final EFA, “Total Types of Experience Online” and “Pacing” were statistically significant in the model in relation to Comfort/Preferences to online, but not in relation to the Social/Emotional factor. The final SEM model is shown in Table 4 below, which converged and has good fit (RMSEA 0.020, CFI 0.992, TLI 0.989, SRMR 0.103, Chi-square 150.765 with 44 degrees of freedom and a p-value of 0.0000). The SEM diagram is shown Figure 4 below.
### Table 4

**Results From the Final SEM**

<table>
<thead>
<tr>
<th>Comfort/Preferences to Online</th>
<th>Unstd. Beta</th>
<th>S.E.</th>
<th>Stnd. Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility in time and tempo (both)</td>
<td>1.000</td>
<td>.000</td>
<td>.764**</td>
</tr>
<tr>
<td>High interactivity</td>
<td>-.494**</td>
<td>.175</td>
<td>-.362**</td>
</tr>
<tr>
<td>Videos used to teach</td>
<td>.446*</td>
<td>.190</td>
<td>.371*</td>
</tr>
<tr>
<td>Asynchronous</td>
<td>1.187**</td>
<td>.262</td>
<td>1.011**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comfort/Preferences to Online Regressed On</th>
<th>Unstd. Beta</th>
<th>S.E.</th>
<th>Stnd. Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacing</td>
<td>.544**</td>
<td>.125</td>
<td>.584**</td>
</tr>
<tr>
<td>Total previous types experience online</td>
<td>.344*</td>
<td>.173</td>
<td>.256*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social/Emotional to Online</th>
<th>Unstd. Beta</th>
<th>S.E.</th>
<th>Stnd. Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative past experiences from online</td>
<td>1.000</td>
<td>.000</td>
<td>.764**</td>
</tr>
<tr>
<td>Positive past experiences from online</td>
<td>1.404**</td>
<td>.372</td>
<td>-.936**</td>
</tr>
<tr>
<td>Being an introvert or extrovert</td>
<td>1.115**</td>
<td>.281</td>
<td>.595**</td>
</tr>
<tr>
<td>Affect (e.g., less interruptions)</td>
<td>0.773**</td>
<td>.208</td>
<td>.447**</td>
</tr>
</tbody>
</table>

*Note.* *p < .05  **p < .01  *p < .001.
In Figure 4 above for the SEM model, two individual sets of four variables are shown as rectangular shapes to create the two unobserved variables as shown in oval shapes. Interpreting the SEM model means that for every one standard deviation increase in the Number of Types of Previous Experience with Online there is a .256 standard deviation change in Learning Preferences/Comfort to Online. For every one unit increase in learning there is a .764 increase in Flexibility in Time and Tempo. Each of the numbers above indicate similar changes as described above.
To see how many students accurately predicted their future attendance of the online versus in-person class session, we ran a Phi Coefficient model, which is the result garnered from a Pearson correlation coefficient. The results from a Phi Coefficient statistical computation ran in SPSS, show in Table 5 that 17 students self-predicted that they would attend an in-person class session when given the opportunity and did attend that class session. On the other hand, seven students predicted that they would attend the online session and actually followed through and attended the online session. Interestingly, seven students predicted that they would attend in-person, but ultimately attended the online class session. Additionally, three students predicted that they would attend online, but ended up attending in-person instead. The results are statistically significant at 0.027. Even though most students (24/34 = 70%) accurately predicted what class session they attended, approximately 30% of them changed their mind for some reason. We additionally interviewed students to find out why their self-predicted choice changed the day of the class, which is presented in the qualitative section below. Even though a student might think they will attend one type of class session, ultimately, they may not attend that session. Knowing this is beneficial for universities that might plan according to students’ stated predictions. A paired sample t-test has the same p-value of 0.027 as above in the phi coefficient. The paired sample t-test has a correlation of 0.378 (N = 34) and a t-value of 9.574 with 33 degrees of freedom.
Table 5

*Phi Coefficient Table of Online vs. In-Person Predicted vs. Actual Attendance

<table>
<thead>
<tr>
<th></th>
<th>Actual Attendance</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Online</td>
<td>In-person</td>
<td>Total</td>
</tr>
<tr>
<td>Self-Prediction</td>
<td>Online</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>In-person</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Self-Prediction</td>
<td>Total</td>
<td>14</td>
<td>20</td>
</tr>
</tbody>
</table>

Note. *$p < .05$; $p = 0.027$ for this table

Additionally, we ran paired sample t-tests on all variables to see how preferences might have changed over time. We ran the analysis on the questions that were in both the pre-survey and post survey and found that the following variables in Table 6 were statistically different from pre and post-surveys. We removed the ones from the table that were not statistically significant to simplify and bring focus to the statistically significant items. The ones that are in the table were consistent in the pre and post responses. Unfortunately, the post-survey response rate was quite lower than the pre-surveys even with follow-up emails from the faculty. In some cases, students also did not provide their name so we could not correlate the pre and post-surveys. The final results that we could compare were between $N = 21$ to $N = 35$ depending on the question and response rates for each item. The highest three items with the greatest statistical significance were Pacing, Positive Past Experiences, and Synchronicity. These three items had the greatest correlation between the pre and post survey. This could indicate that the intervention of the course session was impactful. In other words, the class session may have changed their opinion...
in regards to the importance of the item. This could also be caused by several reasons such as their choice in that moment of time, their mood at the time, other classes, lack of importance, etc. To rule out the lack of importance as a changing factor between the two points in time, we next looked at the level of importance based on the mean.
Table 6

Paired Sample T-tests for Pre and Post-Surveys

<table>
<thead>
<tr>
<th></th>
<th>Correlation</th>
<th>Significance</th>
<th>Mean Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy</td>
<td>.553</td>
<td>.005</td>
<td>.292</td>
</tr>
<tr>
<td>Pacing</td>
<td>.722</td>
<td>.000</td>
<td>-.042</td>
</tr>
<tr>
<td>Videos Used to Teach</td>
<td>.474</td>
<td>.019</td>
<td>-.042</td>
</tr>
<tr>
<td>Collaborative Tools</td>
<td>.515</td>
<td>.010</td>
<td>-.375</td>
</tr>
<tr>
<td>to work with peers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asynchronous (on-demand)</td>
<td>.492</td>
<td>.015</td>
<td>.167</td>
</tr>
<tr>
<td>Synchronous (live)</td>
<td>.592</td>
<td>.002</td>
<td>.083</td>
</tr>
<tr>
<td>Technical Skills</td>
<td>.528</td>
<td>.014</td>
<td>-.238</td>
</tr>
<tr>
<td>Life Circumstances</td>
<td>.526</td>
<td>.014</td>
<td>-.190</td>
</tr>
<tr>
<td>Property Availability</td>
<td>.552</td>
<td>.008</td>
<td>.182</td>
</tr>
<tr>
<td>Social Factors (e.g.</td>
<td>.567</td>
<td>.006</td>
<td>-.182</td>
</tr>
<tr>
<td>collaboration)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Past Experiences</td>
<td>.626</td>
<td>.002</td>
<td>.136</td>
</tr>
<tr>
<td>Affect (e.g.</td>
<td>.549</td>
<td>.008</td>
<td>-.182</td>
</tr>
<tr>
<td>Enjoy QAs of others, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition of ‘online’</td>
<td>.361</td>
<td>.033</td>
<td>-.400</td>
</tr>
<tr>
<td>Preferred Online Delivery</td>
<td>.510</td>
<td>.003</td>
<td>-.161</td>
</tr>
</tbody>
</table>

Note. *p < .05; p =0.027 for this table
In addition to Table 6 and instead of the correlation from pre to post-survey, we wanted to look at the mean score of each item’s level of importance to see which item was the most impactful by individual item based on the mean score of importance (not matching pre and post individuals, up to N = 66). Because each item was rated in both the pre-survey and the post-survey, we added the post or pre-survey means together for a final mean score of each. This allows us to see which items on average from both points in time had the overall highest mean. The items that were rated as the most important or most impactful are the highest number, taken from both the pre or post-survey and sorted from highest to lowest in order of importance as shown in Table 7.
<table>
<thead>
<tr>
<th>Importance of item to participate online</th>
<th>Total Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your own learning preferences (e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.)</td>
<td>5.08</td>
</tr>
<tr>
<td>Course design (e.g., pacing interactivity, synchronicity, adaptivity, etc.)</td>
<td>4.95</td>
</tr>
<tr>
<td>Flexibility in time and tempo (both)</td>
<td>4.69</td>
</tr>
<tr>
<td>High interactivity</td>
<td>4.15</td>
</tr>
<tr>
<td>Adaptivity (i.e., content presented changes based on my interactions/answers to course content)</td>
<td>4.02</td>
</tr>
<tr>
<td>Pacing (i.e., I can determine to complete the material at my own pace)</td>
<td>4.01</td>
</tr>
<tr>
<td>Convenience of being on campus</td>
<td>3.85</td>
</tr>
<tr>
<td>Social factors such as collaboration (e.g., group work, etc.)</td>
<td>3.81</td>
</tr>
<tr>
<td>Autonomy (i.e., create your own experience)</td>
<td>3.76</td>
</tr>
<tr>
<td>Choice (i.e.; choose a learning path or learning option)</td>
<td>3.61</td>
</tr>
<tr>
<td>Technical skill</td>
<td>3.53</td>
</tr>
<tr>
<td>Social factors such as working alone (e.g., prefer to self-study, etc.)</td>
<td>3.40</td>
</tr>
<tr>
<td>Videos used to teach</td>
<td>3.36</td>
</tr>
<tr>
<td>Collaborative tools to work with peers</td>
<td>3.35</td>
</tr>
<tr>
<td>Property Availability (e.g., transportation, comfort of home)</td>
<td>3.28</td>
</tr>
<tr>
<td>Asynchronous (i.e., on-demand)</td>
<td>3.09</td>
</tr>
<tr>
<td>Affect (e.g., Less interruptions)</td>
<td>2.90</td>
</tr>
<tr>
<td>Affect (e.g., Enjoy QAs of others)</td>
<td>2.89</td>
</tr>
<tr>
<td>Timing in life (i.e., year in school, age, older)</td>
<td>2.88</td>
</tr>
<tr>
<td>Synchronous (i.e., live)</td>
<td>2.85</td>
</tr>
<tr>
<td>Life circumstances (e.g., disability, health, etc.)</td>
<td>2.47</td>
</tr>
<tr>
<td>Current employment, Synchronous (i.e., live)</td>
<td>2.46</td>
</tr>
<tr>
<td>Positive past experiences from online</td>
<td>2.42</td>
</tr>
<tr>
<td>Negative past experiences from online</td>
<td>2.3</td>
</tr>
<tr>
<td>Being an introvert or extrovert</td>
<td>1.83</td>
</tr>
</tbody>
</table>

*The higher the number, the more impact/importance for the item to participate online*
We also asked the students what their definition was for online both pre and post-COVID in our pre-survey. Two multiple choice questions with the last option as “other” with a fill in the blank were asked in our pre-survey, which took place in January of 2021. The first question was “Before COVID-19 conditions, which of the following definitions BEST described ‘online’ for a course or class session for you?” The second question was “AFTER experiencing COVID-19 conditions, which of the following definitions BEST describes ‘online’ for a course or class session for you?” The response options were the same for both questions and were the following (the bracket is the text we will use for Table 8 below):

- You can participate from anywhere with an internet connection [anywhere]
- You can participate anywhere and it is a live (zoom like) lecture (synchronous) [synchronous]
- You can participate anywhere and it is not a live lecture (asynchronous; on-demand; pre-recorded) [asynchronous lecture]
- You can participate anywhere by completing interactive/hands-on learning modules (asynchronous; on-demand) [asynchronous interactive]
- Other

The results were not statistically significant with a correlation between their pre-survey and post-survey definition and are shown in Table 8. However, the pre-survey after COVID definitions and post-survey definitions of “online” correlations are statistically significant as shown in Table 9.
Table 8

*Phi Coefficient Table of Definitions of ‘Online’ Pre-COVID and Post-COVID

<table>
<thead>
<tr>
<th></th>
<th>Anywhere</th>
<th>Synchronous</th>
<th>Asynchronous Lecture</th>
<th>Asynchronous Interactive</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-COVID definition of “Online”</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pre-COVID definition of “Online”</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anywhere</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Synchronous</td>
<td>2</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Asynchronous Lecture</td>
<td>6</td>
<td>19</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Asynchronous Interactive</td>
<td>4</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>45</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>74</td>
</tr>
</tbody>
</table>

Note. Approximate Significance $p = 0.149$

In comparing the pre and post-survey question about definitions (see Table 9), the pre-survey definitions of “online” had changed from nine students defining it as “You can participate from anywhere with an internet connection” to 18 defining it that way after the course. The question in the post-survey was also even worded differently as “Which of the following best defines ‘online’ for you?” This potentially means that a student’s definition of “online” is highly impacted upon by the classes they are taking during a semester.
Table 9

*Phi Coefficient Table of Definitions of ‘Online’ Pre-Survey and Post-Survey

<table>
<thead>
<tr>
<th></th>
<th>Post-survey definition of “Online”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anywhere</td>
</tr>
<tr>
<td>Pre-survey</td>
<td></td>
</tr>
<tr>
<td>after experiencing</td>
<td></td>
</tr>
<tr>
<td>COVID-19 conditions</td>
<td></td>
</tr>
<tr>
<td>definition</td>
<td></td>
</tr>
<tr>
<td>of “Online”</td>
<td></td>
</tr>
<tr>
<td>Anywhere</td>
<td>8</td>
</tr>
<tr>
<td>Synchronous</td>
<td>9</td>
</tr>
<tr>
<td>Asynchronous Lecture</td>
<td>1</td>
</tr>
<tr>
<td>Asynchronous Interactive</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
</tr>
</tbody>
</table>

Note. Approximate Significance $p = 0.020$

For student preferences toward online or in-person, we asked a survey question about what percent blend is preferred including the various types of online and in-person. The questions was “What percentage of mix would you like for class sessions (assuming it is well designed)? As shown in Table 10, the mean preferred blend is 52.04%. The next most preferred blend is “Hands-on online interactive modules (asynchronous – on-demand)” at 17.06%.
### Table 10

*Percent of Blend Preferred (N = 50)*

<table>
<thead>
<tr>
<th>Method</th>
<th>Mean</th>
<th>Maximum</th>
<th>Stnd. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on online interactive modules (asynchronous – on-demand)</td>
<td>17.06%</td>
<td>70%</td>
<td>19.20</td>
</tr>
<tr>
<td>Online pre-recorded lectures (asynchronous – on-demand)</td>
<td>15.26%</td>
<td>100%</td>
<td>19.23</td>
</tr>
<tr>
<td>Online synchronous live lectures (live Zoom like)</td>
<td>15.64%</td>
<td>85%</td>
<td>21.37</td>
</tr>
<tr>
<td>Live in-person lectures</td>
<td>52.04%</td>
<td>100%</td>
<td>32.68</td>
</tr>
</tbody>
</table>

Surprisingly and in contrast to Table 10, when we asked students their preferred delivery method for online delivery, the results were different. Overall, students in our context prefer live, in-person lectures the most and then asynchronous on-demand second, but if a live option is not a choice we see they prefer live, synchronous (Zoom like) delivery. We specifically asked “Which type of online delivery method do you prefer (assuming it is well designed)?” The results are shown in Table 11, showing gender in relation to their responses.
Table 11

*Gender and Preferred Online Delivery Method*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Synchronous (Zoom like live)</th>
<th>Asynchronous (pre-recorded on-demand)</th>
<th>Asynchronous Interactive (on-demand)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male</strong></td>
<td>24</td>
<td>15</td>
<td>6</td>
<td>45</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>27</td>
<td>17</td>
<td>6</td>
<td>50</td>
</tr>
</tbody>
</table>

*Note. Approximate Significance p = 0.683*

We also wanted to see if COVID-19 had impacted students learning preferences, which we asked via the survey. Twenty-six students out of 38 (68%) said that COVID-19 had impacted their learning preferences. Twelve out of 38 (32%) said that COVID-19 had not impacted their learning preferences. We also wanted to see if gender also had any impact on the question, which was not statistically significant, but it does show our results in Table 12.
**Table 12**

*Gender and COVID-19 Impact on Learning Preferences*

<table>
<thead>
<tr>
<th>Has COVID-19 impacted your learning preferences?</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your gender?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>23</td>
<td>11</td>
<td>34</td>
</tr>
<tr>
<td>Female</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>12</td>
<td>38</td>
</tr>
</tbody>
</table>

*Note.* Approximate Significance (p = .765)

In summary, our statistical analysis converged with an SEM model shown in Figure 4 and Table 4 providing two unobservable variables, but did not predict a student’s probability of attending class online. Table 5 shows our phi coefficient analysis showing that we can predict if a student will participate in an online session if we ask them to predict it in a pre-survey. Table 6 shows our paired sample t-test resulting in three items with significant correlation from the pre and post-survey being Pacing, Positive Past Experiences, and Synchronicity. Table 7 shows how important these top four items are in order of importance for participating online according to the student surveys: “Your own learning preferences (e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.),” “Course design (e.g., pacing interactivity, synchronicity, adaptivity, etc.),” “Flexibility in time and tempo (both),” and “High interactivity.” In Table 7, the first two items “Your own learning preferences (e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.)” and “Course design (e.g., pacing interactivity, synchronicity, adaptivity, etc.)” could be
considered as including multiple items from Table 7. If we look at the next two individual items (that may not be considered as including other items in the same table), they are “Flexibility in time and tempo (both)” and “High interactivity.” This is interesting because in the interviews, students mentioned both of those items as important as well. Our qualitative analysis below provides additional insights from our quantitative research.

**Qualitative Analysis**

For the qualitative research, we started with some quantitative analysis to identify participants whose predictions did not match their actions. In our quantitative research above, we found that 30% of the students did not attend what the class they had predicted they would attend (see Table 5). To find out why there was the discrepancy, we used targeted interviews looking at those students who stated one thing but did another.

First, we looked at some additional descriptive statistics to guide our research from the pre-surveys and post-surveys using a cross-tabs analysis in SPSS as shown in Table 13. The question in the pre-survey was “In a blended course, which would you prefer, more online or in-person class sessions?” We compared that with the modality they actually attended from the post-survey.
### Table 13

**Crosstab Statistics for Pre and Post-Survey Preferences vs. Attendance**

<table>
<thead>
<tr>
<th>Preferred Blend</th>
<th>Actual Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Online</td>
</tr>
<tr>
<td>All in-class sessions</td>
<td>2</td>
</tr>
<tr>
<td>A few online class sessions and mostly in-person sessions</td>
<td>3</td>
</tr>
<tr>
<td>About half online and half in-person sessions</td>
<td>0</td>
</tr>
<tr>
<td>Mostly online sessions and a few in-person sessions</td>
<td>4</td>
</tr>
<tr>
<td>All online class sessions</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
</tr>
</tbody>
</table>

*Note. p = 0.060 for this table*

From Table 13, we see that by summing the “Total” column of those students that wanted at least a few, half, most, or all online, we had 23 out of 30 (76%) students that are stating they want at least one or more online class sessions. We found similar statistics in the literature review (Loftus, 2013, p. 43). The p-value is .06 for Table 13, which is why we used Table 5 to guide our interviews because its p-value is .027. Surprisingly, Table 5 was statistically significant at 0.027, but Table 13 was not at 0.06.

To provide some additional insights to the context, we will describe some of the descriptive statistics. In Professor A’s course, the post survey (N = 45) showed that nine out of 45 (including those that did not respond to the question) students’ post-survey attendance did not
match their (pre-survey) prediction of attending online or in-person. Of those 45 responses, we had to be able to identify the student and match their pre-survey with their post-survey. Some of those 45 students in the post-survey did not take the pre-survey and we could not match their pre-survey and post-survey data. Of those nine that we could identify, five students were willing to be interviewed, as shown in Table 14.

In Professor A’s course, three of the nine wanted and predicted they would attend online, but ended up attending in-person instead, one of which was willing to be interviewed. Six of the nine wanted and predicted they would attend in-person, but attended online instead, four of which were willing to be interviewed.

In Professor B’s course, the post-survey response rate was low (N = 10) and none of the students that fit the criteria of their prediction not matching their actual attendance that also did both the pre-survey and post-survey that we could identify and interview. For Professor B’s course, we identified and interviewed someone of interest finding only one student that was willing to be interviewed that had shown interest in wanting some online class sessions, but did not participate in the online class session.

Table 14

Students Willing to be Interviewed

<table>
<thead>
<tr>
<th></th>
<th>Willing to be interviewed</th>
<th>No response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor A’s class.</td>
<td>Prediction not matching</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Professor B’s class.</td>
<td>Prediction not matching</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>
Because COVID may have impacted student preferences toward online class sessions, we also used data from the previous year’s course that we wanted to look at in more depth. The data did not have a self-prediction of attendance like this year, but we did have an indicator of if they wanted some online class sessions. We identified seven students that expressed interest in having at least one or more online class sessions and were willing to be interviewed who did not actually attend the one-time online class session. We interviewed all seven of these students from the previous year’s course of Professor A (pre-COVID, January 2020) and of the seven we identified three students that specifically said the word “convenience” as the main reason for not attending online, which were all related to already being on campus. Another three students also said that the main reason for the discrepancy in what they wanted versus what they attended was because they were already on campus. We categorized these three as “convenience” too for a total of six out of seven that said the main reason was “convenience.” These were identified with open coding as two sub categories – one being stated “convenience” and the other sub category “implied convenience,” all of which were related to being on campus already. During these interviews, that pattern emerged for a main category, which included six out seven interviews. That main reason for the discrepancy between their pre-survey desire for some online class sessions not matching their actual attendance was convenience. The one student out of the seven that did not fit the same categories said that the main reason for not attending online was that they felt like the class was challenging and they wanted more help and they felt they could achieve that by attending in-person instead. Overall, from these interviews we see that convenience, specifically convenience of being on campus, was the most significant reason for students’ prediction of their attendance of online or in-person to not match their actual attendance.
In 2020, all of the class sessions were in-person and we offered one online class session with the option to attend it either in-person or an online asynchronous module. In 2021, it was the opposite for Professor A’s course because of COVID-19 with all of the course sessions being online. Professor A’s courses for early 2021 were online synchronous via Zoom because of COVID-19 and we were able to offer one in-person class session with everyone wearing masks. We had to reserve and use the largest room possible, an auditorium, so that we could socially distance as needed. Interestingly, we saw six students that predicted and wanted in-person, but instead attended online, four of whom were willing to be interviewed. That was the opposite of previous years because in 2020 no student indicated they wanted only in-person and then participated in the online module instead. This could be caused by students being more aware of and open to online class sessions caused by COVID-19 conditions. We also saw three students that wanted online sessions and predicted to attend online, but instead attended in-person, one of whom was willing to be interviewed. That gave us a total of five students from 2021 to interview that matched our criteria for targeted interviews.

As we interviewed the students from early 2021, we saw similar main patterns and categories as 2020, but instead of it being for not attending the online course in most cases, it was for not attending the in-person course that they wanted and predicted they would attend. The four we could interview that ultimately attended online, but wanted and predicted to attend in-person said the main reason was a scheduling conflict, which was a new sub-category we identified that all related to the main category still of convenience. Two of the four students specifically said the word “convenience” in the interview.

The one student we were able to interview from Professor A’s course that wanted and predicted to attend online, but instead attended in-person was because it was the easiest path. He
said that he looked at the online module and it seemed like another assignment and did not want to spend the time on it. Instead, he wanted to sit in class and work on other homework because he was already somewhat familiar with the material from past experience. He also mentioned another class that he really liked that was online that did not use “any of my time.” We categorized this as “Your own learning preferences (e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.)” from Table 1.

Professor B had been doing all in-person class sessions with students wearing masks that were delivered via Zoom with little focus on the students online, but more focused on the students in class. For this study, he offered a one-time asynchronous offering instead of his in-person class session delivered also via Zoom.

In Professor B’s course post-survey (N = 10), four out of 10 students preferred all in-class sessions instead of some or all online class sessions. One out of the 10 did not respond to that question. Five of 10 students said that wanted at least some (a few, half, or more) online class sessions. Interestingly, all of those five students preferred synchronous delivery for online class sessions. Only one was willing to be interviewed. Five of the 10 reported attending the entire in-class session. Two did not respond to the question. Three of the 10 reported completing the entire asynchronous session but only one of those three wanted some online class sessions - two of the three only wanted in-person. All three of those students had attended an entire Zoom synchronous class session. One of the three had attended a live class session that was also delivered via Zoom. The other two of the three had only attended the synchronous Zoom class sessions. Seven of the 10 reported attending an entire in-person class session that was also delivered via Zoom. Four of those seven reported attending an entire online class session via
Zoom as well as the in-person class. Four of the 10 reported taking the pre-survey. Of those four, they said that they all attended the class session they thought they would.

The one student that was willing to be interviewed that we found of interest in Professor B’s course indicated he wanted some online class sessions but predicted he would attend the in-person class session. This was similar to the pre-COVID-19 2020 data in that it was a one-time online offering. Like in the previous year’s set of students we interviewed, he wanted some online class sessions, but instead attended the in-person class session. He also predicted that he would attend the in-person class session. What the student predicts they will attend at the beginning of the semester is more accurate in predicting whether or not they will attend an online or in-person class session than a student saying or preferring that they want some online class sessions. The quantitative data also showed this in that the self-prediction is highly accurate in predicting their actual attendance more so than any of their preferences or other variables. The main reason this student said they wanted online class sessions but did not participate in it was because the online class session did not appear to be as interactive and the professor would be lecturing only (a clear learning design preference). He also said that if the session were online he would be less likely to take notes, more likely to goof off, and he would know that he could watch it later. Going in-person he would be more likely to take copious notes and pay more attention. We categorized this as the main reason of “High Interactivity” from our Table 1.

The last question in our interviews was “How has COVID-19 impacted your preferences toward online class sessions?” The main finding was that now students are more open to and comfortable with online class sessions, for the most part. When coding their responses to that question, nine out of 13 students said that they are more open to online learning now. For example, one student said about online class sessions, “I viewed them with disdain and dislike
but I never really tried it, and now that I’ve done several it's not as bad as I thought they were going to be.” That student mentioned some positives of online are flexibility and pacing, two items that we also found were important. Another student said, “…it has expanded my ability to study for the exams, because you can go back through and watch the exams over again…” On the other hand, a different student in particular said they prefer in-person much more now though. They said in regards to why they prefer in-person even more now is because, “I am much more able to absorb information and to learn things that I need to if I’m in an atmosphere where that is the center focus and instead of just a small screen.” Similarly, another student said, “being in person is better because, like you get like more interaction and stuff which is in my opinion the most important part of the learning.”

In summary, our qualitative findings show the main reason students’ actions contradict their stated preferences for choosing online or in-person learning in our context is that although they generally prefer in-person class sessions, convenience is the main reason they might attend something other than what they preferred or predicted. In our discussion section below, we referred back to the literature and discussed implications of these findings.
CHAPTER 5

Discussion

From our literature review and as our a priori lens using the “Reasoned Action Approach” (Fishbein & Ajzen, 2011) from Figure 3 we created above, we created and analyzed the items from our Table 1 to see if they could predict the ultimate behavior of a student choosing to attend online or in-person. Being able to predict if a student will attend in-person or online could be very beneficial to a university, especially with COVID-19 situations. If a university or a professor is considering spending a significant amount of time, effort, and resources to provide or create an in-person or online class session during either COVID or non-COVID situations, a simple question derived from our research could help determine how many students might take advantage of the offering.

Results

For the discussion results, we first discuss the quantitative aspects and then the qualitative. Secondly, we individually address and answer our initial research questions.

Quantitative Results

At first glance, it might appear that the two similar survey questions seem predictive, but only one of them is statistically significant. For instance, asking a student if they want/prefer some in-person or online class sessions, it is not statistically significant at predicting online or in-person attendance; however, if asked specifically to self-predict if they will attend, it becomes statistically significant as shown in our findings in Table 5 (p = 0.027) as opposed to Table 13 (p = 0.60). To illustrate that critical question, we modified our Figure 3 with the results from our analysis and created Figure 5.
The survey questions for two of the predictive circles, “Background, Beliefs, and Attitudes” and “Actual Control (skills abilities, environmental factors),” in Figure 5 of the “Reasoned Action Approach” were created from Table 1 and used in the SEM, which table was derived from the literature review to the point of reaching saturation (Bowen, 2008). From that survey and literature, we created the SEM diagram (see Figure 4), which included the aspects of the circles from the “Reasoned Action Approach,” which included “backgrounds, beliefs, attitudes” and “actual control (skills abilities, environmental factors).” The “perceived behavior control” from Figure 3 (defined as “our own perceptions of our ability to do the behaviour”) fits well with the question in our survey for students’ self-prediction in attending the online or in-person class session; however, action is more than just their ability to do the behavior and includes their “intention,” “environmental factors,” “skills abilities,” “attitudes,” “beliefs,”
“background,” “perceived norms,” and more. This is significant because if we have questions that ask the students to self-predict, they are able to consider most of the factors from all the circles in Figure 5 that might predict their final behavior of the outcome variable of attending in-person or online.

Knowing the predictive nature of that single self-prediction question is beneficial and was 70% accurate in predicting the outcome variable in our data (as shown by the red box in Figure 5 p = 0.027). However, 30% of the students did not accurately predict the outcome variable of their online or in-person attendance (see Table 5). The qualitative finding that “convenience” was the biggest factor of why students did not act on their self-prediction seems to be the main reason accounting for the 30 percent. The 30% may be related to “Actual Control” items such as “environmental factors” from Figure 5, which could be related to our interview results that include already being on campus, already being at home, scheduling conflicts, and unanticipated events.

In our SEM analysis, the model converged to reveal two statistically significant unobservable latent variables: “Learning Preferences/Comfort to participate online” and “Social/Emotional factors to participate in online.” Each latent and unobservable variable has four items that contributed to it and each are statistically significant for those hidden variables, but not for predicting actual attendance. In other words, our synthesis of the literature was significant, but only with four of several variables for each latent variable according to the SEM. None of the other variables from our surveys that we ran in our SEM analysis or individually were statistically significant at predicting actual attendance other than one. The question that was predictive, outside of the SEM, is “At some point during the semester, you will have the option to participate in a lesson in this class either in-person or online by completing an adaptive,
asynchronous module. Which of the following modalities are you MOST LIKELY going to choose to participate in?” The only response options for that question that they could select were “online” or “in-person.” That question seems to predict the outcome using all of the circles in Figure 5 outlined in the red box. The outcome is the “Behavior” circle of the actual demonstrated attendance of online or in person as shown at the far right of Figure 5.

Latent Variable - Social/Emotional Factors to Participate in Online. In our SEM model, one of the two main latent variables, comprised of other four factors, that was statistically significant was “Social/Emotional factors to participate in online.” This aligns with our literature review in that Tempelaar et al. (2012) also found that emotions “have a moderately strong effect on student’s preferences for online learning. (p. 161).” The four factors that were statistically significant in the SEM (see Figure 5) included “Negative past experiences with online,” “Positive past experiences with online,” “Being an introvert or extrovert,” and “Affect (e.g. less interruptions).” This social/emotional factor is important and as found from the literature, as Tseng and Walsh’s (2016) mentioned, social interaction can foster various learning styles. This latent variable, however, was not statistically significant at predicting the online or in-person attendance. The highest statistically significant item had a standardized beta of -.936 and was “Positive past experiences with online.” One might think that since it was a negative number, the opposite would be negative past experiences, but it is actually the lack of positive experiences. This was also found and supported in the literature. Jan (2015) found and cited four other references (Fletcher, 2005; Moore et al., 2002; Shen et al., 2013; Tyler-Smith, 2006) showing that students who had more experiences with online learning were more likely to be successful than those who had less online experience. The negative past experiences are a separate item with a standardized beta of .764, meaning that negative past experience online also greatly
impact social/emotional factors to participate online. In other words, for every one unit increase in “Social/Emotional factors to participate in online” there is a .936 decrease in positive past experiences, meaning that the lack of positive past experiences online has the greatest impact on this latent variable of social emotional factors to participate online. Additionally, for every one unit increase in “Social/Emotional factors to participate in online” there is a .595 increase in “Being an introvert or extrovert.” It is interesting to note that 14 out of 76 students self-identified as being neither an introvert or an extrovert. When we ran the model for our question of them self-identifying it was not statistically significant, but the one for “being an introvert or extrovert” was significant in the SEM model. The literature also shows that being an introvert or extrovert may be indicative of preferred online learning styles (Al-Dujaily et al., 2013). Lastly, for every one unit increase in “Social/Emotional factors to participate in online” there is a .447 increase in “Affect (e.g. less interruptions),” meaning that affect, like having like less interruptions, is an important social/emotional factor to participate online. The literature review also revealed that these emotional aspects are important to consider and “may hinder the learner’s progress” if not considered (Suero Montero & Suhoenen, 2014, p. 165). We also find this emotional and social factor a significant variable as did the SEM results similar to Suero Montero and Suhonen’s (2014), Tempelaar et al.’s (2012), and Tseng and Walsh’s (2016) findings. The analysis did not reveal any items from our survey that would predict, in a statistically significant way, that latent variable “Social/Emotional factors to participate in online,” but future research could add additional survey items that might be more statistically significant or predictive.

Additionally, each of these variables or factors as shown in rectangles in Figure 4 could be broken down into smaller components for greater insight and potentially could allow us to
predict the outcome variable of students’ behavior of attending class. These latent variables could also potentially be coupled with other latent variables not included in our survey that might predict student behavior in attending online or in-person class sessions. For example, we might be able to find other variables not in our survey and create a new survey to find other latent variables or factors that might help predict our outcome variable. Additionally, we could dive deeper into each of our four items from the latent variables and expand them out to see if we can add to them with more survey questions to potentially make them more significant or more predictive of the outcome variable. Larger sample sizes could also make them become more predictive of our outcome variable.

**Latent Variable - Learning Preference/Comfort to Participate Online.** In our SEM findings, the other statistically significant latent variable was “Learning Preference/Comfort to Participate Online,” which was comprised of four significant factors “Flexibility in time and tempo (both),” “High interactivity,” “Videos used to teach,” and “Asynchronous.” This aligns with our literature review in that Song (2004), Jaggars (2012), and Alzahrani and O’Toole (2017) also found that comfort level to participate online is important. This latent variable was also not significant at predicting the online or in-person attendance. The latent variable is significant in that it indicates student preferences, but is not predictive of actual attendance. The highest statistically significant item had a standardized beta of 1.011, which was whether or not the online offering was “Asynchronous.” This means that for every one unit increase in “Learning Preference/Comfort to Participate Online,” there is a 1.011 increase in the desire for it to be “Asynchronous.” Additionally, “Flexibility” was the second most significant factor for this latent variable. For every one unit increase in “Learning Preference/Comfort to Participate Online,” there is a .764 increase in a preference for “Flexibility in time and tempo (both).” Students want
and prefer that flexibility for online offerings as we found in the literature as well (Koper, 2015). For every one unit increase in “Learning Preference/Comfort to Participate Online,” there is a .371 increase in the preference for videos being used to teach. This means that students want videos for online instruction as also found in the literature. For example, Boateng et al. (2016) also found that students perceive “videos in general as being of some benefit to their learning activities” (p. 1). Lastly, for every one unit increase in “Learning Preference/Comfort to Participate Online,” there is a .362 decrease in a preference for “High interactivity,” which could mean that students learning preference to participate online is less likely if it requires a high level of interactivity. We actually found this in our interviews too. Some students did not want to participate online because it was too interactive. They said they would rather sit in class and just listen while multi-tasking. In the literature, on the flip-side, students usually want interactivity as Croxton (2014) found and referenced three other studies (Chejlyk, 2006; Keeler, 2006; Kuo et al., 2014) that interactivity is a strong predictor of student satisfaction. While some students want interactivity, other students do not, depending on the level of interactivity, the context, and the situation.

In our SEM analysis, we also found two variables from our survey that were statistically significant at predicting one of our latent variables, “Learning Preference/Comfort to Participate Online.” The two were the “Number of Types of Previous Experience with Online” and “Pacing” that could predict the “Learning Preference/Comfort to Participate Online” factor, both of which are statistically significant at predicting it within our SEM model. The first one is of interest because if a student has had several types of online learning experiences with different types of online such as synchronous, asynchronous, interactive/hands-on, and other online experiences, then that may predict their “Learning Preference/Comfort to Participate Online.” Additionally, if
a student knows how important “Pacing” is in their decision to participate in online, then it may help predict their “Learning Preference/Comfort to Participate Online.”

**What are College Students’ Stated Preferences for Online vs. In-Person Sessions in a Blended Online Course?** We synthesized and categorized students’ stated preferences from the literature as shown in Table 1. Students’ preferences for online vs. in-person sessions in a blended online course were analyzed in our research as shown in Table 7 and in Table 13. Table 7 shows their preferences in order of importance. Table 13 shows their preferences to how many online class sessions they would prefer. Additionally, two latent variables of “Learning Preferences/Comfort to participate online” and “Social/Emotional factors to participate in online” were statistically significant in our SEM model that demonstrate student preferences to participate online.

We also found via surveys as shown in Table 10 that the preferred mix of blend in our context is 52.04% of the lectures live in-person, 17.06% of the lectures as hands-on online interactive modules (asynchronous – on-demand), 15.26% of the lectures online pre-recorded lectures (asynchronous – on-demand), and 15.64% of the lectures as online synchronous live lectures (live Zoom like). However, if they have to pick an online delivery method as shown in Table 11, the majority of students pick online synchronous live lectures (live Zoom like). Table 10 also matches well with our interviews because students said they prefer in-person lectures, but they want some online class sessions, especially when it is convenient for them.

**Qualitative Results**

Two of our three research questions are related to our qualitative findings. The next two sections will address the qualitative findings in the research questions.
When Students’ Actions Contradict Their Stated Preferences for Choosing Online Learning, What Reasons Do Students Give for This Contrary Action and Can We Predict It? In addition to our quantitative finding of why 30% of students do not participate in their predicted attendance as shown in Table 5, we showed in Figure 5 that our qualitative research found that the reason the 30% of students did not accurately self-predict if they would attend online or in-person was because of convenience. Before COVID-19, when the option was to attend an online class session, the main reason for not participating even though they wanted some online class sessions was because it was convenient as they were already on campus. Since COVID-19, we found the reverse where students were not on-campus and so they did the online class session because it was more convenient even though they wanted and predicted to attend in-person. Overall, the students said they prefer in-person the most because of personal (e.g., “I will focus better”) and pedagogical (e.g., “I can interact with the professor and other students more easily”) reasons and if they were on campus they would attend, but if it is not convenient to be in-person then they will choose online.

The literature shows that convenience is a main factor for students in participating online (Northrup, 2009; McBrien et al., 2009; Serdyukov & Serdyukova, 2006), but not as the main factor for blended learning. Serdyukov and Serdyukova (2006) found that for online convenience was one of the most important factors for adult learning. On the other hand, Hannay and Newvine (2006) found that convenience is not the most important factor, but quality is more important. In a blended context, convenience is mentioned a lot in the literature, but not as the main factor (Graham, 2006; Garrison & Vaughan, 2008; Owston et al., 2013). Barrett et al. (2019) for example, found that for oral presentation convenience is an important factor in
blended learning. We also found convenience as a factor in our literature review, which is why it was included in our synthesis of findings that we created in Table 1.

In our research we found that for a blended course, convenience is the main reason students choose to not participate in what they prefer and also in what they predict they will attend. The unique aspect of our research is that even though students say they want online class sessions, but then they do not participate, we did not know why. Now we have more evidence to suggest that convenience is the main reason for not participating in a blended context even when a student may prefer it, similar to how Serdyukov and Serdyukova (2006) found that convenience was the main reason for participating online. However, if the quality of online instruction is poor then students may not choose to continue to participate and future research could be done in that area.

In our qualitative research, it was also interesting to note that in the interviews four of 13 students mentioned that “Pacing” with the ability to watch videos at multiple speeds was important to them. This relates the SEM model with “Pacing” as a predictive variable for “Learning Preference/Comfort to Participate Online.” Some additional insights from our qualitative research can be found in the response to each research question below. To specifically answer our initial research questions that include some qualitative and quantitative aspects, we will address each question below.

**Have Students’ Learning Preferences Been Affected by COVID-19 Conditions? If so, How and in What Ways?** In our quantitative research, we showed in Table 8 that students’ definitions of ‘online’ have changed. For their pre-COVID definition of “online,” it had the most students (30 out of 74) with the definition of “You can participate anywhere and it is not a live lecture (asynchronous; on-demand; pre-recorded).” The post-COVID definition of “online” for
the most students was (45 out of 74): “You can participate anywhere and it is a live (zoom like) lecture (synchronous).” Table 9 also shows that students’ definitions of “online” changed during a semester, which was statistically significant. Thus, COVID-19 conditions may have had an important effect on the definition of online learning. This was supported by students’ answer to the question, “Has COVID-19 impacted your learning preferences?” According to our results (see Table 12), 68% of students said “Yes” COVID-19 has impacted their learning preferences. We found out how they were impacted in our interviews.

In our interviews, we found that most students are more open to online than they were previously. However, one student said, “The idea of doing an online class seemed enjoyable or preferable almost, but now having gone through a lot of online classes and realizing how I learned in online classes, I definitely prefer in-person.” This student, after experiencing all of this online teaching because of COVID-19, now prefers in-person even more.

Another interesting quote from the interviews that relates to convenience is, “I don’t make it a habit of going to campus unless I have an in-person class and just that I would still rather be in-person, but online does have the values of convenience that otherwise wouldn't be available.” Convenience may have a greater impact on attendance in relation to blended learning than we may have realized previously.

**Limitations and Future Research**

Future research could be done in breaking these variables and items from Table 1 or from Figure 5 down into further fine-tuned items or include additional items we may have overlooked. For example, future research could potentially dive deeper into each one such as “High Interactivity” and find out more about what that means to students and re-run an SEM on a new data set with additional items. A larger sample size would be more ideal of at least N = 150
according to Worthington and Whittaker (2006); however, we meet their recommendation of 4:1 items per factor and more than 3:1 participant-to-item ratios, but they do recommend with the smaller sample sizes that all communalities have factor loadings greater than |.6|. Some of ours factors met that threshold while others did not. Future research could be done with a larger sample size to hopefully overcome those thresholds and make this research more statistically strengthened. Although the SEM converged, is a good fit, and provided insights on these latent variables, it did not predict in a statistically significant way whether the students would actually attend the online or in-person class session. However, our self-prediction variable by itself was statistically significant at predicting online or in-person attendance. Additional research could be done around blended learning and convenience to see if this can be generalizable to other contexts as well.
Conclusion

In conclusion, this study found that one question in a pre-survey, asking students to self-predict if they will attend in an online or in-person class session in a blended learning context, will provide a statistically significant prediction of their attendance. Universities and professors sometimes create or consider creating online or in-person class sessions that they would not normally offer as a blended alternative; however, knowing if the cost, effort, and time will be worth it if no one attends can be found out by that one question from our research. This study also found out why some students want and prefer some online class sessions, but ultimately do not participate in them even when they predicted that they would. The main reason from our findings is that convenience is the greatest determining factor if a student will ultimately attend an online or in-person class session.

We also summarized college students’ stated preferences for online vs. in-person class sessions in a blended online course and listed our findings in Tables 1, 7, 10, 11, and 13. Table 7 lists the items in order of importance to participate online. The top four items were “Your own learning preferences (e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.),” “Course design (e.g., pacing interactivity, synchronicity, adaptivity, etc.),” “Flexibility in time and tempo (both),” and “High interactivity.”

To better understand student preferences, we created an SEM that converged, had good fit, but could be strengthened statistically with a greater sample size. Although the SEM did not predict our outcome variable of actual attendance, it leads us to future research with two statistically significant latent variables that could be used along with other factors or items we have not explored to find out what it is that actually makes students choose to participate. Lastly, we found that students’ learning preferences have been affected by COVID-19 conditions,
including their definition of ‘online,’ but mainly students are more open to online learning now. However, some students are not as open to online learning and student preferences vary widely. With most students being more open to ‘online,’ we can additionally better meet their preferences by considering the findings from Table 1 and Table 7.
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APPENDIX A

Consent/Institutional Review Board Approval Letter

Memorandum

To: James Christensen, Ph.D.
   Department: BYU - E&T - Mechanical Engineering
   From: Sandee Aina, MPA, HRPP Associate Director

Wayne Larsen, MAcc, IRB Administrator
   Date: November 10, 2020

IRB#: IRB2020-344
   Title: Comparing Online vs. Face-to-face Classes in Engineering

Brigham Young University’s IRB has approved the research study referenced in the subject heading as exempt level, categories 1 and 2.
This study does not require an annual continuing review. Each year near the anniversary of the approval date, you will receive an email reminding you of your obligations as a researcher and to check on the status of the study. You will receive this email each year until you close the study.

The study is approved as of 11/10/2020. Please reference your assigned IRB identification number in any correspondence with the IRB.

Continued approval is conditional upon your compliance with the following requirements:

1. A copy of the approved informed consent statement can be found in iRIS. No other consent statement should be used. Each research subject must be provided with a copy or a way to access the consent statement.
2. Any modifications to the approved protocol must be submitted, reviewed, and approved by the IRB before modifications are incorporated in the study.
3. All recruiting tools must be submitted and approved by the IRB prior to use.
4. Instructions to access approved documents, submit modifications, report adverse events, can be found on the IRB website, iRIS guide: https://irb.byu.edu/iris-training-resources
5. All non-serious unanticipated problems should be reported to the IRB within 2 weeks of the first awareness of the problem by the PI. Prompt reporting is important, as unanticipated problems often require some modification of study procedures, protocols, and/or informed consent processes. Such modifications require the review and approval of the IRB. Please refer to the IRB website for more information.
APPENDIX B

Pre-Survey

Pre-survey BYU MechEng Class Sessions Student Preferences

Start of Block: Consent

Informed_consent

I consent to participate in this study by completing this survey:

☐ Yes (1)

☐ No (2)

End of Block: Consent

Start of Block: Demographics

first_name What is your FIRST name (please provide your name to help us correlate pre and post surveys)?

________________________________________________________________

last_name What is your LAST name (please provide your name to help us correlate pre and post surveys)?

________________________________________________________________
enrollment Which class are you enrolled in currently?

- Professor A’s programming class (MeEn 273)  (1)
- Professor B’s CAD class (MeEn 272)  (2)
- Both classes  (4)

credits How many credits are you currently enrolled in?

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

technical abilities How would you rate your current technical abilities with computers?

neophyte tech guru

1 2 3 4 5 6 6 7 8 9 10
What is your current employment status?

- unemployed (1)
- part-time (2)
- part-time (between 20-29 hours/week) (3)
- 3/4 time (between 30-39 hours/week) (4)
- full time (40+ hours/week) (5)

What year are you at in your schooling?

- freshman (1)
- sophomore (2)
- junior (3)
- senior (4)
- graduate student (5)
personality_type Would you describe yourself as an extrovert or an introvert?

- Extrovert (1)
- Introvert (2)
- Neither (3)

relationship_status What is your current relationship status?

- Single (1)
- Married (2)
- Divorced (3)
- Other (4) ____________________________

children Do you have any children?

- yes (1)
- no (2)
exp_directions The questions on this page seek to understand what your definition is of "online learning."

exp_before Before COVID-19 conditions, which of the following definitions BEST described ‘online’ for a course or class session for you?

- You can participate from anywhere with an internet connection (1)
- You can participate anywhere and it is a live (zoom like) lecture (synchronous) (2)
- You can participate anywhere and it is not a live lecture (asynchronous; on-demand; pre-recorded) (3)
- You can participate anywhere by completing interactive/hands-on learning modules (asynchronous; on-demand) (4)
- Other (please describe) (13) ________________________________________________
exp_after **AFTER** experiencing COVID-19 conditions, which of the following definitions BEST describes ‘online’ for a course or class session for you?

- You can participate from anywhere with an internet connection (1)
- You can participate anywhere and it is a live (zoom like) lecture (synchronous) (2)
- You can participate anywhere and it is *not* a live lecture (asynchronous; on-demand; pre-recorded) (3)
- You can participate anywhere by completing interactive/hands-on learning modules (asynchronous; on-demand) (4)
- Other (please describe) (13) ____________________________

---

Page Break
The remaining questions use the following definition of 'online' classes or lessons: "You can participate in it from anywhere with an internet connection."

exp_enrollment How many times have you participated in each of the following?

<table>
<thead>
<tr>
<th>fully online classes ()</th>
<th>0 10 20 30 40 50 60 70 80 90 100</th>
</tr>
</thead>
</table>

| online class sessions as part of a blended course (i.e., online+in-person) () |
|--------------------------|-------------------|

| 0 10 20 30 40 50 60 70 80 90 100 |
exp_type What types of online courses have you participated in (mark all that apply)?

☐ You can watch it anywhere and it is a live (zoom like) lecture (synchronous) (4)

☐ You can watch it anywhere and it is not live (pre-recorded) lecture (asynchronous – on-demand) (5)

☐ You can watch it anywhere and it is not live (interactive/hands-on) learning modules (asynchronous – on-demand) (6)

☐ Other (7) ________________________________

ext_rating Please rate your past experience with online courses on a scale of 1 to 10.

awful       amazing

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>fully online class ()</td>
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<tr>
<td>online class sessions as part of a blended course ()</td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
At some point during the semester, you will have the option to participate in a lesson in this class either in-person or online by completing an adaptive, asynchronous module. Which of the following modalities are you MOST LIKELY going to choose to participate in?

- [ ] in-person (1)
- [ ] online (2)

Why do you believe you are most likely to choose to participate in this modality?

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

End of Block: Experience

Start of Block: Preferences

Page Break
Preferences_intro The following questions seek to understand your preferences for online or in-person learning.

pref_features What features did you like the most from your PREVIOUS ONLINE (not in this class) experience that you would like in future online courses?

________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
pref_blended_types In a blended course, which would you prefer, more online or in-person class sessions?

- Mostly online sessions and a few in-person sessions (1)
- A few online sessions and mostly in-person sessions (2)
- About half online and half in-person sessions (5)
- All online class sessions (3)
- All in-class sessions (4)

preferred_delivery Which type of online delivery method would you prefer (assuming it is well-designed)?

- You can participate anywhere and it is a live (zoom like) lecture (synchronous) (4)
- You can participate anywhere and it is not a live lecture (asynchronous; on-demand; pre-recorded) (5)
- You can participate anywhere by completing interactive/hands-on learning modules (asynchronous; on-demand) (6)
Sort and rank the following features based on how likely they are to influence your decision to participate in an online session or course.

<table>
<thead>
<tr>
<th>Very Important</th>
<th>Somewhat Important</th>
<th>Minimally Important</th>
<th>Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy (i.e., create your own experience) (4)</td>
<td>Autonomy (i.e., create your own experience) (4)</td>
<td>Autonomy (i.e., create your own experience) (4)</td>
<td>Autonomy (i.e., create your own experience) (4)</td>
</tr>
<tr>
<td>Choice (i.e.; choose a learning path or learning option) (5)</td>
<td>Choice (i.e.; choose a learning path or learning option) (5)</td>
<td>Choice (i.e.; choose a learning path or learning option) (5)</td>
<td>Choice (i.e.; choose a learning path or learning option) (5)</td>
</tr>
<tr>
<td>Adaptivity (i.e., content presented changes based on my interactions/answers to course content) (6)</td>
<td>Adaptivity (i.e., content presented changes based on my interactions/answers to course content) (6)</td>
<td>Adaptivity (i.e., content presented changes based on my interactions/answers to course content) (6)</td>
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</tr>
<tr>
<td>Pacing (i.e., I can determine to complete the material at my own pace) (7)</td>
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</tr>
<tr>
<td>Flexibility in time and tempo (BOTH) (9)</td>
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<tr>
<td>High interactivity (10)</td>
<td>High interactivity (10)</td>
<td>High interactivity (10)</td>
<td>High interactivity (10)</td>
</tr>
<tr>
<td>Videos used to teach (11)</td>
<td>Videos used to teach (11)</td>
<td>Videos used to teach (11)</td>
<td>Videos used to teach (11)</td>
</tr>
<tr>
<td>Collaborative tools to work with peers (12)</td>
<td>Collaborative tools to work with peers (12)</td>
<td>Collaborative tools to work with peers (12)</td>
<td>Collaborative tools to work with peers (12)</td>
</tr>
<tr>
<td>Asynchronous (i.e., on-demand) (13)</td>
<td>Asynchronous (i.e., on-demand) (13)</td>
<td>Asynchronous (i.e., on-demand) (13)</td>
<td>Asynchronous (i.e., on-demand) (13)</td>
</tr>
<tr>
<td>Synchronous (i.e., live) (14)</td>
<td>Synchronous (i.e., live) (14)</td>
<td>Synchronous (i.e., live) (14)</td>
<td>Synchronous (i.e., live) (14)</td>
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</tbody>
</table>

Page Break
To what extent do each of the following factors influence your decision to participate in an online class or online class session in a course?

Drag items from the following list to one of the 3 bins below (very important, somewhat important, minimally important, not important). Then, rank order the items in each bin from MOST to LEAST important.

<table>
<thead>
<tr>
<th>Very Important</th>
<th>Somewhat Important</th>
<th>Minimally Important</th>
<th>Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>______ Course design (e.g., pacing, interactivity, synchronicity, adaptivity, etc.) (1)</td>
<td>______ Course design (e.g., pacing, interactivity, synchronicity, adaptivity, etc.) (1)</td>
<td>______ Course design (e.g., pacing, interactivity, synchronicity, adaptivity, etc.) (1)</td>
<td>______ Course design (e.g., pacing, interactivity, synchronicity, adaptivity, etc.) (1)</td>
</tr>
<tr>
<td>______ Your own learning preferences (e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.) (16)</td>
<td>______ Your own learning preferences (e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.) (16)</td>
<td>______ Your own learning preferences (e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.) (16)</td>
<td>______ Your own learning preferences (e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.) (16)</td>
</tr>
<tr>
<td>______ Technical skill (17)</td>
<td>______ Technical skill (17)</td>
<td>______ Technical skill (17)</td>
<td>______ Technical skill (17)</td>
</tr>
<tr>
<td>______ Timing in life (i.e., year in school, age, older) (18)</td>
<td>______ Timing in life (i.e., year in school, age, older) (18)</td>
<td>______ Timing in life (i.e., year in school, age, older) (18)</td>
<td>______ Timing in life (i.e., year in school, age, older) (18)</td>
</tr>
<tr>
<td>______ Current employment (19)</td>
<td>______ Current employment (19)</td>
<td>______ Current employment (19)</td>
<td>______ Current employment (19)</td>
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</tbody>
</table>
| ______ Life circumstances (e.g., circumstances (e.g., circumstances (e.g., circumstances (e.g,
<table>
<thead>
<tr>
<th>Preference</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disability, health, etc.</td>
<td>20</td>
</tr>
<tr>
<td>Property Availability (e.g., transportation, comfort of home)</td>
<td>29</td>
</tr>
<tr>
<td>Convenience of being on campus</td>
<td>21</td>
</tr>
<tr>
<td>Social factors such as collaboration (e.g., group work, etc.)</td>
<td>22</td>
</tr>
<tr>
<td>Social factors such as working alone (e.g., prefer to self-study, etc.)</td>
<td>23</td>
</tr>
<tr>
<td>Negative past experiences from online</td>
<td>24</td>
</tr>
<tr>
<td>Positive past experiences from online</td>
<td>25</td>
</tr>
<tr>
<td>Being an introvert or extrovert</td>
<td>26</td>
</tr>
<tr>
<td>Affect (e.g., Less interruptions)</td>
<td>27</td>
</tr>
<tr>
<td>Affect (e.g., Enjoy QAs of others)</td>
<td>28</td>
</tr>
</tbody>
</table>

End of Block: Preferences
APPENDIX C

Post-Survey

Post-survey BYU MechEng Class Sessions Student Preferences

My name is James Christensen; I am a researcher at Brigham Young University and I am conducting this research under the supervision of Professor Peter Rich, from the Department of Instructional Psychology & Technology. You are being invited to participate in a research study of the effectiveness and benefits of online vs. face-to-face class sessions. I am interested in finding out about the effectiveness of and benefits of online classes versus face-to-face classes.

You are invited to complete the attached survey. This should take approximately 5-10 minutes of your time. Your participation will be made anonymous to your professor and in any publications. We may keep the data for future research but you will be de-identified and made anonymous. You may be contacted again in the future for an interview. You will not be paid for being in this study. This survey involves minimal risk to you. The benefits, however, may impact society by helping increase knowledge about online and blended learning.

You do not have to participate in this study if you do not want to. You do not have to answer any question that you do not want to answer for any reason. We will be happy to answer any questions you may have about this study. If you have further questions about this project or if you have a research-related problem you may contact me, James Christensen at jamesmax@byu.edu or my advisor, Peter Rich at peter_rich@byu.edu.
If you have any questions about your rights as a research participant you may contact the Human Research Protection Program at Brigham Young University, Provo, UT 84602; irb@byu.edu; (801) 422-1461. They review research studies to protect the rights and welfare of research participants.

The completion of this survey implies your consent to participate. If you choose to participate, please complete the attached survey and return it as soon as possible. Thank you!

---

consent I consent to participate in this study by completing this survey:

- [ ] Yes (1)
- [ ] No (2)
first_name What is your FIRST name (please provide your name to help us correlate pre and post surveys)?

________________________________________________________________

last_name What is your LAST name (please provide your name to help us correlate pre and post surveys)?

________________________________________________________________
age What age are you?

- Under 18 (1)
- 18 - 24 (2)
- 25 - 34 (3)
- 35 - 44 (4)
- 45 - 54 (5)
- 55 - 64 (6)
- 65 - 74 (7)
- 75 - 84 (8)
- 85 or older (9)

gender What is your gender?

- Male (1)
- Female (2)
enrollment Which class are you enrolled in currently?

- Professor A’s programming class (MeEn 273) (1)
- Professor B’s CAD class (MeEn 272) (2)
- Both classes (4)

Display This Question:
If Which class are you enrolled in currently? = Professor B’s CAD class (MeEn 272)
Or Which class are you enrolled in currently? = Both classes
Professor Bs_one_attendn Which did you do/attend this semester when there was a one-time online offering besides Zoom in Professor B's CAD class (MeEn 272)? (Mark all that apply)

☐ A part of the one-time online pre-recorded videos class (not Zoom recording) (asynchronous – on-demand near Feb 9th) (8)

☐ The entire one-time online pre-recorded videos class (not Zoom recording) (asynchronous – on-demand near Feb 9th) (7)

☐ Part of the in-person class session when the one-time pre-recorded videos (Not Zoom) class session was offered on Feb 9th (3)

☐ The entire in-person class session when the one-time pre-recorded videos (Not Zoom) class session was offered on Feb 9th (4)

Display This Question:
If Which class are you enrolled in currently? = Professor B’s CAD class (MeEn 272)
Or Which class are you enrolled in currently? = Both classes
Professor B attendance Which did you do/attend this semester in Professor B's CAD class (MeEn 272)? (Mark all that apply)

☐ Part of an in-person class session by Professor B (1)

☐ An entire in-person class session by Professor B (2)

☐ Only parts of an online live class session via Zoom (synchronous) (6)

☐ An entire online live class session via Zoom (synchronous) (5)

---

Display This Question:

If Which class are you enrolled in currently? = Professor A’s programming class (MeEn 273)
Or Which class are you enrolled in currently? = Both classes
Professor As attendance Which did you do/attend this semester in Professor A's programming class (MeEn 273)? (Mark all that apply)

☐ A part of Dr. Professor A's MeEn 273 in-person class session on January 19th (1)

☐ The entire session of Dr. Professor A's MeEn 273 in-person class on January 19th (2)

☐ A part of the interactive online module for MeEn 273 on the week of January 19th (on-demand) (3)

☐ Completed the entire interactive online module for MeEn 273 the week of January 19th (on-demand) (4)

__________

* 

email If you are willing to participate in a Zoom interview to help our research, please provide your email.

________________________________________________________

________________________________________________________
Which of the following best defines ‘online’ for you?

- You can participate from anywhere with an internet connection (1)
- You can participate anywhere and it is a live (zoom like) lecture (synchronous) (2)
- You can participate anywhere and it is not a live lecture (asynchronous; on-demand; pre-recorded) (3)
- You can participate anywhere by completing interactive/hands-on learning modules (asynchronous; on-demand) (4)
- Other (please describe) (13) ________________________________________________

For the questions below, assume that ONLINE means you can participate anywhere with an internet connection. Also, if not stated, assume it is the online method you prefer (live or on-demand) and assume it is well designed.
preferred_delivery Which type of online delivery method do you prefer (assuming it is well designed)?

- You can participate anywhere and it is a live (zoom like) lecture (synchronous) (1)
- You can participate anywhere and it is not a live lecture (asynchronous; on-demand; pre-recorded) (2)
- You can participate anywhere by completing interactive/hands-on learning modules (asynchronous; on-demand) (3)

pref_blended_types In a course, which would you prefer, more online or in-class sessions?

- Mostly online sessions and a few in-class sessions (1)
- A few online sessions and mostly in-class sessions (2)
- About half online and half in-person sessions (5)
- All online class sessions (3)
- All in-class sessions (4)
percent_preferred What percentage of mix would you like for class sessions (assuming it is well designed)?

Hands-on online interactive modules (asynchronous – on-demand) : _______ (1)

Online pre-recorded lectures (asynchronous – on-demand) : _______ (2)

Online synchronous live lectures (live Zoom like) : _______ (3)

Live in-person lectures : _______ (4)

Total : _______

took_presurvey Did you take the pre-survey?

- Yes (1)

- No (2)

Display This Question:
If Did you take the pre-survey? = Yes
participate_in_pref Did you participate in the delivery modality (online live via Zoom, in-person, online pre-recorded & on-demand, interactive online & on-demand) you indicated that you preferred in the pre-survey?

○ Yes (1)

○ No (2)

Display This Question:
If Did you take the pre-survey? = Yes
And Did you participate in the delivery modality (online live via Zoom, in-person, online pre-recorded... = No

WhyNotPartcip Why did you not participate in the delivery modality you preferred in the pre-survey?

________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
Sort and rank how the following features impacted your decision to participate in the online session instead of the in-person course?

<table>
<thead>
<tr>
<th>Highly Impacted</th>
<th>Somewhat Impacted</th>
<th>Minimally Impacted</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy (i.e., create your own experience) (1)</td>
<td>Autonomy (i.e., create your own experience) (1)</td>
<td>Autonomy (i.e., create your own experience) (1)</td>
<td>Autonomy (i.e., create your own experience) (1)</td>
</tr>
<tr>
<td>Choice (i.e.; choose a learning path or learning option ) (2)</td>
<td>Choice (i.e.; choose a learning path or learning option ) (2)</td>
<td>Choice (i.e.; choose a learning path or learning option ) (2)</td>
<td>Choice (i.e.; choose a learning path or learning option ) (2)</td>
</tr>
<tr>
<td>Adaptivity (i.e., content presented changes based on my interactions/answers to course content) (3)</td>
<td>Adaptivity (i.e., content presented changes based on my interactions/answers to course content) (3)</td>
<td>Adaptivity (i.e., content presented changes based on my interactions/answers to course content) (3)</td>
<td>Adaptivity (i.e., content presented changes based on my interactions/answers to course content) (3)</td>
</tr>
<tr>
<td>Pacing (i.e., I can determine to complete the material at my own pace) (4)</td>
<td>Pacing (i.e., I can determine to complete the material at my own pace) (4)</td>
<td>Pacing (i.e., I can determine to complete the material at my own pace) (4)</td>
<td>Pacing (i.e., I can determine to complete the material at my own pace) (4)</td>
</tr>
<tr>
<td>Flexibility in time and tempo (BOTH) (5)</td>
<td>Flexibility in time and tempo (BOTH) (5)</td>
<td>Flexibility in time and tempo (BOTH) (5)</td>
<td>Flexibility in time and tempo (BOTH) (5)</td>
</tr>
<tr>
<td>High interactivity (6)</td>
<td>High interactivity (6)</td>
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<td>High interactivity (6)</td>
</tr>
<tr>
<td>Videos used to teach (7)</td>
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<td>Videos used to teach (7)</td>
<td>Videos used to teach (7)</td>
</tr>
<tr>
<td>Collaborative tools to work with peers (8)</td>
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<td>Collaborative tools to work with peers (8)</td>
<td>Collaborative tools to work with peers (8)</td>
</tr>
<tr>
<td>Asynchronous (i.e., on-demand) (9)</td>
<td>Asynchronous (i.e., on-demand) (9)</td>
<td>Asynchronous (i.e., on-demand) (9)</td>
<td>Asynchronous (i.e., on-demand) (9)</td>
</tr>
</tbody>
</table>
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<table>
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<tr>
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<th>Somewhat Impacted</th>
<th>Minimally Importanted</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course design</td>
<td>Course design</td>
<td>Course design</td>
<td>Course design</td>
</tr>
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<td>(e.g., pacing,</td>
<td>(e.g., pacing,</td>
<td>(e.g., pacing,</td>
<td>(e.g., pacing,</td>
</tr>
<tr>
<td>interactivity,</td>
<td>interactivity,</td>
<td>interactivity,</td>
<td>interactivity,</td>
</tr>
<tr>
<td>synchronicity,</td>
<td>synchronicity,</td>
<td>synchronicity,</td>
<td>synchronicity,</td>
</tr>
<tr>
<td>adaptivity, etc.) (1)</td>
<td>adaptivity, etc.)</td>
<td>adaptivity, etc.)</td>
<td>adaptivity, etc.) (1)</td>
</tr>
<tr>
<td>Your own learning preferences</td>
<td>Your own learning preferences</td>
<td>Your own learning preferences</td>
<td>Your own learning preferences</td>
</tr>
<tr>
<td>(e.g., motivation for taking the course, interest in the topic, perceived ease of the course, sense of control, etc.) (2)</td>
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- Social factors such as collaboration (e.g., group work, etc.) (9)

- Social factors such as working alone (e.g., prefer to self-study, etc.) (10)

- Negative past experiences from online (11)

- Positive past experiences from online (12)

- Being an introvert or extrovert (13)

- Affect (e.g., Less interruptions) (14)

- Affect (e.g., Enjoy QAs of others) (15)

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- Affect (e.g., Enjoy QAs of others) (15)
previous_participnt What types of online instruction have you participated in prior to this course (mark all that apply)?

☐ You can watch it anywhere and it is a live (zoom like) lecture (synchronous) (4)

☐ You can watch it anywhere and it is not live (pre-recorded) lecture (asynchronous – on-demand) (5)

☐ You can watch it anywhere and it is not live (interactive/hands-on) learning modules (asynchronous – on-demand) (6)

COVID_Impact Has COVID-19 impacted your learning preferences?

☐ Yes (1)

☐ No (2)

why_COVID_impact In what ways have your preferences to online been impacted by COVID-19?

End of Block: Informed Consent
APPENDIX D

Interview Protocol

Interviews BYU MechEng Class Sessions Student Preferences

Start of Block: Informed Consent

informed_consent Informed Consent

My name is James Christensen; I am a researcher at Brigham Young University and I am conducting this research under the supervision of Professor Peter Rich, from the Department of Instructional Psychology & Technology. You are being invited to participate in a research study of the effectiveness and benefits of online vs. face-to-face class sessions. I am interested in finding out about the effectiveness of and benefits of online classes versus face-to-face classes.

You are invited to complete the attached survey and interview. This should take approximately 15-20 minutes of your time. Your participation will be made anonymous to your professor and in any publications. We may keep the data for future research but you will be de-identified and made anonymous. You may be contacted again in the future for an interview. You will not be paid for being in this study. This survey involves minimal risk to you. The benefits, however, may impact society by helping increase knowledge about online and blended learning.

You do not have to participate in this study if you do not want to. You do not have to answer any question that you do not want to answer for any reason. We will be happy to answer any questions you may have about this study. If you have further questions about this project or if you have a research-related problem you may contact me, James Christensen at jamesmax@byu.edu or my advisor, Peter Rich at peter_rich@byu.edu.
If you have any questions about your rights as a research participant you may contact the Human Research Protection Program at Brigham Young University, Provo, UT 84602; irb@byu.edu; (801) 422-1461. They review research studies to protect the rights and welfare of research participants.

The completion of this survey implies your consent to participate. If you choose to participate, please complete the attached survey and return it as soon as possible. Thank you!

------------------------------------------------------------

consent

I consent to participate in this study by completing this survey:

○ Yes (1)

○ No (2)

------------------------------------------------------------

first_name

What is your FIRST name (please provide your name to help us correlate pre and post surveys)?

------------------------------------------------------------
What is your LAST name (please provide your name to help us correlate pre and post surveys)?

________________________________________________________________

In a course, which would you prefer, more online or in-class sessions?

- Mostly online sessions and a few in-class sessions (1)
- A few online sessions and mostly in-class sessions (2)
- About half online and half in-person sessions (5)
- All online class sessions (3)
- All in-class sessions (4)

Sort and rank how the following features impacted your decision to participate in the online session instead of the in-person course?

<table>
<thead>
<tr>
<th>Highly Impacted</th>
<th>Somewhat Impacted</th>
<th>Minimally Impacted</th>
<th>No Impact</th>
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<td>Adaptivity (content presented changes based on my interactions/answers to course content)</td>
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<td>Pacing (I can determine to complete the material at my own pace)</td>
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<td>Flexibility in time and tempo (BOTH)</td>
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<td>High interactivity</td>
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<td>Videos used to teach</td>
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<td>Collaborative tools to work with peers</td>
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<td>Asynchronous (i.e., on-demand)</td>
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<td>Synchronous (i.e., live)</td>
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1. (If participant is from last year) Do you have any questions about the survey?
2. Do you remember the optional online class sessions in Dr. Professor A’s or Dr. Professor B’s course?
3. Do you remember in your survey that you stated that you wanted some online class sessions?
4. Do you remember that you went in-person instead of doing the online module?
5. We are curious why you choose not to participate in the online module and would like to understand why. Can you please provide some insights?
6. Is that the biggest reason? Can you explain?
7. Are there additional reasons that you chose to attend in-person rather than complete the online module that you can explain?
8. What might encourage you more to participate in theses online class sessions?
9. How has COVID-19 impacted your preferences toward online class sessions?