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Impacts of Modality Change and Preventative Measures as a Result of the COVID-19 Pandemic on Students' Satisfaction and Engagement

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A number of research studies have been performed with regards to the distinction and impact of modality differences between face-to-face and distance education modalities. However, with the worldwide spread of the Coronavirus / Covid-19 in the Spring of 2020, primary education to graduate institutions were forced to change modality in order to reduce the spread of the disease. A vast number of students, as a result, were forced to transition from traditional face-to-face courses to online distance education courses, with very little warning. This study analyzed what impacts those changes have on the students that are studying for degrees as part of the Aviation Sciences Department at a University within the State of Utah by utilizing a three-part survey that included a demographic question section, a series of Likert statements and three open-ended questions. Emphasis was given to try and understand the impact on student satisfaction and student engagement as a result of the changes that were required as a result of the Coronavirus / Covid-19 pandemic. Descriptive statistical findings of this study, along with a qualitative trend analysis of the responses to the open-ended questions, showed a drop in perceived engagement among the sample population to distance education modalities. In addition, the study showed a trend of negative student perception of the precautions taken as a result of the pandemic, along with instructor preparation to the modality changes. The study found that while there was strong student perception of satisfaction within the Likert statements, that a strong degree of frustration was exhibited in the open-ended questions.

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The Coronavirus / Covid-19 pandemic hit every facet of life to varying degrees. This caused a paradigm shift for some within the learning community, changing from traditional face-to-face classes to classes delivered purely online to limit the spread of the virus among students and school employees. According to the U.S. Census Bureau, "93% of people in households with school-age children reported their children engaged in some form of "distance learning" from home" (Mcelrath, 2020). This change was feared to have an immediate and profound negative impact on those students that suddenly found themselves learning through computers and other distance education methods rather than in face-to-face classes (Goldstein, 2020).

Distance education, virtual classrooms, online learning, massive open online courses are just a few names that digital learning has gone by. According to Simonson and Seeersaud (2019), distance education can be defined as "institution-based, formal education where the learning group is separated, and where interactive telecommunications systems are used to connect learners, resources, and instructors" (p. 1).

A comparative review of distance education through different media types undergone in 1999 found that there was no significant difference and that the delivery medium contributed little to the effectiveness of the instructional outcome (Russell, 1999). A 2017 study found that students in online classes that received instruction via video or other digital delivery methods did as well as students taking face-to-face classes (Chingos et al., 2017). Conversely, a 2018 study showed that when students were randomly selected to either take a distance education course or a face-to-face course, students in the face-to-face class performed better on tests and post-test instructor questions (Arias et al., 2018). There can be a clear differential between those courses that had a deliberate and methodical development process before being delivered to students and those courses that found that they had to be shifted to a distance education format in an emergency setting (Hodges et al., 2020).

One aspect that can reliably be linked to positive student outcomes, such as a measure of critical thinking and higher grades, is the student's engagement (Carini et al., 2006). The concept of student engagement can be broken down into four areas, which are emotional engagement, physical engagement, cognitive engagement in class, and cognitive engagement out of class (Burch et al., 2015).

The other aspect of student learning, either in a face-to-face class or via a distance education course, is the satisfaction of the student to the class. Student satisfaction can have many different factors related to the student's overall satisfaction within a course, including instructor presence within the course, quality of the course itself, and the amount of work versus the perceived learning by the student (Caskurlu et al., 2020). Previous studies have indicated that student satisfaction is higher for those students that complete coursework in a face-to-face modality (Furlonger & Gencic, 2014). Other studies have shown that students show higher satisfaction levels when enrolled in face-to-face classes (Johnson et al., 2000). One 2016 study

showed that, while student satisfaction was higher for face-to-face classes when viewed from the metric of instructor communication, there was no difference between face-to-face and distance education courses (Cole, 2016). Some studies have found that when courses are transitioned from a face-to-face modality to distance-based, student satisfaction goes down (Guest et al., 2018).

Research Methodology

The study utilized a mixed-method methodology that was delivered in the form of an anonymous survey. The mixed-method style of research enables narratives to be added to studies that traditionally have only had quantitative data, giving a greater picture of the studied subject (Hesser-Biber, 2010). Furthermore, mixed-method research considers "multiple viewpoints, perspectives, positions, and standpoints" when trying to understand the subject being studied (Johnson et al., 2007). Permission to perform this research study was approved by the Institutional Review Board at the University (IRB Protocol #684).

The study was conducted at a public, dual mission university. The student population chosen for this study were students that were currently enrolled in classes during the Spring of 2021 semester.

At the beginning of 2020, classes within the Aviation Sciences Department encompassed a wide range of modality and delivery methods, including in-person face-to-face classes, hybrid classes that would occasionally meet face-to-face, but also had a significant online aspect, and courses that were taught entirely online. In March 2020, it was announced that almost all classes at the university would transition to an online-only environment, including current classes that had a face-to-face aspect to the teaching modality in order to safeguard both students and instructors.

Research Questions

The following research questions guided this study in determining the perceptions, satisfaction, and engagement that current, active students taking courses within the Aviation Sciences Department have in response to changes as a result of the Coronavirus/COVID-19 pandemic.

Research Question 1 (RQ1): What is the perception of the impact of the Coronavirus/COVID-19 pandemic amongst Department of Aviation Sciences students at Utah Valley University?

Research Question 2 (RQ2): What has been the impact on student satisfaction as a result of instructional and modality changes within the Department of Aviation Sciences in response to the Coronavirus/COVID-19 pandemic at Utah Valley University?

Research Question 3 (RQ3): What has been the impact on student engagement as a result of instructional and modality changes within the Department of Aviation Sciences in response to the Coronavirus/COVID-19 pandemic at Utah Valley University?

Research Question 4 (RQ4): What preferences do Department of Aviation Sciences students at Utah Valley University have with regards to instructional and modality types in the context of a continued Coronavirus/COVID-19 pandemic?

Survey Instrument

The population for the research instrument was students, full-time or part-time, that were enrolled in any class within the Aviation Sciences Department at the university within the State of Utah. An email was sent to all potential participants utilizing university-provided student email addresses. The population group for the survey consisted of approximately 740 students that were currently enrolled at the university.

Content validity was assured by forwarding the survey to several other faculty members for review. These suggestions were incorporated into the final research instrument. Student satisfaction and engagement questions were also developed after a review of the 2020 National Survey of Student Engagement Survey Instrument (Center for Postsecondary Research, 2020).

Data for the survey instrument was collected utilizing the Qualtrics system of online survey software. A total of 741 students were emailed, and of those potential participants, 94 individuals clicked the link to go to the study page, with a further 91 agreeing to the study consent form and answering the study questions. Thus a response rate of 12.28% was obtained.

Demographic Questions

Once within the survey instrument, participants were asked a number of demographic questions. The first demographic question asked the gender identity of participants. Of those that participated in the survey, the majority identified as male (82.42%, N=75), a much smaller number identified as female (14.29%, N=13). 2 participants preferred not to respond to these questions (2.2 %), and one identified as another category (1.1%).

The participants were next asked to identify their degree at the university. Of the degrees represented within the study, the majority of participants were students enrolled in the Professional Pilot major (79.12%, N=72), while the rest were students enrolled in the Aviation Management majors (19.78%, N=18). One student (1.1%, N=1) responded that they were enrolled in both majors.

The next demographic question asked the participants how many years they were enrolled as a student within the university. Here the majority of participants had been enrolled for two years (37.36%, N=34), 19 participants (20.88%, N=19) had been enrolled less than one year, while 10 (10.99%, (N=10)) had been enrolled for one year. 15 participants (16.48%, N=15)) had been enrolled for three years, while 12 (13.19%, N=12) had been enrolled for four years. One participant (1.1%, N=1)) had been enrolled for six years.

Participants were then asked if they required a student visa to attend classes, and 4 participants indicated that they did (4.4%, N=4). The remainder of the participants (95.60%, N=87) indicated that they did not need a visa.

The final demographic question asked participants to select the different types of classes they had been part of. At the time of the study, students were only enrolled in either synchronous or asynchronous classes. However, the instrument only recorded one option per participant. This demographic variable was omitted from any further analysis.

After the demographic questions, a total of 24 Likert scale statements were presented to the participants (Table 1).

Table 1
Summary of Likert Statement Responses

	Likert Statement	Strongly Disagreed	Disagreed	Agreed	Strongly Agreed	Total
1	The Coronavirus/COVID-19 pandemic has had a significant impact on my studies at UVU.	5	12	34	40	91
2	The Coronavirus/COVID-19 pandemic has had a significant impact on my studies within the Department of Aviation Sciences at UVU.	4	13	32	42	91
3	The Coronavirus/COVID-19 pandemic has required me to make changes to the way I study for classes and assignments.	5	13	38	35	91
4	I feel that the Aviation Sciences Department at UVU has done everything they can in response to the Coronavirus/COVID-19 pandemic.	3	18	50	20	91
5	I feel that the Aviation Sciences Department at UVU could have done more in response to the Coronavirus/COVID-19 pandemic.	13	49	19	10	91
6	I feel that the Aviation Sciences Department at UVU did too much in response to the Coronavirus/COVID-19 pandemic.	14	50	13	14	91
7	I am more interested in class/course material in a face-to-face classroom setting when taking classes.	3	16	23	49	91
8	I am more interested in class/course material when taking asynchronous online classes. Asynchronous classes do not require a student to "attend" class online at certain times.	20	32	27	12	91
9	I am more interested in class/course material when in synchronous online classes. Synchronous classes are online but have a scheduled time that students are required to "attend", such as scheduled times for instructors to teach via a live-stream video format.	22	38	25	6	91
10	I feel I am more focused on class content, activities, and assignments in a traditional face-to-face class.	4	12	25	50	91
11	I feel I am more focused on class content, activities, and assignments in an asynchronous class.	29	33	23	6	91
12	I feel I am more focused on class content, activities, and assignments in a synchronous class.	24	35	27	5	91

13	I feel I more focused on class content, activities, and assignments in a class that has an online component (hybrid, synchronous, asynchronous).	18	34	35	4	91
14	As a result of the changes within the Aviation Sciences Department in response to Coronavirus/COVID-19, I concentrate more on class discussions and activities.	15	47	24	5	91
15	As a result of the changes within the Aviation Sciences Department in response to Coronavirus/COVID-19, I am more interested in the work I do in my classes.	17	42	30	2	91
16	As a result of the changes within the Aviation Sciences Department in response to Coronavirus/COVID-19, I devote more effort to class discussions and activities.	19	34	35	3	91
17	I am satisfied with the changes that occurred within the Aviation Sciences Department in response to the Coronavirus/COVID-19 pandemic with regard to class delivery methods.	16	26	43	6	91
18	I am satisfied with the changes made to the flight training program within the Aviation Sciences Department in response to the Coronavirus/COVID-19 pandemic.	11	32	43	5	91
19	I am satisfied with previous and current protection efforts put in place by the Aviation Sciences Department in response to the Coronavirus/COVID-19 pandemic, including temporary suspension of the flight program in order to protect students and instructors, along with current increased testing and checks.	17	18	47	9	91
20	I am satisfied with the ability of instructors within the Aviation Sciences Department to make changes to the delivery of classes in response to the Coronavirus/COVID-19 pandemic.	6	13	63	9	91
21	I am satisfied with the communication that was provided to me regarding changes to class delivery within the Aviation Sciences Department in response to the Coronavirus/COVID-19 pandemic.	5	20	59	7	91
22	I am satisfied with the speed of class delivery changes within the Aviation Sciences Department in response to the Coronavirus/COVID-19 pandemic.	4	18	61	8	91
23	Given the changes that happened to class delivery methods in response to the Coronavirus/COVID-19 pandemic, overall, I am satisfied with my classes within the Aviation Sciences Department.	12	23	46	10	91
24	Given the changes that happened to class delivery methods in response to the coronavirus/COVID-19 pandemic, overall, I am satisfied with all my classes at UVU.	13	25	45	8	91

Analysis of Likert Statements

The Likert-scale statements listed in the research instrument were analyzed for internal reliability by using Cronbach's alpha. Cronbach's alpha is a general formula for estimating internal consistency based on a determination of how all items on a test compared to all other items and to the total test (Gay, Mills, & Airasian, 2006). George and Mallery (2003) have established the following Cronbach's alpha acceptance scale: " - > .9 – Excellent, - > .8 – Good, - > .7 – Acceptable, - > .6 – Questionable, - > .5 – Poor, and - < .5 – Unacceptable" (p. 231). Calculated alpha's approach 1 as the reliability increases, with .8 or higher being regarded as a good value for the alpha (Peterson, 1994). Using data results from all participants, the internal reliability of the instrument was found to have an alpha coefficient of .664. Given that this was the first use of these Likert statements, coupled with the uniqueness of the pandemic situation, this is understandable.

To better understand the relationship between the department variable and the Likert statements, a Pearson's correlation was computed utilizing the SPSS statistical software between the demographic variables and the Likert statement. Some significant correlation was found (Table 2).

Table 2
Pearson's correlation between demographic variables and Likert statements

Demographic Variable	Likert Statement	Pearson Correlation
Gender Identity	I feel that the Aviation Sciences Department at UVU has done everything they can in response to the Coronavirus/COVID-19 pandemic.	-.277
Degree	The Coronavirus/COVID-19 pandemic has had a significant impact on my studies at UVU.	.365
Degree	The Coronavirus/COVID-19 pandemic has had a significant impact on my studies within the Department of Aviation Sciences at UVU.	.409
Degree	The Coronavirus/COVID-19 pandemic has required me to make changes to the way I study for classes and assignments.	.272
Years Enrolled as a student at UVU	As a result of the changes within the Aviation Sciences Department in response to Coronavirus/COVID-19, I concentrate more on class discussions and activities.	-.341
Do you require a student visa to attend classes at UVU	The Coronavirus/COVID-19 pandemic has required me to make changes to the way I study for classes and assignments.	.221

Survey Open Ended Question Responses

Question 1: What thoughts, if any, do you have on the changes made to the Aviation Department's class delivery methods at UVU in response to the Coronavirus/COVID-19 pandemic?

A strong desire to have face-to-face classes developed from the responses (13.19%, N=12). Other trends included the desire for instructors to actually teach and deliver material rather than reduce the classes to self-taught lessons (14.29%, N=13). This was especially true for those students within the Professional Pilot program. Another trend commented on the cost associated with the change in class modality (3.30%, N=3). There was also a trend that some participants enjoyed the increased flexibility of the now online classes (5.49%, N=5). A final significant trend was the devotion and adaptation of the instructors to the courses being taught (5.49%, N=5).

Question 2: What thoughts, if any, do you have on the changes made to the Aviation Department's flight training program at UVU in response to the Coronavirus/COVID-19 pandemic?

This question was limited to those participants that either were new to the Aviation Sciences Department and thus not taking flying lessons or those that were not enrolled in the professional pilot program. As such, the majority (61.54%, N=56) either had no comment or admitted that they were too new to the program. Of those that did respond substantially (38.46%, N=35), a significant trend was frustration with preventative measures put in place to allow flight training to continue (12.09%, N=11). There were a noticeable number (7.69%, N=7) of participants that were supportive of the precautions put in place that enable flight lessons to continue.

Question 3: What changes, if any, would you make to the Aviation Department's response to the Coronavirus/COVID-19 pandemic?

The most significant trend here was once again a desire to have at least some face-to-face classroom instruction. Of those participants that entered information, thirteen (14.29%, N=13) expressed some sort of desire to have face-to-face classes, while only four (4.40%, N=4) expressed a desire for continued or increased online class modality. Other trends included comments on instructors' ability to instruct and operate in online modalities (7.69%, N=7). The precautions implemented within the department against the pandemic were also highlighted, with twelve (13.19%, N=12) participants mentioning either the mask requirements, testing requirements, or both.

Findings

The data from the Likert statements from all participants did yield a few notable strong agreements and disagreements. After the Likert statements were transferred into an ordinal series, any means greater than 2.5 indicated that more individuals agree with the statement than disagree. In looking at the first group of statements in regards to the pandemic in general (Table 1, Statements 1-6), the majority of participants agreed with the statements. The notable exception was statement 6, which stated, "I feel that the Aviation Sciences Department at UVU did too much in response to the Coronavirus/COVID-19 pandemic." The mean for this statement was 2.3.

With regards to the set of statements regarding students engagement (Table 2, Statements 7- 16), the statements with the majority of participant agreement are those that indicated a preference for face-to-face classes, with statements 7 and 10 having a mean value of 3.30 and 3.33, respectively. The rest of the student engagement statements (Statements 8, 9, 11-16) all received mean values less than 2.5. Notable was the mean for statement 11, which was 2.07.

The final group of Likert statements was regarding the satisfaction of the participant about the changes to their classes and coursework in the context of the pandemic (Table 3, Statements 17-24). Participants generally agreed with these statements, with not a single statement mean being less than 2.5. Critically, statement 20 and statement 22 received a mean of 2.82, and 2.80 respectively.

The open-ended survey questions were analyzed utilizing trend techniques in order to discover any similarities within the responses. After analyzing this qualitative data, three trends emerged from the responses to the open-ended questions. These trends were the desire for a face-to-face modality, frustration with the precautions put in place for the pandemic, and the importance for quality instructors in light of the modality change.

The desire for face-to-face modality was particularly evident from questions 1 and 3. Participants expressed a strong desire to return to some sort of face-to-face modality, either through traditional face-to-face classes as well as some sort of hybrid classes. Statements from participants include "I feel that I have suffered in learning as a result of being forced to take online classes", and "like saving a seat for a classroom or take it online and live stream the lessons". Also, participants expressed a desire to work within the precautions put in place within the pandemic if it resulted in more face-to-face modality classes. Such desire was expressed with comments such as "all aviation classes back in person, a waiver for illness risk, special care of those who are not baseline low risk".

The frustration with the precautions put in place was evident across all three open-ended questions. Participants were frustrated not only with the types of precautions but also the frequency of requiring them to follow such precautions. Typical statements included things such as "going to campus once a week to get tested is extremely inconvenient. Wearing masks while flying at higher altitudes is uncomfortable and unpleasant", as well as "I'm fed up with the masks and the weekly tests. I feel like the restrictions have degraded the training that I'm paying for, and that's eaten into my motivation and satisfaction with the program".

The final trend that emerged during the analysis of the open-ended questions was the concept of ensuring that instructors were prepared to handle the change in modality. Participants expressed frustration that some of their instructors seemed to not be prepared to handle even the most basic responsibilities with regards to online instruction. One statement in response to question 3 in particular, which was "figure out who's horrible at teaching online and fix it" seemed to encompass the frustration with the instruction. Participants expressed frustration with both the way that instructors embraced the online modality, as well as instructor's ability to function within that modality. In addition, it was also expressed by one participant in response to question 1 that "online classes make for lazy teachers".

Conclusions

While the population of the study was limited to a singular aviation department within the State of Utah, this study revealed that, while participants were satisfied with the changes to modality and precautions in light of the COVID-19 pandemic, they experienced a reduction in engagement to their studies, as well as a desire to return to face-to-face classes. However, participants did express some frustration, both with those precautions, as well as the perceived reduction in the quality of the instruction they received. These trends were developed out of the responses to the open-ended questions, as well as the agreement or disagreement to the Likert statements.

Critically, some of this lack of engagement does indeed seem to stem from the un-preparedness of some instructors to the online modality, whether asynchronous or synchronous types. Instructors need to be better prepared to transition to or fully embrace online modalities while still also having traditional face-to-face class modalities as well. Participants expressed frustration with online classes that seemed to either be too student self-motivated or lacked a perceived instructor presence.

Participants also expressed frustration with the precautions taken in light of the pandemic but seemed to be satisfied with what was implemented. Some frustration could possibly be attributed to "pandemic fatigue" or a reduction in the desire to accomplish preventative measures in the light of the extended timeframe of the pandemic since at the time of the study, it had been exactly one year since precautions were implemented at the university in response to the pandemic (Badre, 2021).

Stories have been published since the Spring of 2020 that report the fact that students are struggling with online classes when they potentially would not have had as much difficulty with face-to-face classes (Hall & Batty, 2020; Richards, 2020; May & Hirschi, 2020). This study, while focused on the response to the COVID-19 pandemic with the sample population from the Aviation Sciences Department at the university, does open some potential areas for improvement and benefits across all of education.

At this time, there continues to exist some uncertainty about the status of the pandemic. It should also be noted that, while the changes made to education systems, both within the sample population and worldwide, were unprecedented, there is now a precedent for future events to cause other drastic changes to education systems. Thus, the focus should be given to increasing training and development of education pedagogy with regards to asynchronous or synchronous distance education.

Finally, the focus should be given to developing more effective plans for any transition to a distance education format within each education institution. With current technology, those situations have the ability to be mitigated to reduce the impact on students' education progress. These plans would hopefully serve to increase student satisfaction perceptions in those changes, as well as mitigate frustration when time-sensitive instruction is interrupted.

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