The COVID-19 Effect: Have Students Changed Perceptions on Online Education?

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Abstract

This research examines the changes in student perceptions toward course delivery formats in higher education right before and during the Coronavirus (COVID-19) pandemic. Over 200 undergraduate and postgraduate students from three universities enrolled in computer information systems courses were involved in the survey between February 2020 and April 2021. The findings of the study highlighted that student preferences of online education have significantly increased from about 30% pre-pandemic to 48% during the pandemic, despite the unchanged perceptions of online course effectiveness and increased time and effort in online learning. Students appear to have become more self-reliant in online learning. There was no change in prioritization and time management skills or the perceived helpfulness of classroom interaction/discussion in learning. These results provide additional insights to the controversial literature on online education effectiveness during the COVID-19 pandemic and are useful in post-pandemic policy making in higher education.

Keywords: Online Education, e-Learning, Hybrid Learning, Computer Information Systems, COVID-19, Education Effectiveness

1. INTRODUCTON

The delivery of courses, programs and degrees in the online format has been established in institutions of higher education for decades with relatively steady, gradual increase. The Babson Survey Research Group has been tracking online education for more than a decade with data collected from more than 2,800 colleges and universities and has reported that the number of students enrolled in online courses has increased from about 1.6 million in 2002 to 5.8 million in 2014 (Allen & Seaman, 2015). However, the unexpected global outbreak of COVID-19 in early 2020 has brought upon an unprecedented, abrupt changes to course offerings and student learning. With the start of the pandemic in the middle of spring semester of 2020, near the traditional spring break time, institutions of higher education in the U.S. had to shift on-ground and hybrid teaching to 100% online.

This abrupt change in course delivery formats placed unprecedented pressures on institutions of higher education. Both educators and students struggled with the large-scale shift, dealing with learning-management systems, unfamiliar web conferencing technologies, and different procedures for assignments, examinations, and other coursework (Daniel, 2020; Liguori & Winkler, 2020).

The continuation of the COVID-19 pandemic and the uncertainties in waves of contagion have kept policy makers and administrators in education on their toes to dynamically seek the best strategies and processes allowing safe and effective education during the pandemic. In many cases, the result of the strategies and processes, including the move from face-to-face and hybrid learning to 100% online learning was a substantial compromise to the quality of the learning experience (DeVaney, Shimshon, Rascoff, & Maggioncalda, 2020; Hodges, Moore, Lockee, Trust, & Bond, 2020).

The purpose of this research was to assess student perception of the transition between the existing on-ground and/or hybrid (i.e., blended) courses pre-COVID-19 pandemic, in the early spring of 2020, to more and even 100% online learning from the late spring of 2020 through the spring of 2021.

Specifically, this study sought to answer the following research questions.

1. Have students' preferences of course delivery format changed during the COVID-19 pandemic?
2. Have students' perceptions of course delivery format changed during the COVID-19 pandemic?
3. Have students' perceptions of self-skills supporting online learning (such as learning without direct supervision, prioritization, and time management) changed during the COVID-19 pandemic?
4. Have students' perceptions of the usefulness of classroom interaction and discussion in learning changed during the COVID-19 pandemic?

2. DEFINITIONS

The online course delivery format involves active instruction, testing, assignments, and discussion conducted over the Internet through a learning management system, in which the delivery of the course content is 100% online with no face-to-face meetings. The on-ground format involves courses offered in which 100% of the content delivery is face-to-face in the traditional brick-and-mortar classroom. Although an on-ground course might contain additional online resources such as assignments, videos, examinations, and podcasts the use of these additional resources are to enhance the class but the course is still on-ground. The hybrid delivery format occurs when 25% - 50% of instruction, assignments, and discussions, take place online. The online material is an alternative to in-person material with the intent to create a flexible learning experience.

3. RELATED STUDIES

The literature on the impact of the COVID-19 pandemic on education is limited as the pandemic is still unfolding at the present time of September 2021. The limited literature also has inconclusive results about how the transition to more online education, due to COVID-19, has affected students' learning experiences and performance.

OneClass (2020) reached out to 1,287 students at 45 colleges and universities across the United States to produce a comprehensive study on the transition to online learning during the COVID-19 pandemic. It found that 75% of college students were unhappy with the quality of online learning during the COVID-19 pandemic. Several reasons listed for student dissatisfaction were: 1) the lack of face-to-face interaction; 2) differences in learning styles, which made learning difficult; 3) the technologies and engagement practices with online learning were unfamiliar to students and

professors, and 4) students felt that they were not getting the curriculum they had expected and were concerned about their grades.

Pinkus (2020) showed that 86% of the students found the transition to online learning to be disruptive and only 37% of them were prepared to move to an online learning environment. Even among those students who did find themselves prepared for online learning; 71% still found their school experience disrupted by this transition. Forty-five percent of the students also expressed concerns about keeping up with their coursework and 33% were concerned with losing contact with their professors.

During the spring of 2020, Top Hat (2020) polled 3,089 students enrolled in higher education in North America. They found that the majority of students are feeling anxious (52%) and concerned about passing (50%). A large portion of the students that they surveyed report missing face-to-face interaction with faculty (85%) and missing socializing with peers (86%). Sixty-eight percent of the students surveyed felt that the abrupt movement to online learning during the spring 2020 semester was worse than the on-ground instruction that they were receiving.

Lederman (2020) reported on a study conducted by Eric Loepp, an assistant professor of political science, at the University of Wisconsin-Whitewater. This study surveyed over 100 of Loepp's students at the start of the pandemic, when courses were first shifted to remote learning, and then, again. at the end of the spring 2020 semester. This study found that going into the shift to online learning, students' biggest concern was their academic performance (i.e., their final grade) followed closely by learning; students were not as concerned with maintaining communication with their professor or fellow classmates.   Students surveyed rated the following factors, in order of importance that contributed to successful online learning: a good professor, a well-organized learning management system, communication technology, and course materials.

Burke (2021) reported on a study conducted on 1,008 college students in a national sample which occurred 10 months into the pandemic. This study found that while over 50% of the students' surveyed said higher education is not good quality when conducted online; 76% of students learning online said they wanted classes to remain in a hybrid or online format. Approximately 86% of those surveyed were concerned about COVID-19

infections and 79% were concerned about the pandemic's effect on their mental health.

There is also some indication to suggest that during the pandemic the online course delivery format facilitated benefits. According to a study performed by Sykes Enterprises (2020), the vast majority of higher education students during the COVID-19 indicated their online instructors have supported them academically and personally. This report found that 95% of respondents said they felt professors were addressing students' personal needs, while allowing for understanding in completing course work. Nearly the same percentage of the 1,500 students polled felt their instructors pivoted well to a switch to remote models. The student responses were positive in that 85% said their online courses felt like a "classroom community", 84% indicated that the remote learning environment can be effective, and 70% said they would consider taking more virtual classes in the future.

Gonzalez et al. (2020) investigated students' performance during COVID-19 and found that students improved their performance when compared with a previous year's cohort. These authors analyzed the results of specific tests designed for both the online and face-to-face delivery methods and found substantial improvement in the online scores. Although there may be improvements in test performance, there is still a lack of evidence about what has contributed to the performance enhancement. Students may simply have studied at home more due to the lockdown and hence limited other activities. Their improvement in performance does not necessarily equate to their satisfaction with online learning experiences.

Motivated by the above inconsistent research results concerning online learning during the COVID-19 pandemic, this study examines changes in students' perceptions related to online education, such as preferences of selecting online courses, online course effectiveness, and skill enhancement supporting online learning.

4. METHODOLOGY

This research utilized the QuestionPro online survey software that consisted of thirty-four (34) closed-ended questions. The design included questions concerning student demographics and learning styles, and preferences related to Computer Information Systems (CIS) courses. Additional questions asked students to identify reasons for either taking or not taking online

courses as opposed to on-ground or hybrid courses.

The study involved three university types: a state-related, a private, and a state-owned public university. The state-related university receives funding from the state but remains a separate and private entity, with assets under its own ownership and control, operating under its own charter, and administered by an independent board of trustees. The private university does not receive any state funding. The state-owned universality receives significant public funds from the state and is governed by a Board of Governors, state legislators, the Governor and the Secretary of Education. The students surveyed at the state-owned and the state-related universities only included those seeking a bachelor's degree while the students surveyed at the private university included those seeking a bachelor's, master's, or doctoral degree.

The rational to survey respondents from different types of universities provided a diverse, socio-economic mixture of participants and potentially different demographics. According to Norvilitis, Merwin, Osberg, Roehling, Young, and Kamas (2006), many demographic differences exist between state and private university students including debt to income ratio and a significant disparity in race. This research strategy of surveying students in different universities is consistent with the survey and data analysis strategy of categorizing research results based on different groups of universities used in the 2017 Noel-Levitz National Student Satisfaction and Priorities Report (2017).

Only students enrolled in CIS courses completed the survey, regardless of their academic major. The authors distributed the survey to students in their courses from the spring of 2020 to spring of 2021. Some of these course sections were offered as either online or remote learning from the start, whereas, other sections had initially started as face-to-face classes and were moved to either online or remote learning sections at the start of the pandemic, in March of 2020. The two time periods compared were the pre-pandemic environment (the time period immediately before March 2020 and the start of the pandemic environment) and the active pandemic environment (from the start of the pandemic to April 2021).

5. RESULTS

Demographics

Two hundred and five (N=205) students answered all the survey questions. However, the actual number of responses to each question varied by question. There were 91 respondents in the pre-pandemic environment and 114 respondents in the pandemic environment.

Undergraduate students made up the majority of the survey respondents at 71%. The ratio of male to female students was 72% male, 27% female, and 1% identified as other. Eighty-five percent of the survey respondents were between 18 and 30 years of age. Eighty-eight percent were full-time students.

Research Question 1: Have students' preferences of course delivery format changed during the COVID-19 pandemic?

In order to address the first research question, the authors asked students the following question: "If given a choice to take the same course in an ONLINE format or an ONGROUND format, would you select the ONLINE format?"

As Table 1 shows, in comparison to pre-pandemic time, during COVID-19, students, if given the choice, were significantly more likely to take the same course online rather than on-ground. The lower mean in the table indicates that more students answered yes (1) than no (2). This difference was significant at $p < 0.006$.

"If given a choice to take the same course in an ONLINE format or an ONGROUND format, would you select the ONLINE format?"

Time Period	N	Mean	Std.
Pre-COVID-19 pandemic	91	1.71	.454
During-COVID-19 pandemic	114	1.53	.502

Table 1: Average preference of selecting the online format of a course, if both online and on-ground formats are available (1 = Select Online, 2 = Not Select Online).

As Table 2 shows, there was a large increase in the percentage of students selecting an online course format during-pandemic compared to pre-pandemic – an increase from less than a third (28.6%) to almost half (47.4%). Of course, much of the significant difference in rating may be due to increased safety concerns associated with

being on-campus. Therefore, as described below, we asked additional survey questions to better understand this finding.

"If given a choice to take the same course in an ONLINE format or an ONGROUND format, would you select the ONLINE format?"

Time Period		**Yes**	No	Total
Pre-COVID-19	N	**26**	65	91
	%	**28.6%**	71.4%	100%
During-COVID-19	N	**54**	60	114
	%	**47.4%**	52.6%	100%
Total	N	80	125	205
	%	39%	61%	100%

Table 2: Count and percentage within Time Period of selection of online versus not-selecting online format of a course if both online and on-ground formats are available (Yes = Select Online, No = Not Select Online).

A surprising finding of this survey question was that students were still more likely to select the on-ground format, if available. Table 2 shows a total of 61% versus 39% of the students selecting the on-ground course format over the online course format for both time periods. Even during-pandemic, there was still a slightly higher percentage of students selecting the on-ground course format (52.6%) versus the online course format (47.4%).

Research Question 2: Have students' perceptions of course delivery format changed during the COVID-19 pandemic?

In order to determine student perceptions of course delivery format, we analyzed the following question: "Do you perceive the OVERALL effectiveness of courses that are offered COMPLETELY online as … (1: very effective to 6: very ineffective)?"

Overall, as shown in Table 3, we found a slight difference in students' perceptions of online effectiveness during the two time periods. The average perception of online course effectiveness slightly decreased during-pandemic, down from 2.86 to 3.05. This may be due to the unexpected quick change from the traditionally fully on-ground and hybrid courses to have more online components or even to completely online courses. Such a quick change may have led to the reduced course effectiveness. Supporting this view were responses to a question concerning "students' perceptions that more time and effort was needed for an online class". Responses to this question rose from 20% pre-pandemic to 36% during-pandemic. Thus, the slight reduction of students' perceptions of online course effectiveness could

be attributed to the students' increase in time and effort to quickly adapt to the pandemic. Another factor that may have contributed to the slight reduction of students' perceptions of online course effectiveness could be the adverse effects of the pandemic, itself, such as stress and mental health.

"Do you perceive the OVERALL effectiveness of courses that are offered COMPLETELY online as … (1: very effective to 6: very ineffective)?"

Time Period	N	Mean	Std.
Pre-COVID-19 pandemic	42	2.86	1.221
During-COVID-19 pandemic	105	3.05	1.188

Table 3: Average perceptions of online course effectiveness (1= very effective, 6 = very ineffective).

Although there was a decrease in perceived online course effectiveness during the pandemic, as shown in Table 3, the difference between the two time periods, was not statistically significant with $p < 0.385$.

As a result, we suggest that the significant difference in the average preference selecting online versus on-ground courses shown in Table 1, was most likely due to safety concerns related to physical participation in on-ground courses and was not due to the perceptions of improved online course effectiveness or reduced time and effort. In other words, with higher time and effort exerted and no change in perceived online course effectiveness, other reasons, such as safety concerns over on-ground courses were likely the main impetus of selecting online courses versus on-ground.

To confirm the above hypothesis, we reviewed the text inputs by students who specified "Other" as the main reason for selecting the online format rather than "convenience," "scheduling", or "taking a particular professor". Among those students who made the extra effort to provide the text inputs on the "Other" main reason, more than half of them mentioned COVID-19. They have made phrases/statements like "Covid," "pandemic," "forced to," "Only Co(v)vid stops the ability on ground," "Covit-19," "In the current climate, it would be due to Covid, otherwise would take an onground format," or "To not go on campus to avoid COVID-19 exposure." Students' text inputs have echoed well with the speculations that students' preferences of selecting online

versus on-ground courses was due to the COVID-19 contagion.

Research Question 3: Have students' perceptions of self-skills supporting online learning (such as learning without direct supervision, prioritization, and time management) changed during the COVID-19 pandemic?

To evaluate if students' perceptions of self-skills supporting online learning have changed, three questions were asked.

Learning without direct supervision

The first question regarded the students' skills in learning without direct supervision; students were asked to -- Select one of the following choices of "I work better without direct supervision" or "I work better when someone is there to keep me focused." The first choice was coded as 1 and the second was coded as 2. As it was also reverse coded, it indicated that the lower the average score, the better performance in learning without direct supervision.

The results of this question show a significant improvement in "working better without direct supervision." The average score was lowered from 1.64 pre-pandemic to 1.5 during-pandemic, which indicated the improvement in skill. The average score of 1.64 pre-pandemic indicated more students had selected "working better when someone is there to keep me focused." And the average score of 1.5 during the pandemic suggested that the students were equally divided between selecting working better with direct supervision and without direct supervision. The difference was significant at $p < 0.056$.

COVID-19 may have made students during-pandemic realize that they are more self-reliant than they were before COVID-19. We posit that the pandemic has improved student independence and confidence in their ability to supervise themselves for the purpose of online learning.

Prioritization

The second question regarded the students' skill in prioritization. Students were asked to select one of the following choices: "I can prioritize my workload" or "I tend to put work off until later." The first choice was coded as 1 and the second as 2.

For this question, although there was little improvement in students' perceptions of prioritization skill (average score of 1.34 during-pandemic versus 1.39 pre-pandemic), the difference was not significant at $p < 0.423$. COVID-19 has added unexpected stress and health-related concerns and workload (such as caring for the sick, sanitization tasks, etc.). We speculate that this added workload due to the COVID-19 virus did not help students improve skills in prioritization.

Time management

The third question regarded the students' skills in time management. Students were asked to self-describe in terms of time management as either "well-organized" or "having difficulty completing assignments and/or projects."

Similarly as the above discussion, given the many challenges that needed to be faced during the pandemic, it may have suggested that time management skills would be required and perhaps improved. Though there was a minor increase in those who felt they were "well organized" during the pandemic than those pre-pandemic, the difference was not significant. In both time periods, approximately 80% of students consider themselves as "well-organized." The non-significance may be due to the fact that the majority of the students had already regarded themselves as "well-organized". The good news here is that the COVID-19 pandemic did not make students less organized due to the additional challenges they had to face during the pandemic.

Research Question 4: Have students' perceptions of the usefulness of classroom interaction and discussion in learning changed during the COVID-19 pandemic?

A final question asked regarded the change in students' perceptions of the usefulness of classroom interaction and discussion. With the lack of on-ground courses enabling face-to-face interaction and discussion, it was postulated that the desire for classroom interaction and discussion would increase. Our study did not find this desire.

The question analyzed was to ask students to choose among three options in "classroom interaction and discussion" as "not essential" "sometimes helpful", or "always helpful" "for me to learn/understand."

The results show nearly identical percentages for each of the three options in the pre-pandemic and during-pandemic time periods. There was no significant difference in the students' perceptions of helpfulness of classroom interaction and discussion in their learning/understanding.

This may echo back with the significant improvement in "learning without direct supervision". If students have less reliance on supervisors in learning during the pandemic, students also do not increase their reliance on class interactions/discussions with peers and/or faculty in learning/understanding.

6. DISCUSSION

Our research aligns with the controversial results from the limited literature on online education effectiveness during the COVID-19 pandemic. Students preferred online to on-ground courses mainly due to health and safety concerns during the pandemic. Student's perception of online course effectiveness has not improved. Students improved some but not all relevant skills for online learning. They have become more self-reliant and confident in online learning with lesser need of direct supervision from educators and no desire of more classroom interaction and discussion from peers and/or faculty.

Our research shows adaptability and growth among students when the situation calls for such changes. Students are resilient and such a quality is enhanced through life experiences, such as the COVID-19 pandemic, and may not be taught in content-focused subject knowledge courses. It is comforting to know such positive growth in character is an outcome of a rather depressive and frustrating pandemic in which many people have unfortunately lost their lives.

7. CONCLUSIONS

Although the pandemic has forced many universities to offer a higher percentage of online courses and students have stronger preferences and willingness to take online courses, students' perceptions of online education effectiveness have not changed.

This study holds significant implications for policy makers in universities and other providers of online education, such as K-12 administrators, both during and post the COVID-19 pandemic, in that it suggests that safety concerns are real and important, which even override the concerns of course effectiveness. When facing choices that have life-and-death consequences, preferences are given to the choices that save lives and avoid death. As there is still no end in sight of the COVID-19 pandemic, school administrators need to respect students' wishes of a safe learning environment and have strategies and processes in place that support the lives of stakeholders in education.

This study shows that when situations call for it, stakeholders can easily adapt and grow. Even though there are still needs for improving real and perceived effectiveness of online courses and for enhancing skill sets supportive of online education, collective efforts from administrators, educators, and students have been and will continue to be the driving force for more acceptance of online education.

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