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ORIGINAL RESEARCH

Variation in Student Perceptions of Higher Education Course Quality and Difficulty as a Result of Widespread Implementation of Online Education During the COVID-19 Pandemic

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Abstract
The onset of the COVID-19 global pandemic affected higher education in a myriad of ways. One of the most notable effects however was the rapid and sudden transition of nearly all courses at most institutions to an online environment. And while there are a growing number of courses offered online already, this transition to nearly 100% remote education presented numerous challenges for instructors and students of face-to-face and hybrid style courses. Since student perceptions are closely tied to recruitment and retention, it is important to know if there are differences in student perceptions present in the way different courses are taught. This study extends the work of other authors that have investigated student perceptions by looking specifically at how the COVID-19 pandemic may have changed student views of course difficulty and quality both overall and across discipline or institution categories. Course evaluations from 837 courses from 191 different schools archived on RateMyProfessors.com were used in a general linear model where a statistically significant overall decline of 6% in perceived course difficulty and 4% decline in perceived quality was detected. In addition to calculating this mean decrease, courses were also categorized on the basis of academic discipline (Business, Engineering and Mathematics, Humanities, Natural Sciences, Social Sciences), institution type (2-Year, 4-Year), and whether instructors had previous experience teaching online courses (No, Yes) to determine any variation in differences that may have appeared as a result of more nuanced details in course type or delivery. Most notably, declines in course difficulty were slightly more apparent with instructors that had no previous online teaching experience. No other discipline, institution type, or teaching experience interactions were detected with either difficulty or quality variation. These data suggest that there were very real changes in perceived quality and difficulty but that these changes were largely universal irrespective of discipline, institution type, or prior experience teaching online (with exception of course difficulty).

Keywords Higher education · Course evaluations · COVID-19 · Student assessment

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1 Introduction

The distinction between online and traditional face-to-face instruction has narrowed tremendously over the past decade. While there were once stark differences between these forms of teaching, there is now more common ground. This has been primarily a function of the evolution in instructional methods and technology used in classrooms today. Online education has become increasingly interactive, and face-to-face classes more commonly make use of online student activities performed outside of the classroom (Bernard et al., 2014; McKenna et al., 2020; NCES, 2003). However, to the degree that differences still exist, it is likely that students' perceptions about course difficulty and quality also will differ. Further, what those perceptions say about course mode delivery is important. Most notably, these distinctions matter in the context of recruitment and retention, since higher student satisfaction can motivate students to continue pursuing their degrees through a variety of course offering styles. The issues of how students perform in and feel about online vs face to face courses has become even more relevant as the COVID-19 pandemic necessitated a shift to remote learning. While many studies have explored the impact of online learning on student perceptions and learning (Nguyn, 2015; Tratnik et al. 2019; Yang et al., 2017), the shift to an almost entirely remote teaching and learning environment during the COVID-19 pandemic represents a unique opportunity to study a broader range of students' experiences, especially since many students who would not have opted into an online class were suddenly forced to do so. These students were in the position, too, to make a direct comparison between the face-to-face course (at the beginning of the semester) to a remote learning course (at the second half of the semester). Given the abrupt and recent timing of this transition, few studies have documented what kind of an impact this has had on student perceptions of the educational experience. Thus, this study is unique to other authors not only by investigating how the COVID-19 pandemic affected student perceptions across U.S. public higher education, but also by allowing for a large-scale comparison of student perception in online vs face-to-face courses that is not biased by student course self-selection that is predominant in most other online vs face to face studies.

A few studies have examined the issue of student course perceptions during the COVID pandemic. They have identified several emerging patterns. A recent study by Shim and Lee (2020) used a sample of 393 students attending one institution where they reported positive student satisfaction with the flexibility, convenience, and time savings of the switch to online learning but dissatisfaction with technology issues and poor course design. Additionally, Guo (2020) surveyed students taking an online introductory calculus-based physics class who attended optional synchronous sessions compared to those who did not. He found that for all online students (using either of these online teaching methods), the switch to online learning during COVID made learning more difficult, and students reported a preference for in-class instruction prior to the switch to online learning. Moreover, students preferred synchronous to asynchronous online courses. Related to a specific course discipline, a study by Buchannan (2021) notes that during the pandemic, shifting his lecture portions of science courses to remote delivery were relatively straightforward. The transition of the interactive lab components into an online format were, however, much more difficult. Additional studies at specific institutions find students recognize tradeoffs in their perceptions of the remote teaching during COVID-19 compared to face-to-face (Gillis & Krull, 2020, Castro & George, 2021, Swanson et al. 2012). Overall, because the shift was so quick, for most courses, effective online learning guidelines like pacing, pedagogy, student and teachers' roles, online communication and feedback, were not designed

or implemented. And while these studies outlined above are valuable, much more research across disciplines that employs larger sample sizes, among multiple institutions is needed.

Thus, the objective of this study was to assess the relationship between students' experiences of remote and online learning during the COVID-19 pandemic in Spring 2020 and other institutional factors. More specifically, this study utilized a large-scale dataset to disentangle whether differences in perceived quality and/or difficulty varied by institution type (2-Year vs. 4-Year), academic discipline (Business, Engineering and Mathematics, Humanities, Natural Sciences, Social Sciences), whether instructors had previous experience teaching online courses (No, Yes), or any combination of the above. This study complements the growing body of COVID-19 student class experience literature. Herein, by using a large and diverse data set, this investigation includes a wider variety of U.S. public higher education institution types and disciplines than have been used in past studies.

2 Literature Review

2.1 Mixed Evidence of Online Course Student Satisfaction

The evidence from past studies that investigate student satisfaction of online to face-to-face courses is mixed. Many researchers have found student perceptions of online courses are positive compared to traditional classroom instruction due to higher motivation, convenience, flexibility, and control over student learning (Bolliger & Halupa, 2018; Lao & Gonzales, 2005; Rodriguez et al., 2008; Russell et al., 2016; Shea & Bidjerano, 2014; Soffer & Nachmias, 2018; Swan et al. 2000; Toven-Lindsey et al., 2015; Young & Norgard, 2006; Zhang, 2005). A number of meta-analyses have also found broad evidence supporting positive student satisfaction, although they also find most studies have problems that might provide misleading conclusions. For example, The Institute for Higher Education Policy (Merisotis & Phipps, 1999), reviewed hundreds of articles and concluded that while student satisfaction is higher for online courses, the mode of teaching is less important than many other factors like the student assignments, characteristics of the student, motivation of the student, and the teaching ability of the instructor. The report also notes that most studies that have compared online learning to traditional teaching have major flaws, such as small sample sizes and lack of random assignment of students, that make their results inconclusive.

2.2 Student Self-Selection

A common criticism of the vast majority of studies that have looked at the differences between online and face-to-face instruction have compared students who have self-selected into either the online section or the face-to-face section (Bernard et al., 2014; Merisotis & Phipps, 1999; Bernard et al., 2004; Nguyn, 2015). It is likely that students who self-select into each of the different course types will have similar characteristics. Trying then to determine if there are significant differences between the online and the face-to-face sections is confounded by the differences in the groups of students that self-selected into the two versions of the course. For example, it is possible that students who are better at time management and learning independently are more likely to take online courses and perceive them as "not difficult," not because of the course itself, but because they likely find *all* courses easier than students who struggle with time-management and independent

learning. For example, a meta-analysis by The National Center for Education Statistics (2003) found that online instruction received higher student satisfaction without any significant difference in academic performance. However, they also found that, for a number of reasons, the quality of this research was suspect, which left these findings inconclusive. One of their concerns was that these studies did not randomly select subjects, resulting in a selection bias wherein students who took online courses could be different from the students taking in-class courses. For example, if more motivated students were more likely to take online courses, then this likely would affect their satisfaction ratings independent of the way the courses were actually taught. In addition, students who self-select into online courses might be then more willing to judge the course favorably then if they were randomly enrolled in online courses.

There are statistical techniques that can be used to account for the different characteristics' students might have, but this data is not easily obtained, particularly across hundreds of institutions. The COVID-19 situation, however, provides a way to minimize this issue since students were generally forced into online learning. This greatly reduced the sample selectivity bias for this study.

2.3 Lower Online Course Satisfaction

Other studies have found less satisfaction and/or higher dropout rates for online courses compared to face-to-face instruction (Dutton et al., 2001; Park & Choi, 2009; Terry, 2001; Tratnik et al., 2019; Yang et al. 2017). A meta-analysis by Bernard et al. (2004) finds that student attitudes and retention were better for face-to-face courses. Consistent with Guo's (2020) research, students preferred synchronous courses, and retention rates for synchronous courses were higher than those for asynchronous courses. Given the number of studies that have found both positive and negative views of students regarding online learning, it is not surprising that studies also have reported not finding any significant satisfaction differences between the course formats (Lim et al., 2008; McFarland & Hamilton, 2006). In this study, online instruction refers to courses that have been designed to be taught over the internet. The online instruction can be either synchronous or asynchronous. Face-to-Face instruction refers to courses that are primarily taught synchronously with the students physically present in the classroom.

2.4 RateMyProfessors

Student satisfaction was measured using RateMyProfessors.com student evaluations. There are several reasons that RateMyProfessors.com was chosen to gather evaluations. First, while most institutions do collect Student Evaluations of Teaching (SET), those evaluations are not publicly or widely available to either students or researchers. Because we wanted to analyze an overall, broad range of experiences and perceptions across institutions, RateMyProfessors.com represents the most accessible and varied set of student evaluations available. While evaluations completed on RateMyProfessors.com are imperfect, they are nonetheless useful. First of all, students who fill out ratings on the popular website are self-selected, as opposed to SETs, and RateMyProfessors.com reviews do tend to skew more to extreme ends of the spectrum of highly positive or highly negative (Kindred & Mohammed, 2005). Moreover, there is some level of halo effect, which is to say that students do seem to be at least somewhat influenced by earlier reviews posted on professors, whether those reviews are positive or negative (Ackerman & Chung, 2018). That said,

numerous studies have found that there are strong correlations between the student evaluations on RateMyProfessors.com and SETs (Brown et al., 2009; Sonntag et al., 2009; Timmerman, 2008), which suggests that, overall, evaluations posted on RateMyProfessors.com are consistent with the teaching evaluations collected by individual institutions. Moreover, this suggests that extremes in evaluation opinions are more or less balanced out on both ends of the spectrum.

Another concern with RateMyProfessors.com is bias. The RateMyProfessors.com website has been rightly criticized in the past for its inclusion of an offensive and inappropriate rating system pertaining to the physical appearance of the instructor, as well as skepticism about how accurately student rankings correlate with the actual quality of courses (Davison & Price, 2009; Felton et al., 2004; Otto et al., 2008). However, concerns about student ratings being biased are not only limited to RateMyProfessors.com. While some studies find that student evaluations accurately measure faculty performance (Cohen, 1981; Renaud and Murray 2005), a good deal of research suggests that student evaluations display significant bias based on gender, race, and ethnicity of instructor as well as class size (Liaw & Goh, 2003). Carle (2009) finds student evaluations were similar between online and face-to-face instructors, but there was evidence of bias surrounding minority instructors when they were teaching face-to-face. Chávez and Mitchell (2020) found that in online courses, women and people of color receive lower evaluations than white males teaching identical courses, wherein the only difference is the presence of a single welcome video that students watched at the beginning of the course. Similarly, MacNell et al. (2014) found that when identical online courses were taught by the same instructor but using different gender identities (something uniquely possible in some online courses), student evaluations of the (perceived) male instructor were significantly higher than those of the (perceived) female instructor.

The purpose of this study is not to determine whether student evaluations are an accurate representation of either faculty or course quality; rather, we are interested in determining how perspectives of the switch to online learning are related to other institutional factors. Though there are doubtless a wide range of biases that could be expressed within these evaluations, as well as inaccuracies regarding the courses and faculty themselves, these evaluations nonetheless do represent students' perspectives and views of their own experiences. They may not tell us a good deal about the quality of either the actual faculty or the actual courses, but they do reveal students' beliefs about their lived experiences of the shift to remote learning during the COVID-19 pandemic.

3 Methods

3.1 RateMyProfessor Student Perception

This study used student evaluations posted to the RateMyProfessors.com website to compare perceptions of courses pre-COVID-19 to during COVID-19. Since the applicable population for this study is U.S. institutions of higher education a random sample was chosen and downloaded. To do this, average ratings of course 'quality' and 'difficulty' were noted for courses that were taught both prior to the pandemic and during the pandemic which we defined as the two years prior to March 2020 and post May 2020 given the timing of when US Higher Education was largely shifted online due to rapid spread of the virus. This included several years of pre pandemic data and one semester

of pandemic data. Two student evaluations were identified for each instructor included in this study. One evaluation was needed for the time period "prior to COVID-19" and one was needed for the time period "during COVID-19". The most recent posted evaluation prior to March 2020 was used as the evaluation "prior to COVID-19". The look back time period was limited to evaluations posted two years prior to March 2020 in order to focus on changes in student perception due to COVID-19. If the professor did not have any evaluations prior to March 2020 or if the most recent evaluation was earlier than March of 2018 then this professor was not used in this study. The "during COVID-19" evaluation used was the most recent student evaluation of the instructor after May 2020. The evaluations after May 2020 were used to help eliminate the situation where a student waited a significant time before they posted evaluations for classes taken prior to COVID-19. Note that ratings were reported on a 1 to 5 sliding scale and centered around two review questions regarding 'how students would rate a professor as an instructor' (quality) and 'how difficult students felt the course was' (difficulty). Since this is a comparative study, only courses that were taught prior and during the pandemic were included. Once these metrics were recorded each course entry was categorized by academic course discipline (Business, Engineering and Mathematics, Humanities, Natural Sciences, Social Sciences), institution type (2-Year, 4-Year), and whether instructors had previous experience teaching online courses (No, Yes). RateMyProfessors.com asks students if the course is taught online. Often students do not answer this, but in their written comments they state the course is taught online. For this study an instructor is deemed an experienced online instructor if within two years prior to COVID-19 (March 2020–March 2018) a student answered yes to the question is the course online or if a student stated in the comment section of their review that the instructor was teaching online. It was assumed that most courses were online for the second half of spring 2020 semesters.

The site guidelines of RateMyProfessors.com states students should only rate professors of courses that they have taken (or are currently taking) and are only allowed one post per course. Individuals evaluating courses are also recommended to evaluate their faculty shortly after the completion of their course. These guidelines or recommendations, however, are not enforced since evaluations are anonymous. Every evaluation posted to RateMyProfessors.com is reviewed by a moderator and posts that do not comply to the site's guidelines are removed. Further, professors can respond to student reviews and anyone can flag a review they feel is inappropriate. Overall, since a number of different students often evaluate the same course within weeks and provide their grade as "I don't know yet" it is unlikely that students are all rating that same course for prior terms. For this reason, evaluations posted after March 2020 are believed to be primarily evaluations of courses taken during COVID-19. Further, the comments provided by these students frequently mention that the course being evaluated was taken during the pandemic. The appendix of this paper provides a sampling of comments made by students taking courses online. They often express the frustration they had in the emergency transition to online instruction during COVID-19. Certainly, the validity of these reviews cannot be ensured as it is possible that the evaluations provided to the site are biased by students who are misrepresenting their actual experience in the course. To the degree that these biases exist, however, there is no reason to believe that these biases would have been weighted towards one time period (pre COVID) or another (during COVID). The findings of this paper reflect the evaluations from students who have posted reviews to RateMyProfessors.com.

3.2 Randomized Institution Selection

These evaluations were posted by students attending a random selection of 191 U.S. Public Higher Education Institutions as listed by the College Board (collegeboard.org). Specifically, to select the institutions for inclusion in this study all institutions were randomly listed in six categories (Public: Small, Medium, and Large, Private: Small Medium and Large). Every seventh institution in each category was selected until approximately 30 institutions were identified in each category. The faculty at each of the randomly selected institutions were ordered in RateMyProfessors.com such that faculty receiving the most student ratings were first considered for this study. By first considering the faculty with the most student ratings at each institution we improved the likelihood that faculty would meet the criteria to be included in this study and helped to ensure that no faculty with only one or two ratings was included. A maximum of five professors at each school met the criteria of the study. Only one set of pre-COVID-19 and during-COVID-19 evaluations were used per faculty member.

For this study, 837 student evaluations were collected from 191 different schools. A maximum of five instructors were identified from each school. The data collection was performed using the RateMyProfessors.com site over a three-month period from November 2020 through January 2021.A general linear model was used to evaluate whether variation in course quality or difficulty (calculated as course mean post May 2020 minus course mean pre March 2020) was dependent on academic discipline (Business, Engineering and Mathematics, Humanities, Natural Sciences, Social Sciences), institution type (2-Year, 4-Year), whether instructors had previous experience teaching online courses (No, Yes), and all 2-way interactions. Linear modeling was implemented in the base stats package of R (R Core Team, 2012).

4 Results

A statistically significant overall drop (6%, SD 1.2) in perceived difficulty from student evaluation scores of courses associated with the sudden shift to online teaching was detected in the dataset (Fig. 1). Further general linear modeling of this variation in difficulty found that of all the predictors factored in that the only significant effect across the dataset was whether an instructor had previous online experience (Table 1, Fig. 1). Specifically, courses taught by instructors with no online experience prior to COVID-19 were rated or scored as being ~70% less difficult than courses taught by instructors with online experience (*coefficient* −0.14). No effects were detected related to discipline, institution type, or any interactions among variables.

A statistically significant overall drop (4%, SD 1.8) in perceived quality from student evaluation scores of courses associated with the sudden shift to online teaching was detected in the dataset (Fig. 2). Further general linear modeling of this variation in quality did not detect any covariation with any of our model parameters (Table 1, Fig. 2). Specifically, this suggests that the decrease in perceived quality reported by students was uniformly distributed irrespective of institution type, online experience of instructor, and discipline.

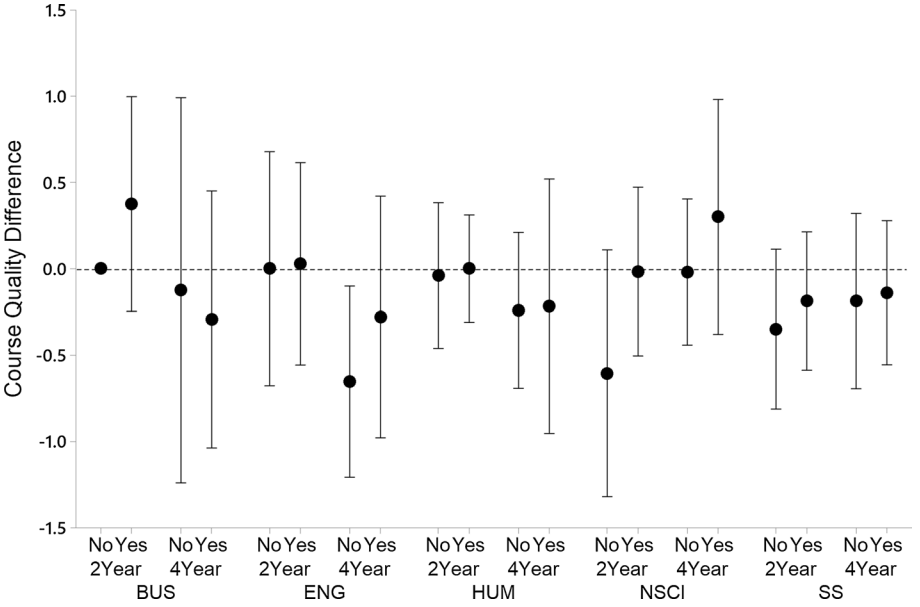

Fig. 1 Interval plot (mean with 95% confidence intervals plotted) of course quality differences among student evaluation scores post Covid-19 online transition minus pre Covid-19 arranged by academic discipline (Business, Engineering and Mathematics, Humanities, Natural Sciences, Social Sciences), institution type (2-Year, 4-Year), and whether instructors had previous experience teaching online courses (No, Yes)

Table 1 Results of general linear models incorporating course quality and course difficulty differences among student evaluation scores post Covid-19 online transition minus pre Covid-19 arranged by academic discipline (Business, Engineering and Mathematics, Humanities, Natural Sciences, Social Sciences), institution type (2-Year, 4-Year), whether instructors had previous experience teaching online courses (No, Yes), and all 2-way interactions

Term	DF	SS	MS	F	P
Course quality					
Institution type (2-Year vs. 4-Year)	1	1.9	1.9	0.59	0.44
Online experience of instructor	1	2.7	2.7	0.84	0.36
Academic discipline	4	4.8	1.2	0.38	0.83
Size * discipline	4	21.1	5.3	1.67	0.16
Size * online experience	1	0.1	0.1	0.04	0.84
Discipline * Online Experience	4	5.3	1.3	0.42	0.79
Error	818	2585	1.2		
Total	833	2622			
Course difficulty					
Institution type (2-Year vs. 4-Year)	1	0.1	0.1	0.09	0.77
Online experience of instructor	1	9.7	9.7	6.59	< 0.01
Academic discipline	4	8.9	2.2	1.53	0.19
Size * discipline	4	3.4	0.9	0.58	0.68
Size * online experience	1	0.3	0.3	0.22	0.64
Discipline * online experience	4	2.8	0.7	0.47	0.76
Error	818	1204	1.5		
Total	833	1236			

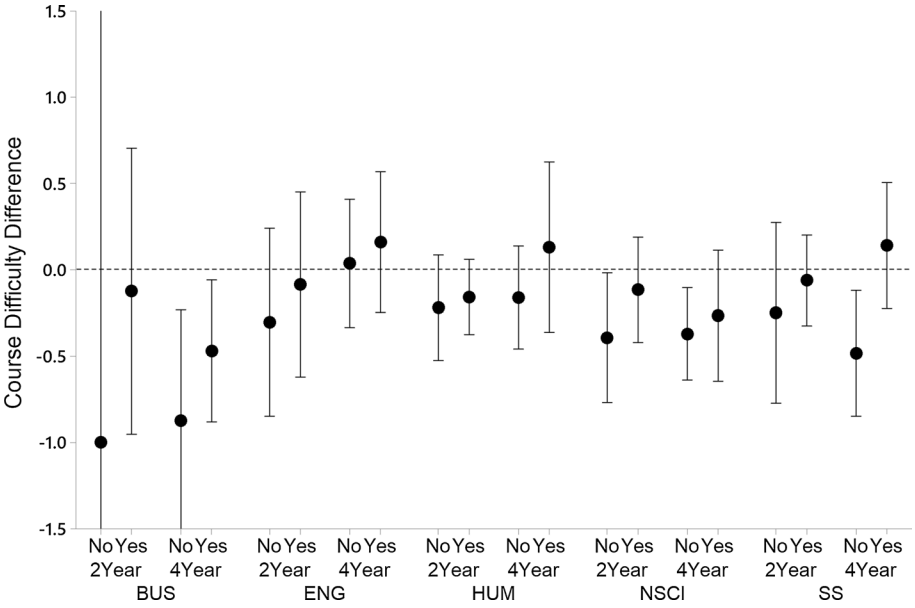

Fig. 2 Interval plot (mean with 95% confidence intervals plotted) of course difficulty differences among student evaluation scores post Covid-19 online transition minus pre Covid-19 arranged by academic discipline (Business, Engineering and Mathematics, Humanities, Natural Sciences, Social Sciences), institution type (2-Year, 4-Year), and whether instructors had previous experience teaching online courses (No, Yes)

5 Discussion and Conclusion

The vast majority of higher education transitioned to emergency online instruction as a result of COVID-19. Specifically, Entangled Solutions list over 4,200 U.S. universities and colleges and over 25.7 million students impacted by COVID-19 as of May 28th 2020 (https://www.entangled.solutions/coronavirus-he/). Our study seeks to answer the question of how students perceived difficulty of their courses and their overall assessment of the quality of their courses after they transitioned to a fully remote mode of delivery. This shift has important implications for understanding how students responded not only to the transition to online/remote learning that semester but also for understanding the future implications and changes that may results from students' experiences of online teaching and learning during the spring semester of 2020.

This study identified a decrease in perceived difficulty as well as quality associated with the onset of the COVID-19 transition to remote learning. The differences in perceived difficulty and quality were magnified in courses where the instructor had limited experience with online teaching. These results have great relevance for understanding changes in higher education, particularly as we move on from the pandemic and begin returning to the classroom.

The perception of course difficulty on the whole decreased (6%, SD 1.2), which is likely due to a myriad of factors. Initially, many faculty worried that the courses would inherently become more difficult by dint of being online. Faculty, experienced and inexperienced with online teaching alike, struggled to adjust their courses to an online format at such short notice. Students, too, struggled to adjust to this new format. Even for courses

wherein lectures that had previously been delivered face-to-face were delivered synchronously using an online platform (through Zoom, Webex, Google Meet, etc.), there was increased difficulty for faculty and students because it is more challenging to assess student learning through body language and interaction. In video formats, it is often harder to see what is being demonstrated, hear what is being said, and more challenging and awkward to interact with the instructor and peers, not to mention the inevitable difficulties in terms of strong internet connections and lagging video. For courses that involved a lot of interaction and/or lab components, this transition was even more difficult. Moreover, everyone was struggling with a dramatic shift to their everyday lives, and the stress of social isolation, job and income loss, concerns about health and well-being, as well as shifts in childcare duties, should not be underestimated.

Nonetheless, this study indicates that students found courses, overall, less difficult after the transition to remote learning. Part of this may be attributed to the fact that online learning is simply more convenient, and the novelty of attending class from one's own home might have been perceived as easier. Also, students could perceive less difficulty if there were fewer outside demands on their time. During COVID-19 mandated lockdowns, students' work hours were often reduced or eliminated, and many outside distractions, such as socializing, were also reduced. Class work might have been perceived as less difficult if there was more flexibility in terms of submitting assignments and if attending classes become optional because the instructor provided recorded lectures. Finally, for many instructors, especially those who had little to no experience teaching online, it was difficult to gauge how much work could or should be assigned to students to maintain consistent and equal rigor between the face-to-face and online versions of the same course. Many instructors were cognizant of the chaos that had erupted in the worlds of their students, and they did not want to increase that stress by creating more work and more assignments; therefore, it is likely that many instructors eliminated all but the most necessary of assignments and classwork during the shift to remote learning. This is not reflective of the overall rigor of online learning, but rather reflective of an emergency transition to remote teaching wherein rigor and difficulty were not the top priorities for either instructors or students.

Student perception of course quality over-all decreased (4%, SD 1.8) The perceived quality of the course would tend to fall if the instructor was not as effective teaching online as they were in face-to-face instruction. Other papers have noted that this is likely the case because it is unlikely that faculty new to teaching online would have the experience to convert their courses or their teaching approach during this emergency. Even faculty members with online teaching experience struggled to convert courses designed to be delivered face-to-face to an entirely different delivery mode within a very short period of time. Course design differs between face-to-face courses and online courses, and this transition did not allow the kind of course design differences that make online teaching and learning effective. Rather than making large-scale changes to assignments and timing that would optimize online learning, faculty were forced to make do with what they already had in place, which was designed to be delivered in an entirely different mode. Whereas a high-quality online course takes months, sometimes years, to create and perfect, all faculty had to accomplish this task within about a week. It is to be expected that course quality would drop under these conditions.

Some students also learned about advantages to online learning, especially if they had never taken an online course before. These students might be surprised to find this format appealing and respond positively. Students, for example, that were reluctant to ask questions in face-to-face courses, or ask an instructor for help in-person, might find it easier to ask questions or solicit help using email. Further, students might be more

willing to email their instructor when that was the only means they had to ask questions. Upon receiving individualized answers from their instructors, it is reasonable for students to feel the instructional quality had improved. Whether the conversion to remote teaching would increase or decrease students' perception of quality, it seems likely that the quality would change less for instructors that were already teaching online because these instructors may have been able to use materials they had created for previous courses they had taught online, and these instructors were already familiar with the technology involved in online teaching and learning. Nonetheless, it is safe to say that the shift to remote teaching and learning was not optimal, for either faculty or students.

5.1 Implications

Students' experiences with online learning during the COVID-19 pandemic could have long-term implications for higher education as we move forward. Student perceptions are important to institutions since they are closely related to enrollment and retention. This study found that student perceptions of course difficulty and quality fell when course teaching formats were abruptly changed during COVID-19. However, these changes were not found to be associated with institution type (2 year vs. 4 year) or course discipline. All institutions or disciplines were able to similarly address the transition to remote leaning. For example, this study found that students' perception of a science course from a two-year institution was no more or less impacted by the COVID-19 transition than an English course taken at a four-year institution. In terms of student perception, this suggests that going forward administrators and instructors should be equally as willing to offer alternative course formats to students regardless of institution type or the course discipline.

Another important consideration to administrators and instructors going forward is how students will perceive alternative instruction. What students experienced during Spring 2020 is best described as remote learning. This distinction is important because a planned online course (whether synchronous or asynchronous) incorporates a wide variety of components meant to optimize the online experience; remote learning courses, on the other hand, are aimed at using the same course design that would be used face-to-face and just delivering it remotely (Craig, 2020; Morgan, 2020). For many students, however, it is possible that this distinction may go unnoticed, especially if they have not experienced an online course before. For the purposes of this study, in fact, student evaluations referred to all instruction delivered via technology as "online," whether they were originally designed as online courses, utilized remote learning, or anything in between. For students, remote learning could become conflated with online learning, thus leading students to make far-reaching assessments about online learning in general that may not be accurate. Students who perceived their "online" course in the spring of 2020 as "less difficult" might be surprised to find that online courses they take in the future are quite different from what they experienced during emergency remote learning, and that difference may be perceived negatively. Students who viewed remote learning courses as lower quality may be less likely to register for online courses in the future, believing that their (negative) experiences are reflective of the online mode of instruction and learning as a whole. It remains to be seen whether students will be more or less enthusiastic about online teaching and learning in the future, but it is clear that what they experienced in the spring is, in many cases, not a fair reflection of online courses that were designed as such.

5.2 Limitations

There are a number of limitations that are present in this study. This study used self-reported data from students who independently posted their perceptions on RateMyProfessors.com. It is possible that students who post their perceptions may not accurately represent the perceptions of typical higher education students. Although the sample was both large and representative of public higher institutions, it did not consider private institutions. Some of the institutions included in this study did not alter their face-to-face teaching approach even during the time period of this study. For these institutions changes in student perceptions pre and post COVID-19 were not due to rapid conversion in course instruction. Additionally, the time period studied in this investigation was narrow. The student perceptions of online/remote instruction are likely to change over time.

5.3 Future Research

Technology allowing for remote/online has existed for decades, but it took the COVID-19 pandemic to force many companies and employees to seriously consider it as a viable alternative to working in person. Likewise, COVID-19 forced many higher education faculty and students to experience remote/online coursework for the first time. This paper finds that during the pandemic student perceptions of instruction quality fell but their perceptions of difficulty was not adversely affected by the abrupt shift to remote/online learning. Future studies should go beyond student perception during COVID-19 to investigate a number of issues that are also important to higher education. For example, did the pandemic impact student course performance? Particularly, did student performance differ significantly across disciplines? Additionally, the impact of the pandemic on enrollment would also be important to study. Did enrollment changes vary at different types of universities and/or across disciplines? During the pandemic many faculty members experienced online/remote teaching for the first time. How will this impact their future willingness to teach in alternative formats? COVID-19 had a profound impact on our world and has led to fundamental changes. Studies like this one will hopefully help us to understand these changes and allow us to better plan for the future.

Appendix

Student Comments (The Punctuation and Grammar were Left Unedited.)

I took this course during covid, so we went from face to face to being online. I loved this class when it was face to face… The only thing I would say is now he doesn't give much feedback on assignments. When it went online, it was less enjoyable.

This class shouldn't be taken as an online course. To me i found it very hard to watch the hour, sometimes longer, lectures. When taken online he also doesn't stick to a schedule very well. This lead to many things getting changed around, including exams. This made it very hard to make plans or work in your personal life. Good luck!

The reviews on this dude talk about how he is a bad teacher, but him in online school is so much worse. He hasn't communicated to the class in 3 weeks.

BEWARE! If youre considering taking this class during COVID-19, I wouldnt recommend. He doesnt budge to help students at all.

This professor does not care about her students. I feel I would have done well in an in-person lecture, however, the online class she has zero knowledge.

She never bothered to turn on her camera. Would only respond to my emails after I send a follow-up (very hard to get a hold of).

I took two classes with her already, great professor. Until I took this with her. The COVID-19 and transitioning online ruined it for me.

I took this class during coronavirus and it was obvious she put zero effort in to adapting the course for online.

She doesn't teach at all, instead she posts online lectures from another teacher for you to watch.

He has no idea how to teach online. I don't know how he was in-person but online he is a nightmare.

He is better suited for in person learning. The first two tests were difficult because you had to manually type long calculus answers into a difficult textbox (very time consuming for a timed test).

When classes went online now due to the corona pandemic, all other classes made the workload easier he made it much harder.

This professor used to be one of my favorites when class was in person. Class is unmotivating, the transition she made into online class is very unfortunate.

She hasnt done any teaching all semester all we do are projects. What a waste of time and money.

She was a fair professor before the pandemic hit. Once we switched to online, she started putting problems on the exams that were very hard and she no longer gives partial credit.

She couldn't figure out Canvas when the pandemic hit so another teacher had to take over.

She regularly teaches online and this was an online specific class so COVID should not have been her excuse for giving us our assignmens so late in the semester. Did NOT even provide a syllabus!

Was never clear on what he wanted. He is newly teaching online so not sure if he's just inexperienced with teaching online courses or if this is normal for him. Also he never gave feedback.

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References

Ackerman, D., & Chung, C. (2018). Is RateMyProfessors.com unbiased? A look at the impact of social modelling on student online reviews of marketing classes. *Journal of Marketing Education, 40*(3), 188–195.

Bernard, R., Abrami, P., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., & Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research, 74*(3), 379–439.

Bernard, R., Borokhovskib, E., & Tamimc, R. (2014). Detecting bias in meta-analyses of distance education research: Big pictures we can rely on. *Distance Education, 35*(3), 271–293.

Bolliger, D., & Halupa, C. (2018). Online student perceptions of engagement, transactional distance, and outcomes. *Distance Education, 39*(3), 299–316.

Brown, M., Baille, M., & Fraser, S. (2009). Rating RateMyProfessors.com: A comparison of online and official student evaluations of teaching. *College Teaching, 57*(2), 89–92.

Carle, A. (2009). Evaluating college students' evaluations of a professor's teaching effectiveness across time and instruction mode (online vs. face-to-face) using a multilevel growth modeling approach. *Computers & Education, 53*(2), 429–435.

Castro, E., & George, J. (2021). The impact of Covid-19 on student perceptions of education and engagement. *E-Journal of Business Education & Scholarship of Teaching, 15*(1), 28–39.

Chávez, K., & Mitchell, K. (2020). Exploring bias in student evaluations: Gender, race, and ethnicity. *The Profession, 53*(2), 270–274.

Cohen, P. (1981). Student ratings of instruction and student achievement: A meta-analysis of multisection validity studies. *Review of Educational Research, 51*, 281–309.

Craig, R. (2020). What students are doing is remote learning, not online learning. There's a difference. Retrieved April 2, 2020, from https://www.edsurge.com/news/2020-04-02-what-students-are-doing-is-remote-learning-not-online-learning-there-s-a-difference

Davison, E., & Price, J. (2009). How do we rate? An evaluation of online student evaluations. *Assessment & Evaluation in Higher Education, 34*(1), 51–65.

Dutton, J., Dutton, M., & Perry, J. (2001). Do online students perform as well as lecture students? *Journal of Engineering Education, 90*(1), 131–136.

Felton, J., Mitchell, J., & Stinson, M. (2004). Web-based student evaluations of professors: The relations between perceived quality, easiness and sexiness. *Assessment & Evaluation in Higher Education, 29*(1), 91–108.

Gillis, A., & Krull, L. (2020). Covid-19 remote learning transition in spring 2020: Class structures, student perceptions, and inequality in college courses. *Teaching Sociology, 48*(4), 283–299.

Guo, S. (2020). Synchronous versus asynchronous online teaching of physics during the COVID-19 pandemic. *Physics Education, 55*(6), 1–8.

Kindred, R., & Mohammed, S. (2005). "He will crush you like an academic ninja!": Exploring teacher ratings on ratemyprofessors.com. *Journal of Computer-Meditated Communication*. https://doi.org/10.1111/j.1083-6101.2005.tb00257.x

Lao, T., & Gonzales, C. (2005). Understanding online learning through a qualitative description of professors and students' experiences. *Journal of Technology and Teacher Education, 13*(3), 459–474.

Liaw, S., & Goh, K. (2003). Evidence and control of biases in student evaluations of teaching. *International Journal of Educational Management, 17*(1), 37–43.

Lim, J., Kim, M., Chen, S., & Ryder, C. (2008). An empirical investigation of student achievement and satisfaction in different learning environments. *Journal of Instructional Psychology, 35*(2), 113–119.

MacNell, L., Driscoll, A., & Hunt, A. (2014). What's in a name: Exposing gender bias in student ratings of teaching. *Innovative Higher Education, 40*, 291–303.

McFarland, D., & Hamilton, D. (2006). Factors affecting student performance and satisfaction: Online versus traditional course delivery. *Journal of Computer Information Systems, 46*(2), 25–32.

McKenna, K., Gupta, K., Kaiser, L., Lopes, T., & Zarestky, J. (2020). Blended learning: Balancing the best of both worlds for adult learners. *Adult Learning, 31*(4), 139–149.

Merisotis, J., & Phipps, R. (1999). *What's the difference? A review of contemporary research on the effectiveness of distance learning in higher education*. Institute for Higher Education Policy.

Morgan, H. (2020). Best practices for implementing remote learning during a pandemic. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 93*(3), 135–141.
National Center for Education Statistics. (2003). Distance education at degree granting postsecondary institutions: 2000–2001, NCES 2003-017 (Washington, DC, US Department of Education, National Center for Education Statistics). Retrieved December 21, 2021, from https://nces.ed.gov/pubs2003/2003017.pdf
Nguyn, T. (2015). The effectiveness of online learning: Beyond no significant difference and future horizons. *MERLOT Journal of Online Learning and Teaching, 11*(2), 309–319.
Otto, J., Sanford, D., & Ross, D. (2008). Does RateMyProfessors.com really RateMyProfessors.com? *Assessment & Evaluation in Higher Education, 33*(4), 355–368.
Park, J., & Choi, H. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Educational Technology & Society, 12*(4), 207–217.
R Core Team. (2012). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Retrieved March 1, 2020, from http://www.R-project.org
Renaud, R., & Murray, H. (2005). Factorial validity of student ratings of instruction. *Research in Higher Education, 46*(8), 929–953.
Rodriguez, M. C., Ooms, A., & Montañez, M. (2008). Students' perceptions of online-learning quality given comfort, motivation, satisfaction, and experience. *Journal of Interactive Online Learning, 7*(2), 105–125.
Russell, J., Van Horne, S., Ward, A., III., Bettis, E. A., Sipola, M., Colombo, M., & Rocheford, M. (2016). Large lecture transformation: Adopting evidence-based practices to increase student engagement and performance in an introductory science course. *Journal of Geoscience Education, 64*(1), 37–51.
Shea, P., & Bidjerano, T. (2014). Does online learning impede degree completion? A national study of community college students. *Computers & Education, 75*, 103–111.
Shim, T., & Lee, S. (2020). College students' experience of emergency remote teaching due to COVID-19. *Children and Youth Services Review, 119*, 1–7.
Soffer, T., & Nachmias, R. (2018). Effectiveness of learning in online academic courses compared with face to face courses in higher education. *Journal of Computer Assisted Learning, 34*(5), 534–543.
Sonntag, M., Bassett, J., & Snyder, T. (2009). An empirical test of the validity of student evaluations of teaching made on RateMyProfessors.com. *Assessment & Evaluation in Higher Education, 34*(5), 499–504.
Swan, K., Shea, P., Fredericksen, E., Pickett, A., Pelz, W., & Maher, G. (2000). Building knowledge building communities: Consistency, contact and communication in the virtual classroom. *Journal of Educational Computing Research, 23*(4), 359–383.
Swanson, S., Davis, C., Gonzalez-Fuentes, M., & Robertson, K. (2012). In these unprecedented times: A critical incident technique examination of student perceptions of satisfying and dissatisfying learning experiences. *Marketing Education Review, 31*(3), 209–225.
Terry, N. (2001). Assessing enrollment and attrition rates for the online MBA. *The Journal, 28*(7), 64–68.
Timmerman, T. (2008). On the validity of RateMyProfessors.com. *Journal of Education for Business, 84*(1), 55–61.
Toven-Lindsey, B., Rhoads, R., & Lozano, J. (2015). Virtually unlimited classrooms: Pedagogical practices in massive open online courses. *The Internet and Higher Education, 24*, 1–12.
Tratnik, A., Urh, M., & Jereb, E. (2019). Student satisfaction with an online and a face-to-face business english course in a higher education context. *Innovations in Education & Teaching International, 56*(1), 36–45.
Yang, D., Baldwin, S., & Snelson, C. (2017). Persistence factors revealed: Students' reflections on completing a fully online program. *Distance Education, 38*(1), 23–36.
Young, A., & Norgard, C. (2006). Assessing the quality of online courses from the students' perspective. *The Internet and Higher Education, 9*(2), 107–115.
Zhang, D. (2005). Interactive multimedia-based e-learning: A study of effectiveness. *American Journal of Distance Education, 19*(3), 149–162.

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