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COVID-19: Understanding the Impact of Societal Disruption on Student Learning and Academic Progress

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introduction

In this paper, we share our study examining how students and faculty cope with disruption to their learning and academic goals in the context of the COVID-19 pandemic. As Agnoletto and Queiroz [1] observe, "the mark of this time is uncertainty." This universal precariousness is what provides an opportunity to investigate the nature of educational disruption. What makes the COVID-19 crisis similar to or different from others? What can we learn from its impact on education that will help educators and educational researchers better support the needs of students, faculty, staff, and administration at educational institutions? Our goal for this pilot study, implemented as evidence for a large funding proposal, was to use the context of the COVID-19 pandemic to better understand how students and faculty cope with disruption to achieve their learning and academic goals. The project delivered a snapshot of what happened in a Calculus I course at a Research 1 institution through survey and interviews. We are eager to extend the application of this data beyond the proposal in which it was used, and connect with similar research and practice around resilience, preparedness, and response to disruption in formal education.

background

Prior studies investigated educational disruption in times of crises. In the case of 9/11, research indicated students were severely at risk for Post-Traumatic Stress Disorder and other anxiety disorders after terrorist attacks [2], [3] and argued for broadening access to mental health services. Studies conducted in the context of Hurricane Katrina revealed school systems' lack of preparedness in supporting the needs of students in implementing disaster-focused programs [4], [5]. The studies recommended strengthening communication lines between administration, staff, and parents along with improving emergency preparedness plans to provide for large-scale disasters. Studies conducted to examine the impact of the 2009 H1N1 pandemic on education focused on the difficulties and effectiveness of school closures in preventing the spread of the virus [6]–[9] as well as the inadequacies of contingency plans for substituting online learning for face-to-face instruction [10], [11]. Current educational research in the context of COVID-19 highlights low perceptions of morale among faculty, staff, and students accompanied with decline in student engagement as outcomes of switching to online learning (Kurtz et al., 2020). Other research exposes the lack of access to technology [12]–[14].

methods

We distributed surveys to students who were enrolled in Calculus I during the Spring 2020 semester and we obtained 26 responses at a Research I university in the southeastern US. Measures used in the survey were the Abbreviated Math Anxiety Scale (AMAS) [15], Basic Psychological Need Satisfaction (BPNS) [16], and the Situational Motivation Scale (SIMS) [17]. The survey also captured information as to what resources students turned to during the shift to online learning and which resources they intend on using in Calculus II. We also piloted a "Navigation of Transition" scale (Table 1) to assess how well the students navigated the

transition to online learning. Scores from this measure were used to select students for interview who had differing experiences with the navigation from in-person to online learning. We expected to obtain more responses on the survey, but we think that the poor response numbers may be due in large part to the timing of the distribution of the survey which took place at the beginning of a very unusual semester in the context of a pandemic. The survey analysis served to provide a descriptive snapshot of our sample and to pilot the "Navigation of Transition" measure.

Table 1
Navigation of Transition Scale

Prompts	Response Scale
I was able to access the internet without issue during online sessions.	Strongly Disagree (1) to Strongly Agree (5)
I had a work environment that was conducive to my learning during online sessions.	
My daily routine of taking classes and studying remained the same as before the transition to remote learning.	
It was more difficult to understand math course material once the course changed to remote learning. [reversed]	
When the course changed to remote learning, it was easy to learn and retain math course material due to online videos, PowerPoints, etc . . .	
Not having face-to face interactions in class made learning more difficult. [reversed]	
I connected/communicated with classmates about course material when the course was being taught through remote learning.	

Semi-structured interviews were conducted with 6 students and 3 instructors who taught Calculus I in the Spring 2020 semester. Interviews aimed to capture stories which provide insight into the nature of the disruption. Instructor interviews served mostly to characterize the climate of the class, but instructors did share with us their struggles and concerns which provided more breadth to the topics discussed in student interviews.

Factors we explored in the pilot data include: the types of resources students and faculty go to, why they choose these resources, what aspects of these resources are helpful, and how they acquired these resources. Other areas of our investigation were: the nature of the rapid, unplanned transition to online learning, how faculty and other instructional designers who were previously inexperienced with online learning have been supported, and how their lack of understanding and experience can be remediated. Student interviews uncovered valuable insight into students' perceptions of the transition. Preliminary analysis yielded two major themes: Learning Preferences and Acquiring Resources.

results

survey

The survey provided no results of statistical significance with the math anxiety, motivation, and NTS measures. The survey did capture information as to what resources students turned to during the shift to online learning. Many students preferred to use online resources rather than going directly to the instructor. These resources included instructional videos such as Khan Academy and online calculators for extra support. Students also heavily utilized notes given online by the instructor while working through problems. Results also showed that students preferred to go directly to the professor for help with issues as opposed to consulting Teaching Assistants for additional help.

student interviews

Two of the main themes uncovered in the analysis of student interviews were “Learning Preferences" and “Acquiring Resources.” For learning preferences, the prevailing idea that emerged was the diverse needs of the students. Some students very much appreciated the prerecorded lecture videos. These students mentioned how they appreciated having the freedom to work at their own pace. Others preferred a fully synchronous class experience and the security in having an instructor present to address needs as they come. Several students indicated their struggles dealing with distractions and “staring at a computer screen” for long periods of time.Some students did better after the transition. Two students mentioned how they had less time commitments after the transition which enabled them to get more sleep and spend more time studying; although one of these students also admitted that in the current semester, teachers seemed to give out more busywork. One student attributed their success to the strong support they received from friends. The other student appeared to simply do better working at their own pace. The interview analysis highlighted the diversity among students regarding learning preferences.

Another theme that emerged from the data was Acquiring Resources. The data from student interviews highlighted the decreased access to resources after the transition. With one exception, the students generally did not make use of office hours. At the same time, some of the students also expressed the value in being able to communicate with the instructors in class. This is significant as one of the main initiatives enacted by instructors was the extension of office hours. Some instructors mentioned they may have had 1 or 2 students attend office hours after the transition. Several students indicated their fear of judgment received from the instructor for either asking unnecessary questions or taking up the instructor’s time. Several of the students did mention their sympathy for the instructors as one student offered, “I feel like they did the best they could because there's only so much you can do with these circumstances. And I guess I [sic] giving office hours is the best they can do.” In retrospect, the majority of students indicated that they would have spent more time preparing and organizing resources if they had known such a transition would take place. This fact highlights how underprepared many of the students were in the skills needed to be successful in online learning. Students have spent years developing learning and study skills in mostly in-person environments. When forced to transition to online learning, students may have lacked the confidence or self-efficacy to take charge of their own learning and seek out resources to better their learning either through office hours, friend or study groups, or online resources.

instructor interviews

The instructor interviews served mostly to help characterize the structure of the course and classes. Instructors did share their struggles with the transition to online learning and their perceptions of how the students handled the transition. Instructors perceived student engagement to drop drastically after the transition and shared their concerns with trying to figure out how to best reach the students. Among the main initiatives enacted by instructors were extension of office hours, prerecording lectures for on-demand use, and decreased numbers of graded assignments accompanied with making available answer keys. The instructors also expressed the issues encountered on a school- and course-wide level along with the initiatives enacted by the school and the course coordinator.

A major theme that arose from conversations with the instructors was the disconnect with students. One instructor described this disconnect by stating, "It's just, some of them just dropped off the face of the earth." The instructors all mentioned that their primary way of accommodating the students in this transition was to extend office hours and make themselves more available, but none of them perceived this accommodation to be very fruitful. Two of the instructors offered that a possibility for the lack of attendance in office hours may be attributed to the students being too overwhelmed with online learning and time management. This is interesting because the primary reason the students gave for not attending office was the fear of judgment. In the case of these three instructors, it appears that there was a disconnect between the instructor perceptions of students and the students' rationale.

implications and conclusion

Although this project served mostly as a snapshot of the transition to online learning that took place in the Spring 2020 semester, it raises some questions regarding what students and instructors turn to in a disruption-type scenario. In a sense, these questions could be viewed in terms of "survival" tactics. Concerning office hours, is there a disconnect at large between instructors' perceptions and students' rationale? In this study, it appeared that the fear of judgment in attending office hours was amplified by the virtual environment. Is this simply because of the inexperience with virtual meetings? Or is it because of privacy issues or the student' self-conscious of their appearance on screen? How can these barriers be overcome?

It is also important to understand and accommodate the diversity of needs present in the class. Some students have more self-efficacy than others. Some students appreciate the independence and freedom in taking charge of their own learning than others who prefer the security of a more rigid conduct of class. Understanding the diversity of needs may be the first step to finding solutions to meet these needs. Pre-recorded lecture videos appeared to be appreciated by many students and appeared to help independent students take charge of their learning, but having set, synchronous class times with check-in quizzes and dialogue would provide the much needed security for many other students.

We had other thoughts as we explored the data related to potential areas for future work. Investigating the resilience in the two students who functioned better after the transition was difficult and requires future work. We have the opportunity with hybrid class formats to explore this phenomenon. Also, we found that in a one-on-one, virtual setting, it is possible that fear of

judgment may be amplified owing mostly to the idea that the student is taking up the time of the instructor. This needs more investigation.

As stated earlier, the disruption in learning caused by the COVID-19 pandemic is unique, however, it does not exist separate from the context of potential disruptions in the future.. It demonstrated on a wide scale what instructors and students turn to in a survival-type scenario. With this presentation, we reach out to you, our colleagues, to discuss how we can continue to make meaning from this evidence. How do these lessons we have learned from this disruption relate to other instances of disruption? Are these lessons enough to make programmatic changes and institutional changes? What are some other ways this disruption is different from others? We invite your engagement with our work and welcome your input.

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