

The Impact of Technology on Business Student Success During the COVID-19 Pandemic

Randy G. Colvin
Texas A&M University-Kingsville

Natalya Delcours
Texas A&M University – Kingsville

Thomas M. Krueger
Texas A&M University – Kingsville

Harmeet Singh
Texas A&M University – Kingsville

This report documents the technology issues students encountered during the first two years of the COVID-19 pandemic. Six different aspects of technology in the pedagogic sphere are examined. Through this analysis, we reveal key aspects external to the effort of faculty that impact student perceptions of online education. Poor internet speed is the most common technology issue cited by respondents whereas the lack of personal computer knowledge is the least cited. Tests are run to assess the variation in student perception based upon their satisfaction with online education that showing students facing no technology related issues report being satisfied with online learning. Suggestions are made regarding how to use these findings to enhance online education in the business college and across campus.

Keywords: online education, higher education, business student, academic success, COVID-19, technology, student perceptions, internet speed, internet access, downloading issues, playback issues, Kendall's tau

INTRODUCTION

The rapid shift to online learning arising from the COVID-19 pandemic had a wide range of implications for business education worldwide. This study focuses on how six aspects of technology has impacted business student academic success. In order to gauge success, we queried students seeking an undergraduate degree at Texas A&M-Kingsville, an AACSB-International accredited institution. The two research hypotheses and alternative hypotheses, tested using business student perceptions in light of the COVID-19 pandemic, are:

Research Hypothesis 1: *Technology-related factors did not impact student success in online education.*

Alternative Hypothesis 1: *Variation in technology impacts success in the online classroom.*

Hypothesis 2: *There is no difference in terms of student opinions regarding characteristics of pedagogic technology, when students are grouped on the basis of their satisfaction with online education.*

Alternative Hypothesis 2: *There are statistical differences across satisfied students, dissatisfied students, and neutral students regarding how various aspects of technology have impacted their online success.*

Students who are noncommittal with regard to the value of their online educational experience, are referred to as neutral students.

LITERATURE REVIEW

Empirical work which examines online teaching, student and faculty satisfaction with online teaching, and online teaching technology among other factors is rich. It goes back to the 1990s (Baran, Correia, and Thompson, 2011). Across the years, researchers have identified pedagogical, social, managerial and technical roles faculty perform as they teach virtually. The pedagogical role enables student learning; the social role encourages student learning; the managerial role facilitates class organization, design, and logistics; while the technical role aids with technology (Berger, 1995; Berger 2009). One potential explanation for this wide variation in results could be attributed to the difference in student populations and courses these studies use to examine effectiveness of students' learning. For example, Stewart, Bachman, and Johnson (2010) find that students who possess strong technology and time management skills adapt to virtual learning easier than others. Kim and Krueger (2017) document the advantages of using technology to create a hybrid class that combines the online learning and classroom participation, but conclude that a key component is student commitment when using technology.

The COVID-19 crisis marked the first attempt to make online education global (Whittle et al, 2020). That is why it is critical and necessary to analyze those factors related to the education model in greater detail (Almaiah et al, 2020). Given that Texas A&M University-Kingsville is a Hispanic-serving institution (H.S.I.), and we are still unsure about when the pandemic will be controlled, it is especially important to study pedagogic factors at this time. A key factor to the successful implementation of online teaching, according to Avolio et al (2021), is the technological adjustment to change. Through a survey of 94 business faculty in Peru, these authors identify technology platform and tools, technology skills, and technology assistance as key aspects of the use of technology within the H.S.I..

Rapper and Brown (2020) note that some students may be better skilled or have better access to technology, when it comes to accessing academic services. The current study follows up on Kazybayeva et al.'s (2022) report concerning students' perceptions of online instruction. However, that study was limited to Kazakhstan, and did not examine the various dimensions of technology.

RESEARCH METHOD

Survey data was collected from 112 College of Business Administration (CBA) students at Texas A&M University-Kingsville during the spring of 2022. Hence, the survey was conducted two years after the university went totally online and then slowly worked back to having most classes back on a face-to-face basis. Even when classes were officially meeting on a face-to-face basis, several students were still taking advantage of online opportunities being offered by most faculty.

Means, medians, and standard deviations were computed using Excel software. Pairwise t-tests were computed to assess statistical significance, with p-values exhibited in this report. Due to their ordinal nature, a non-parametric Kendall's tau test was run to compare the ranking of issues with various technology problems by the three respondent groups. Kendall's tau is a measure of similarity. Hence, a significant finding would mean that the paired groups had a statistically similar experience regarding online

technology. The SPSS Tutorial (2022) lists the following levels of association that can be deduced from Kendall's tau"

- | τ b| = 0.07 indicates a weak association;
- | τ b| = 0.21 indicates a medium association;
- | τ b| = 0.35 indicates a strong association.

Kendall's tau computation was facilitated by a statistical package created by Glen (2022).

RESEARCH FINDINGS

This report focuses on the technical issues experienced by online students. For completeness, six aspects of technology were also studied, which were chosen using input from keycdn, a global, content delivery expert. Alphabetically, they are:

- a. Downloading problems: Incomplete or partial downloads, which could be due to internet interruption or a variety of other issues such as the file being moved or removed on the server side, incomplete source, and timeouts
- b. Lack of PC knowledge: Inability to use hardware and related technology efficiently
- c. Lectures do not display: Inability to get to the freezing and buffering experience
- d. No internet access: No sourcing, including wrong IP address
- e. Playback issues: Freezing and buffering
- f. Poor internet speed: Poor connection with source, potentially due to spyware and viruses.

These issues are viewed as being external to the education component of online education.

Respondents were asked to select from this listing of technical issues, reporting all that they encountered in their online learning. With the option to select as many or as few, the percentages are not cumulative for this question. This value is shown in the first column of Table 1's Panel A, where the technology challenges are subsequently listed in order from the largest to smallest mean percentage of students with a specific technology issue. The most common issue is poor internet speed, which has been experienced by 44.2 percent of the students. The second most common issue is an interruption in playback of content, which occurred for 29.5 percent of the students, or about as frequently as students reported that none of these issues existed. Lectures not displaying, has a lesser frequency, occurring 20.0 percent of the time. The lack of internet access occurred 17.9 percent of the time, with a similar 16.8 percent of the students reporting that they had experienced downloading issues. The least common issue is that of lack of computer knowledge, which occurred for only about one out of every twelve (i.e., 8.4 percent) of the sample. It is reassuring to learn that most online students are comfortable with their personal computing devices.

The frequency of multiple technology issues is reported in Panel B of Table 1. For instance, the meaning of the first number in Panel B is that 40 percent of the students having difficulty with poor Internet speed also were experiencing issues with playback. For ease of reading, this value and all other values in Panel B in excess of one-third of the students are in a bold font. A higher and logical overlap occurs between playback issues causing inability to display lectures, which occurred 46 percent of the time. The other two instances where the values in Panel B exceed one third of the students deals with downloading. Thirty-seven percent of students with the inability to display lectures also had downloading issues. Meanwhile, a not-surprising 47 percent of students experiencing a lack of Internet access also had trouble displaying lectures. All of the other pairwise combinations or problems occurred for less than one third of the students suggesting that if students were able to manage a given issue, they were typically well on their way to accessing the education being provided.

TABLE 1
TECHNOLOGY ISSUES ENCOUNTERED WITHIN ONLINE CLASSES SINCE 2020

| | No Technology Problems | Poor Internet Speed | Playback Problems | Lectures not Displayed | No Internet Access | Downloading Problems | Lack of PC Knowledge |
|--|------------------------|------------------------|--------------------|------------------------|----------------------|----------------------|----------------------|
| Panel A. Distribution of Student Issues | | | | | | | |
| Students | 27 | 42 | 28 | 19 | 17 | 16 | 8 |
| Proportion | 28.4% | 44.2% | 29.5% | 20.0% | 17.9% | 16.8% | 8.4% |
| Panel B. Pairwise Combination of Problems Combinations exceeding 33% in bold | | | | | | | |
| | Playback Problems | Lectures not Displayed | No Internet Access | Downloading Problems | Lack of PC Knowledge | | |
| Poor Internet speed | 0.40 | 0.17 | 0.33 | 0.19 | 0.10 | | |
| Playback problems | | 0.46 | 0.29 | 0.25 | 0.07 | | |
| Lectures did not display | | | 0.26 | 0.37 | 0.16 | | |
| No Internet access | | | | 0.47 | 0.24 | | |
| Downloading problems | | | | | 0.06 | | |

The distribution of students grouped by their self-identified satisfaction with online education is reported in Panel A of Table 2. As one would expect, those without any technology-related issues were satisfied with online education. The remaining eight percent of those without technology issues were still dissatisfied with online education. Interestingly, none of the students without technology problems were on the fence with regard to their opinion of online education. For the 8 percent who are dissatisfied, this finding suggests that their displeasure arose from unfavorable experiences in online learning due to factors other than technology, which are likely to be similar to those they would encounter in a face-to-face classroom.

Dissatisfied students and those unable to indicate their opinion regarding online education had different issues. Dissatisfied students are a relative high proportion of students with access and playback issues. The neutral students were a relatively large proportion of students experiencing poor Internet speed and downloading issues. Addressing these issues is likely to increase the proportion of students that are satisfied with their online experience.

A Kendall's tau test was run to compare the technology issues of the three respondent groups. Kendall's tau is a measure of similarity. Hence, a significant finding would mean that the paired groups had a statistically similar experience regarding online technology. We find that this is not the case, due perhaps to the analysis being limited to paired readings on only six technology issues. The Kendall's tau estimates for the satisfied and dissatisfied student groups is 0.214 (p value = 0.697), for the satisfied and neutral student groups is 0.552 (p value = 0.182), and the dissatisfied and neutral groups is 0.296 (p value = 0.552).

It is possible to deduce a few observations regarding the association between these student groups. First, it should be noted that all of the Kendall's tau values are positive, meaning that even at the weak level of association, all three student groups had at least a low level of similar experience with technology in the online classroom. Next, we can assert that the experience of the satisfied students and neutral students had a strong level of association, though not statistically significant. There was a medium level of association between the dissatisfied students and either the satisfied students or the neutral students. Looking at the rankings of the individual issues, which are presented in Panel B of Table 1, playback issues seems to be the outlier. Additional assistance in the area of playback is likely to limit the disappointments experienced by dissatisfied students.

TABLE 2
STUDENT SATISFACTION ACROSS TECHNOLOGY ISSUES ENCOUNTERED WITH
ONLINE CLASSES SINCE 2020

| Panel A. Distribution of Student Issues across External Problems Encountered with online education | | | | | | | |
|--|-------------|---------------------|-------------------|------------------------|--------------------|----------------------|----------------------|
| | No Problems | Poor Internet Speed | Playback Problems | Lectures Not Displayed | No Internet Access | Downloading Problems | Lack of PC Knowledge |
| Satisfied | 92% | 69% | 68% | 74% | 65% | 63% | 75% |
| Dissatisfied | 8% | 12% | 18% | 16% | 18% | 13% | 13% |
| Neutral | 0% | 19% | 14% | 11% | 18% | 25% | 13% |
| Panel B. Ranking of Student Technology Issue Frequency | | | | | | | |
| Satisfied | 4 | 6 | 3 | 5 | 2 | 1 | |
| Dissatisfied | 4.5 | 1 | 4.5 | 6 | 2.5 | 2.5 | |
| Neutral | 4 | 6 | 5 | 2.5 | 2.5 | 1 | |
| Average | 4.2 | 4.3 | 4.2 | 4.5 | 2.3 | 1.5 | |

CONCLUSION

Businesses throughout the world have been affected by the COVID-19 pandemic. Many businesses shifted from the office to remote locations. The shift to online education at the onset of the COVID-19 pandemic had many implications for business students, which are likely to echo the experience of businesses. The present research examined survey responses of business students at Texas A&M-Kingsville.

In terms of technology issues faced by students, an unsurprising significant majority who faced no issues reported as being satisfied with online learning. Among the issues that caused the highest level of dissatisfaction were lack of internet access and problems with playback of content. For students residing off campus, such issues are beyond the control of faculty and administrators and are difficult to manage. Further work to compare these results across national boundaries, for other ethnic minorities, or within sub-disciplines (i.e., Krueger, 2013) and whether similar experiences occurred for businesses will demonstrate the robustness of these findings.

REFERENCES

- Almaiah, M.A., Al-Khasawneh, A., & Althunibat, A. (2022). Exploring the Critical Challenges and Factors Influencing the E-learning System Usage During COVID-19 Pandemic. *Education and Information Technologies*, 25(6), 5261–5280. doi: 10.1007/s10639-020-10219-y. Epub 2020 May 22. PMID: 32837229; PMCID: PMC7243735
- Avolio, B., Benzaquen, J., & Bazán, C. (2021). Critical Factors to Approach the Emergency Online Teaching Due to the COVID-19. *Journal of Hispanic Higher Education*. doi:10.1177/15381927211066525
- Baran, E., Correia, A., & Thompson, A. (2011). Transforming Online Teaching Practice: Critical analysis of the literature on the roles and competencies of online teachers. *Distance Education*, 32(3), 421–439.
- Berger, Z. (1995). The Role of the Online Instructor/facilitator. *Educational Technology*, 35(1), 22–30.
- Berger, Z. (2009). Changing Instructor's Roles in Virtual Worlds. *Quarterly Review of Distance Education*, 9(4), 407–415. Retrieved from <http://www.infoagepub.com/quarterly-review-of-distance-education.html>

- Glen, S. (2022). "Kendall's Tau (Kendall Rank Correlation Coefficient)" From *StatisticsHowTo.com: Elementary Statistics for the rest of us!* Jacksonville, FL (Independent Media Associates, Inc.). Retrieved from <https://www.statisticshowto.com/kendalls-tau/>
- Kazybayeva, A., Smykova, M., Krueger, T., Duchshanova, M., & Sokhatskaya, N. (2022). Business Student Perspectives Regarding Ways to Enhance the Online Learning Process. *Journal of Eastern European and Central Asian Research (JEECAR)*, 9(2), 284–295. <https://doi.org/10.15549/jeecar.v9i2.817>
- Kim, D., & Krueger, T.M. (2017). Comparison of Student Success in Hybrid and Traditional Introductory Finance Classes. *Journal of Accounting and Finance*, 7(5), 124–134.
- Krueger, T.M. (2013). Acceptance Rates of Finance Journals Dedicated to Various Areas: Impact of review type and reviewer number. *Mustang Journal of Accounting and Finance*, 3, 65–88.
- Rapper, R., & Brown, C. (2020). The Covid-19 Pandemic and the Dissolution of the University Campus: Implications for student support practice. *Journal of Professional Capital and Community*, 5(34), 343–349.
- SPSS Tutorials. (2022). *Kendall's Tau – Simple Introduction*. Retrieved from <https://www.spss-tutorials.com/kendalls-tau/>
- Stewart, C., Bachman, C., & Johnson, R. (2010). Students' Characteristics and Motivation Orientations for Online and Traditional Degree Programs. *Journal of Online Learning and Teaching*, 6(2), 367–379.
- Whittle, C., Tiwari, S., Yan, S., & Williams, J. (2020). Emergency Remote Teaching Environment: A conceptual framework. *Information and Learning Sciences*, 121(5/6), 311–319. <https://doi.org/10.1108/ILS-04-2020-0099>