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THE INFLUENCE OF COVID-19 ON SENTIMENTS OF HIGHER EDUCATION STUDENTS - PROSPECTS FOR THE SPREAD OF DISTANCE LEARNING

Kevin Jackson
Széchenyi István University
Győr, Hungary
E-mail: Kevin.jackson@sze.hu
ORCID 0000-0003-2179-5036

Márta Konczos Szombathelyi
Széchenyi István University
Győr, Hungary
E-mail: kszm@sze.hu
ORCID 0000-0001-5248-7752

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ABSTRACT. Clayton Christensen's theory of "disruptive innovation" describes how smaller firms, with access to far fewer resources, are still able to challenge and displace well-established industry leaders. Uber and Airbnb as startups were able to disrupt the global taxi and hotel industries despite the economic shock of the financial crisis (2007-2008). The COVID-19 pandemic is currently an even more powerful catalyst that is forcing businesses and institutions to define and adapt to the "new normal". Higher education also finds itself at a critical crossroads where universities around world need to quickly adapt to the changing needs of younger generations, discover the optimal balance between traditional and online learning, find ways to reduce costs and avoid tuition escalation, and become better prepared for future health crises and geopolitical events. The COVID-19 pandemic has already significantly accelerated trends in education and a failure to adapt could spark the disruption in education that Christensen spoke of more than a decade ago. This research utilizes valuable feedback from a diverse group of international students to help educators better understand changes that occurred during COVID-19 and form recommendations regarding how to use technology to maximize learning outcomes.

JEL Classification: I23

Keywords: higher education, face-to-face learning, blended learning, COVID-19, technology, sentiments

Introduction

In the aftermath of the financial crisis of 2007-2008, Clayton Christensen argued that universities were at a "critical crossroads" and at "great risk of competitive disruption and potentially poised for an innovation-fueled renaissance" (Christensen & Eyring, 2011). Before the COVID-19 pandemic, however, his prediction proved to be incorrect as there was no substantial evidence of disruption in higher education. According to the U.S. Department of Education, there were 19,637,499 total students in 2019. 3,3450,00 (17%) of these students exclusively took courses online, and 3,863,498 (19.7%) students took at least one course online. According to Eurostat, 8% of the people in the European Union in 2019, aged 16 to 74, indicated

that they did an online course within three months of the survey. This was only a slight increase from 7% in 2017, but the data also showed that people doing an online course in Europe doubled from 4% in 2010. Among the 16 – 24 year old population, 13% participated in online courses in 2019. While steady progress has been made in both the U.S. and in Europe over the past decade, it cannot be classified as disruption since online learning did not fully replace traditional learning at a significant scale. The question for all educators is whether COVID-19 has created the conditions where disruption in higher education will now occur.

On March 11, 2020, the World Health Organization declared COVID-19 to be a pandemic. According to the United Nations, 1.6 billion learners in more than 190 countries were instantly affected. The only choice for educators on all levels was to frantically adopt "Emergency Remote Learning (ERT)", which is the creation of temporary access to educational interaction materials that are quick to set up and reliable during a crisis (Hodges, Moore, Lockee, Trust, & Bond, 2020). In a post-pandemic period, universities are now faced with the tough choice of either shutting down their ERT programs and reverting to pre-pandemic operations or transitioning their ERT programs to permanent online learning platforms. The development of an online learning platform is certainly the harder option as it involves committed faculty support, training, and online course design and support (Hodges et al., 2020). In a comprehensive, ten-year research study of online learning, distance learning, and blended learning, one of the principal findings was that online courses must be designed far beyond simple platforms if learners' intellectual advancement is to occur (Park & Shea, 2020). Please consider the time and effort it took to design and create university campuses, physical classrooms, and live teaching techniques. Despite the challenge of adoption, many university leaders view online learning as an opportunity and student support is growing (Müller, Goh, Lim, & Gao, 2021). Traditional universities have also realized during the pandemic that they have direct and rapidly growing competition from distance education universities with far more advanced online learning platforms (Cranfield, Tick, Venter, Blignaut, & Renaud, 2021).

There are many academics, however, that do not view online learning favorably and remain hesitant to embrace its usage. In a 2020 survey of 1,148 academics working in the U.K., most respondents expressed their fear that the digital disruption of higher education will leave them vulnerable and marginalized (Watermeyer, Crick, Knight, & Goodall, 2021). These fears are understandable given the fact that online education cannot be turned on like a light switch and requires significant time and effort to be on par with live classroom teaching (Seaman 2009). Another significant survey was conducted in Canada in 2020 that included 1,626 teachers (Sokal, Trudel, & Babb, 2020). The analyses from this survey revealed that the level of burnout of teachers during the pandemic was a function of their attitudes to technology, willingness to change, and efficacy. If we assume that online learning will be a permanent part of higher education in the future, then minimizing teacher burnout and boosting positive attitudes toward online learning and technology is critical. Regardless of what universities and educators think about online learning, however, it their moral responsibility to understand whether online education has the potential to outperform in-person teaching (Zimmerman, 2020).

The need for significant educational reforms, which would lead to an increase in the quality of higher education is underpinned by Draskovic, Jovovic, and Rychlik (2020), Sułkowski, Gregor, and Kaczorowska-Spychalska (2020), and Pup and Filep (2021). The article is devoted to the study of prospects for the spread of distance learning technologies in higher education. The relevance of this study comes from the fact that the development of distance learning using online platforms is currently the most significant competitive advantage for higher education institutions. Since distance learning has not only advantages but also

disadvantages, it is important to manage the quality of distance education, in particular the collection and analysis of students' opinions on such technological transformations.

1. Literature review

This literature review studies the integration of online learning into higher education before and during the COVID-19 pandemic, as well reviewing recommendations for the future. The renowned management consultant and Harvard professor, Clayton Christensen and his co-authors wrote two books about higher education entitled "Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns" (Christensen, Johnson, & Horn, 2008) and "The Innovative University: Changing the DNA of Higher Education" (Christensen, & Eyring, 2011). While Christensen's predictions did not happen as quickly as he originally envisioned, his view that higher education will be transformed by technology has now become more relevant, which is the topic of this research

The emergency remote teaching (ERT) used during the early stages of the COVID-19 pandemic, and its consequences was well researched by Müller et al. (2021), Hodges et al., (2020), and Watermeyer et al. (2021). The challenge of the transition from ERT to high-end online learning platforms was well documented in Seaman (2009), Park and Shea (2020), and Cranfield et al. (2021).

1.1. COVID 19 education transition

While Christensen believed that universities were threatening their futures by holding on too tightly to their traditions, he also believed that traditional universities are also indispensable and a place for students to broaden their horizons (Christensen &Eyring, 2011). It is quite logical; therefore, that blended learning (BL) or hybrid learning, a combination of in-class and online learning, has gained popularity as educators look to the future (Konczos, Horvath & Jackson, 2021). A 2020 U.K. study indicated that while students preferred face-to-face learning before COVID-19, they much preferred BL during COVID-19. For practical purposes, BL helps to better prepare educators and students for future pandemics and can eliminate the stress and anxiety that is associated with rapid transitions from offline to online (Mali & Lim, 2021). The implementation itself of BL requires universities to decide how to split class times between in-class and online and this represents a wide range. Many programs with more developed online programs have 20-30% in-class and 70-80% online (Bokolo et al., 2019, 2020). While BL seems to be a convenient solution, however, it also takes significant resources and time to create and maintain the right balance between in-class and online. A comprehensive Canadian survey of teachers indicated how any successful transition from ERT to high-end learning platforms must involve teachers that are motivated and embrace the change (Sokal et al., 2020).

A 2018 survey in India asked teachers about their perceptions of BL based on the following criteria: learning flexibility, online learning, study management, technology, classroom learning, and online interaction (Saboowala, & Manghirmalani, 2021). Not surprisingly, the teachers with more positive and adaptable attitudes were the ones who viewed BL favorably. These positive attitudes are critical when transitioning from low-end online learning, which commonly includes content transmission and knowledge transfer, to high-end online learning, which is the establishment of an interactive environment where students are engaged at the same time (Openo, 2020). The recognition that the "new normal" will involve the migration towards digital by higher education is well supported by Bhagat & Kim (2020), Cesco et al, (2021), Kedraka & Kaltsidis (2020). COVID-19 has undoubtedly unleashed the

great online-learning experiment and educators must decide if there will be a "new normal" or just normal (Zimmerman, 2020).

1.2. Measuring student sentiment during COVID-19

In turbulent times, successful businesses continuously collect and analyze data to understand rapidly evolving customer sentiment. Entrepreneurs follow the "build, measure, learn" model to ensure that they are always putting their precious resources to work in the most productive way possible. Higher education institutions must now operate in a similar fashion as education will increasingly become more digitized in the future. Constant feedback from administrators, teachers, and students is critical for creating an effective roadmap during turbulent times and detecting problems at an early stage can prevent more serious consequences (Ilieva, Yankova, Klisarova-Belcheva, & Ivanova, 2021). Feedback evaluation tools (Aryal, 2021) and large amounts of data collected from student surveys, discussion forums, blogs, and other sources (Rani & Kumar, 2017), however, are too often underutilized by universities.

A growing number of researchers regularly use Twitter to get a quick read on public opinion, sentiment, or a belief related to a particular area of interest (Antonakaki, Fragopoulou, & Loannidis, 2021). Mujahid et al. (2021) used machine learning and deep learning to analyze a dataset of 17,155 tweets about the effectiveness of e-learning. Their conclusion was that online education should be modified to realize its full potential. Duong, Pham, Yang, Wang, & Luo (2020) conducted similar research by analyzing 73,787 tweets from 12,776 Twitter college followers regarding their living conditions during COVID-19. The results showed that the students were frustrated and troubled during COVID-19. Almossa (2021) conducted an even larger study in Saudi Arabia analyzing 124,810 tweets from students during COVID-19 regarding their experience with online learning. The result indicated that the students felt disengaged and a reduced desire to learn. While significant in scope, these studies are good for measuring general trends and not the discovery of specific issues.

Additional approaches to measuring university student sentiment during COVID-19 included extracting and analyzing articles from Google and DuckDuckGo related to online learning (Bhagat, Sanjaya, Alakh, & Chun-Yen, 2021). Another approach involved conducting a sentiment analysis based on feedback of classes collected through Google survey forms and WhatsApp (Umair, Hakim, Hussain, & Naseem, 2021). The use of online surveys was also frequently used during the pandemic like the ones conducted at the University of Katowice in Poland (Cicha, Rizun, Rutecka, & Strzelecki, 2021) and a survey that included the three universities of Istanbul Bilgi University, The Northcap University (India), and the Universidad Latina de Costa Rica (Benito et al., 2021).

1.3. Gap in COVID 19 Student sentiment research

While Twitter has emerged as a useful tool for sentiment research and analysis, there are many reservations about its effectiveness. Such Twitter research reservations include the accuracy of using hashtags to measure sentiment, the inability to properly understand sentiment from different cultures and languages, and not using comparative analysis to compare public sentiment to the same entity, such as climate change, immigration, or education (Antonakaki et al, 2021). Extracting articles related to online learning from Google and DuckDuckGo has the limitations such as a small set of individuals influencing public opinion by creating frequent and large amounts of content. According to a 2021 Pew research study, the most active 25% of U.S. adult on Twitter produced 97% of the tweet volume (McClain, Widjaya, Rivero, & Smith, 2021).

The research gap in these sentiment research and analysis techniques is related to the level of involvement from the survey participants and the amount of outside influence during the data collection process. This sentiment research study involves a diverse group of international students that were all university students during the previous Fall 2020 semester. The sentiment of this sample was done both at the beginning and at end of the Spring 2021 semester, which at least includes their experience from Fall 2020 semester and the Spring 2021 semester. The students were given the opportunity to respond to "free answer" questions and there was a significant number of responses to these questions from many students. These free answer responses involve a much higher level of involvement by the students over multiple-choice surveys. The range of responses was far wider than the limited answer options used in typical surveys since students has the freedom to create their own responses. This research represents a deeper dive into student sentiment during COVID-19 and powerful complement to student sentiment studies conducted with alternative methods.

2. Methodological approach

2.1. Research objectives

The goal of this paper is to improve learning technologies due to the analysis of the results of the ABO survey, which aim was to measure and analyze university and graduate student sentiment in the Fall 2020 and Spring 2021 semesters. Further aim is to present a survey methodology that can be used by other educational institutions that want to manage consumer quality of educational services. Further aim is to measure and analyze university and graduate student sentiment in the Fall 2020 and Spring 2021 semester.

The speed of change during COVID-19 was unprecedented in education. To better adapt to this change, surveys were given at the beginning and at the end of the Spring 2021. At the beginning of the semester, students reflected on the Fall 2020 semester at their home universities. The Fall 2020 semester was a very mixed picture where some students attended live classes, some students learned exclusively online, and some had a combination of the two. The Spring 2021 semester at Corvinus University and the ESSCA School of Management was done entirely online due to COVID-19 restrictions. Due to the different conditions between the Fall 2020 and Spring 2021 semesters, the purpose of the survey was to see how much change in sentiment occurred during this period given the severity of the COVID 19 disruption.

The purpose of this paper is to support the following three hypotheses:

H.1: The collection and analysis of use of free answer data can provide valuable insight into higher education student sentiment.

H.2: The data from the free answer questions from the Fall 2020 and Spring 2021 semesters will show significant changes in student sentiment towards online learning.

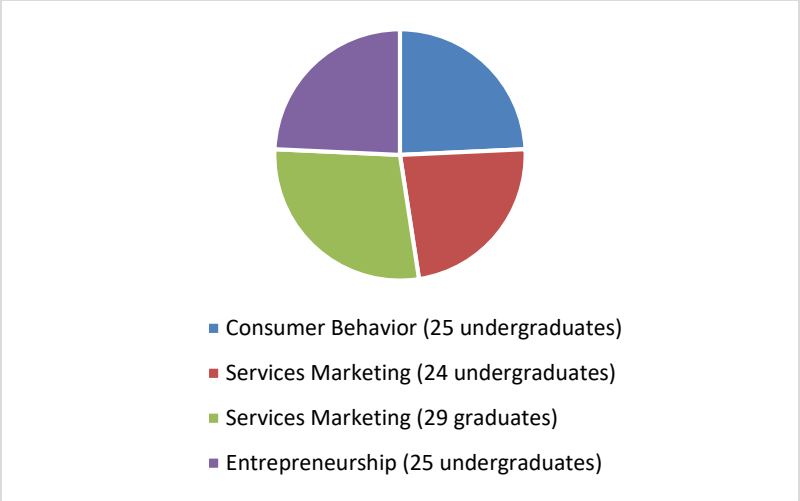
H.3: COVID-19 has been very disruptive and student sentiment indicates that technology will play a larger role in the future.

The rest of the paper will be organized as follows: Section 2 outlines the research methodology, Section 3 presents and discusses the results, Section 4 provides a discussion of the results, the conclusion, and possible future research options

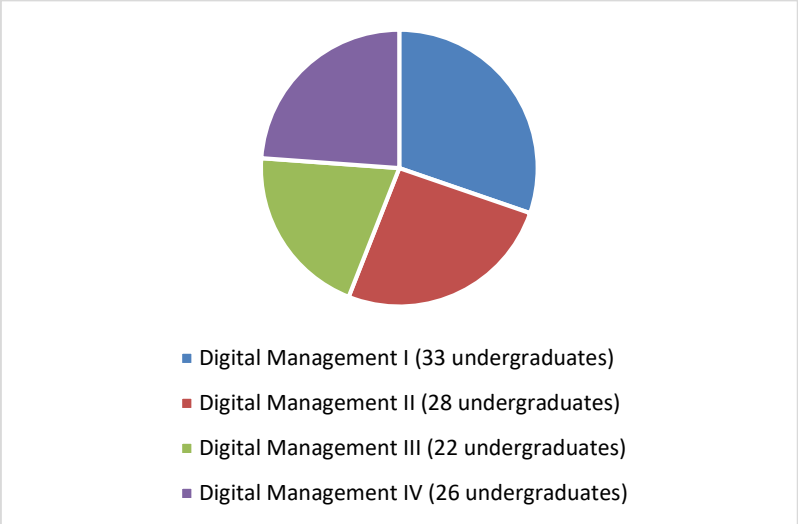
2.2. Demographics of participants

The research was conducted among students from the Corvinus University and the ESSCA School of Management (*Graph 1 and Graph 2*). The survey given at the beginning of the Spring 2021 semester (BOS) measured the student remote learning sentiment from the Fall

2020 and Spring 2020 semesters. The end of the Spring 2021 semester survey (EOS) was primarily focused on the changes in student remote learning sentiment that occurred during this semester. All the following classes were taught entirely online, in English, by the same teacher, using Microsoft Teams.



Graph 1. Corvinus University (103 students)
Source: *own data*

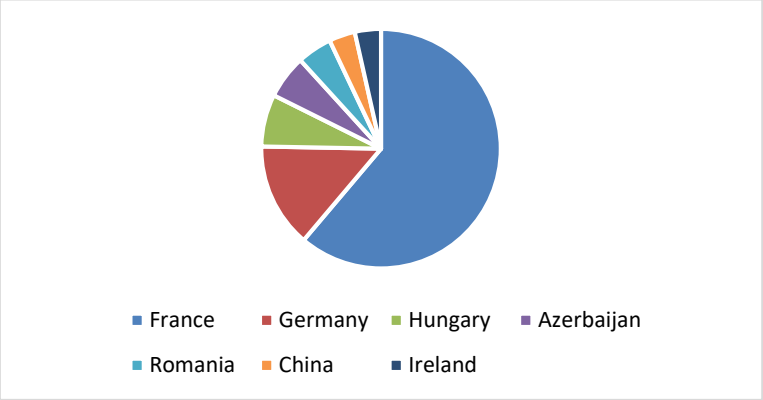


Graph 2. ESSCA School of Management (109 students)
Source: *own data*

There were 109 students who responded to the BOS survey that included 45 males (41.28%) and 64 females (58.72%). The average age was 21.48 years (standard deviation = 2.18). There were 129 students who participated in the EOS survey that included 53 males (41.01%) and 76 females (58.91%). The average age was 21.78 years of age (standard deviation = 2.19). The sample size of the EOS average age is only 87 students, which only includes the

students who took both the BOS and EOS surveys. The data, however, shows that there not a significant difference between the average age of the students in BOS[1] vs. EOS.

The students participating in the BOS and EOS surveys were from 29 different countries (*Graph 3*). The highest concentrations of students came from the following countries: France (52), Germany (12), Hungary (6), Azerbaijan (5), Romania (4), China (3), Ireland (3) (See Appendix A for the full breakdown).



Graph 3. Student Country Breakdown
Source: *own data*

The 109 survey participants were also asked to rate their remote learning sentiment on a scale of 1-10 at the beginning on the Spring 2021 semester. The distribution of these responses is fairly even where the average rating was 5.5.

Table 1. Remote Learning Sentiment (n=109) Spring 2021 BOS

Remote Learning Scale	Number of Students
1	3
2	9
3	13
4	17
5	11
6	15
7	16
8	10
9	8
10	7

2.3. Free answer questions

The Spring semester in 2021 was done exclusively online at both Corvinus University and the ESSCA School of Management. While many students previously experienced online learning, this semester proved to be difficult for educators and students. Most of the students included in these surveys came to Budapest as exchange students and spent the entire semester learning online from locally rented flats.

[1] BOS refers to the students who participated in the beginning of the semester survey. EOS refers to those students who participated in the end of the semester survey.

To better understanding how students view their education and the future of education, they were given the opportunity to freely answer questions rather than be limited to a few choices created by a researcher. By giving students the freedom to provide their own answers, the results will act a useful complement to the quantitative data collected from similar surveys and student sentiment research conducted during the COVID-19 pandemic. All the text provided by students was analyzed and sorted into relevant categories.

The following are the free answer questions from the beginning of the Spring 2021 Semester (BOS) and the end of the Spring 2021 Semester (EOS) (Table 2).

Table 2. Free answers questions from the BOS and EOS of Spring 2021

BOS: Question 7	What are the top three things you like about online learning?
BOS: Question 8	What are the biggest challenges of online learning?
BOS: Final Question	Please tell us how you would improve the university education experience in the future.
EOS: Question 6	What are the top three things you like about your online learning experience?
EOS: Question 7	What were the biggest challenges of your online learning experience?
EOS: Final Question	Please provide any additional suggestions regarding how university education should be improved.

Source: *own compilation*

After reading all the students' free answer text, codes were created to capture and quantify the range of responses. The coding for the questions is the following (Table 3, 4 and 5).

Table 3. Coding from the students' free answer responses in the BOS and EOS

Categories/Coding	The following codes are derived from the students' free answers to these questions: "What are the top three things you like about online learning?" "What were the biggest challenges of your online learning experience?
Positive Online Impact on Home Environment, Comfort, Health	
B_P_HO+	Comforts of a home environment when learning.
B_P_Covid+	Learning online from home reduces exposure to COVID-19.
B_P_EatDr+	Online learning from home offers the freedom to eat and drink.
B_P_Distract+	Online learning from home has less distractions than in classrooms.
B_P_Stress+	Home learning environment is less stressful than in-class learning.
B_P_Sleep+	Online learning allows students to get more sleep.
Positive Online Impact on Time, Cost, Convenience	
B_P_TCCB+	Time, cost, and convenience benefits when learning online.
B_P_Time+	Online learning is time saving for students daily.
B_P_Conven+	Online learning is more convenient than in-class learning.
B_P_Trav+	Online learning eliminates the needs for students to commute.
B_P_Fam+	Online learning allows students to spend more time with their families.
B_P_Cost+	Online learning reduces students' cost.
Negative Online Impact on Time, Cost, and Convenience	
B_P_TimeMan-	Online learning makes it harder for me to manage my time.
B_P_Conven-	Online learning resulted in a loss of convenience.
Positive Academic Benefits of Online Learning	
B_P_ED+	Educational benefits of learning online.
B_P_Flex+	Online learning is more flexible than in-class learning.
B_P_TeachMeth+	There are better teaching methods when learning online.

B_P_Tech+	Online learning makes better use of technology.
B_P_OppLearn+	Opportunities to learn are better online.
Negative Academic Benefits of Online Learning	
B_P_Focus-	Learning online affects my ability to focus.
B_P_Workload-	Online learning increases my academic workload.
B_P_Technical-	Technical issues related to online learning negatively impact my studies.
B_P_ClassInt-	Class interaction while learning online is lower than in-class learning.
B_P_EdQual-	The quality of education went down while learning online.
B_P_CommInfo-	The communication of information is worse while learning online.
B_P_Monotony-	Learning online is monotonous.
Negative Online Impact on Personal and Social	
B_P_Soc-	Online learning has had a negative impact on my social life.
B_P_SelfOrg-	While learning online it is harder for me to organize my activities.
B_P_Motivate-	Learning online negatively affects my motivation.
B_P_Personal-	Online learning negatively affected my personal life.
B_P_Health-	Learning online had detriments effects on my health.

Table 4. Coding from the students' free answer responses in the BOS and EOS

Category/Coding	The following codes are derived from the students' free answers to these questions: "Please tell us how you would improve university education experience in the future."
Online Learning and Technology Suggestions from Students	
B_P_HYB+	Hybrid learning is the best educational model.
B_P_INTERACT+	University education needs to be more interactive.
B_P_TECH+	University classes should make better use of technology to enhance learning.
B_P_Record+	University education should offer the ability to record all lectures.
B_P_ONL+	Online learning offers significant benefits over traditional, in-class learning.
B_P_TRAD-	Traditional, in-class learning had detrimental effects and is inferior to online learning.
B_P_ONL-	Online learning has detrimental effects and is inferior to in-class learning.
B_P_MOTIV+	Classes should be more motivating and interactive. Non-traditional.
B_P_NoLike	I do not like online learning and prefer in-class learning.
Student Pedagogical Suggestions	
B_P_DISCUSS+	More engaging discussions about topics to encourage active student participation.
B_P_Flex+	University education should be more flexible and less rigid.
B_P_Group +	University education should have more group work.
B_P_Theory-	University education should focus less on theory and more on practice.
B_P_Pract+	Practical applications of theory enhance university education.
B_P_Grades-	Universities are too focused on grades and not enough focused on learning outcomes.
B_P_Eval+	Constant evaluation rather than infrequent evaluation enhances university education.
B_P_Class-	There should be less class time.

Table 5. Course coding

Course Name	Course Code
Consumer Behavior	CB

Services Marketing Masters	SMM
Services Marketing Undergraduate	SMU
Entrepreneurship	ENT
Digital Management	DM
BOS 1/EOS 1	Includes only the students that completed the survey in both BOS and EOS.
BOS 2/ EOS 2	Includes all students who participated in the survey in either the BOS or EOS.

Appendix A presents a detailed breakdown of the survey participants.
Appendix B shows the BOS and EOS survey questions from the Spring 2021 semester.
Appendix C displays Tables 9-14 showing more detailed data regarding the students who participated in both the BOS and EOS surveys.
Appendix D displays Tables 15-17 showing a comparison BOS and EOS results.
Appendix E displays Tables A-E that use the data from the BOS survey (n=109) and EOS survey (n=129) including the students who participated in one or both surveys.

3. Conducting research and results

At the beginning of the Spring 2021 semester (BOS), students were asked to list the top three things that they like about online learning. Their BOS responses draw on their experiences with online learning from Fall 2020 and Spring 2020 semesters. March 2020 was the period when the COVID 19 pandemic globally shut down education worldwide.

During the BOS Spring 2021, many students positively mentioned the comforts of their home environment when learning online (26) and the ability to eat and drink during their online classes (15). The benefits of timesaving, cost, and convenience when learning online (46) were also frequently mentioned. Many students communicated that online learning has positive educational benefits (38). Having more free time (31) was also a strong positive, while convenience (4) was more muted. Travel (19) and sleep (18) were both positive benefits that were mentioned when learning online, showing that many students did not miss commuting back and forth to school and used the extra time for either leisure or getting more sleep. Flexibility was another positive (21) that reflects the fact that students did see online learning as being less rigid than in-class learning. Finally, many students think that teaching methods (26) are positively influenced by online learning where recorded lectures, professor accessibility, and more interactivity were commonly cited. Technology (18) was also seen as a positive benefit of online learning over traditional in-class learning.

Students were again asked in the BOS to share their thoughts on what the biggest challenges of online learning are. While there were positives associated with online learning, there were numerous negative influences. Many students indicated that online learning had a detrimental effect on their social lives (27) and personal lives (19), a negative effect on their ability to focus (56) and organize their studies (10), and a dampening effect on their motivation to study (15). Technical issues related to online learning (13) received negative comments and many students saw class interaction (21) and quality of education (10) decline while learning online. Finally, we saw a significant number of students mention that group projects and activities were negatively impacted by online learning (36). While students do favor certain aspects of online learning, the exclusive use of online learning generates a wide range of negative effects for a significant number of students.

The students were also asked to share their thoughts on how university education can be improved in the future. Many students positively mentioned hybrid learning (29) as a solution that combines online and in-class learning. Other notable mentions touched on the need

to have university education be more interactive and focus less on theory. Again, flexibility was mentioned, which suggests that students find in-class learning to be too rigid, and online learning as more flexible offering the ability to watched recorded videos at one own leisure.

At the end of the Spring 2021 semester, students were again asked to list the top three things that they like about online learning. An analysis of how the EOS responses compare to the BOS responses from the same students can be found in Tables 6-7. The purpose of using beginning and end of semester surveys was to see how fast COVID 19 was affecting student sentiment toward their education.

Table 6. Students who participated in both BOS and EOS surveys, answering what are the top three things they like the most of online learning and what are the three biggest challenges of learning online (n=83).

Coding	BOS 1 Total	EOS 1 Total	Change +/-	Comments
Change in Home Environment, Comfort, Health				
B_P_HO+	26	12	**-14**	Students mentioned the benefits of their home environment far less at the end of the semester. This indicates that the negative of the COVID 19 increased during the semester.
B_P_EatDr+	15	7	**-8**	The ability to eat and drink whatever and whenever became less important during the Spring 2021 semester.
B_P_Sleep+	19	14	**-5**	While many students mentioned the bonus of extra sleep when learning online, this enthusiasm faded a bit as the length of the lockdown became greater.
B_P_Distract+	6	3	**-3**	The distractions at home from remote learning became less of a factor.
B_P_Stress+	6	4	**-2**	Fewer students mentioned stress as an issue for them perhaps implying that they became more comfortable with the conditions of their education since the beginning of the semester.
B_P_Covid+	4	4	**0**	COVID 19 did not see any increase in mentions as students became more accustomed to living with it.
B_P_Health-	6	3	**-3**	The belief that online learning is detrimental to your health decreased during this semester.
Change in Time, Cost, Convenience				
B_P_TCCB+	46	16	**-30**	The number of mentions for the Time, Cost, and Convenience of online learning became much lower at the end of the semester as students began to reassess the consequences of online learning.
B_P_Time+	31	9	**-22**	It is consistent with the TCCB+ result those students saw less value in the time saving element of online learning.
B_P_Fam+	6	1	**-5**	The positive of spending more time with family lessened according to these results.
B_P_Conven-	5	1	**-4**	This result is again consistent that the convenience of online learning became less important during this semester.
B_P_Trav+	18	16	**-2**	Students continued to not miss their commutes back and forth to school.

B_P_TimeMan-	2	2	**0**	Only a few students thought online learning had a negative effect on their time management.
B_P_Conven+	4	3	**-1**	The overall convenience of online learning remained flat during the semester.
B_P_Cost+	5	16	**+11**	Students continued to see cost as a clear positive of online learning.
	Change in Academic Benefits of Online Learning			
B_P_ED+	38	61	**+23**	The educational benefits of online learning showed a significant rise in mentions from the same students in the same semester. This indicates that sentiment towards online learning potentially changed significantly in just one semester.
B_P_Tech+	18	37	**+19**	Students also specifically mentions the positive benefit of technology in education, reinforcing the ED+ and TeachMeth+ results.
B_P_TeachMeth+	26	43	**+17**	A significant jump in positive mentions for online teaching methodology. This supports the earlier ED+ result.
B_P_ClassInt-	21	35	**+14**	There was a significant increase in students who mentioned that the class interaction with online learning was inferior to traditional in-class learning.
B_P_CommInfo-	6	13	**+7**	More students commented that communication of information with online learning was a problem.
B_P_Onlinetran-	5	9	**+4**	Four more students commented that the transition to online learning was a difficult process.
B_P_Technical-	13	16	**+3**	There a slight increase in mentions of technical issues being a problem when learning online. This remained an issue throughout the semester.
B_P_NoLike	7	9	**+2**	There was a modest increase in those who do not like online learning.
B_P_OppLearn+	4	4	**0**	The was little change in sentiment towards the opportunity to learn and use new technologies. Only four mentions make this result insignificant.
B_P_EdQual-	10	8	**-2**	The number of students who believe online education is lower quality than traditional in-class learning dropped slightly.
B_P_Workload-	8	4	**-4**	The number of students mentioning that online learning caused an increase in workload dropped.
B_P_Monotony-	7	0	**-7**	The mentions of online learning being monotonous fell to no mentions.
B_P_Flex+	21	16	**-5**	A marginal decrease in the positive mentions of flexibility. This remains a strong result.
B_P_Focus-	56	40	**-16**	One of the most negative observations about online learning is that it impairs one's ability to focus. This number came down significantly during the semester but remains an issue for many students at the end of this semester.

Change in Personal and Social Life				
B_P_Soc-	27	6	**-21**	The number of students who mentioned a negative impact on their social lives from online learning dropped significantly. This drop could be due to students being close the end of the semester.
B_P_Personal-	19	17	**-2**	The negative impact of online learning on personal lives, however, remained a consistent negative.
B_P_Motivate-	15	9	**-6**	Less students cited a loss of motivation from online learning. This implies that students gained valuable experience during the Spring 2021 semester and their online learning competency rose.
B_P_SelfOrg-	10	8	**-2**	Self-organization problems remained an issue for many students during the Spring 2021 and many were missing the organization and structure offered by university campuses.

Source: *own compilation*

Table 7. Students who participated in both surveys, providing their ideas about how university education can be improved (n=83)

Coding	BOS 1 Total	EOS 1 Total	Change +/-
B_P_HYB+	29	16	**-13**
B_P_INTERACT+	11	13	**+2**
B_P_DISCUSS+	7	7	**0**
B_P_MOTIV+	1	1	**0**
B_P_Flex+	10	1	**-9**
B_P_TECH+	9	3	**-6**
B_P_Group +	4	1	**-3**
B_P_Record+	3	1	**-2**
B_P_ONL+	0	0	**0**
B_P_ONL-	3	5	**+2**
B_P_TRAD+	3	1	**-2**
B_P_TRAD-	4	1	**-3**
B_P_Theory-	10	4	**-6**
B_P_Pract+	7	3	**-4**
B_P_Grades-	2	0	**-2**
B_P_Eval+	5	1	**-4**
B_P_Class-	1	1	**0**

Source: *own compilation*

Although these 83 students were the same in the BOS and EOS, their responses show significant differences between the two surveys. The home environment was much less mentioned (-14), along with time, convenience, and cost (-30). Time (-22) was also mentioned far less. The significant drop in these variables could reflect the fact that while many students do like learning from a comfortable home environment, they also realize that it comes at the expense of intellectual and social interaction. The students participating in the EOS survey rather focused on how online learning had a positive effect on their education. More specifically, they mentioned the convenience of recorded lectures, online learning was more interactive than offline and professors more accessible online. These results are further supported by the positive changes for online teaching methods (17) and the use of technology (19). It is clear at the EOS of the Spring 2021 semester; students were recognizing both the

downside of learning exclusively online and the upside of technology on the quality of their education.

Students mentioned the detrimental social effects of online learning far less in the EOS than the BOS (-21). This result could reflect the students were already anticipating the end of the semester, the weather was improving, or that they learned how to better coping with home learning conditions. The ability to focus was frequently mentioned in the BOS (56) and dropped to (40) in the EOS. Although the mentions of focus dropped, it remained a problem for many students throughout the semester. Class interaction (-14) was seen more negatively as many students see online learning as a poor substitute for in-class learning. Although the values for group activities and projects remained unchanged, the values for BOS and EOS (36) indicate that this was an ongoing issue and a negative effect on online learning for many students.

Students mentioned hybrid learning less in the EOS (-13), but it still received a significant number of mentions (16). These responses were not prompted as students chose to mention hybrid learning for these questions.

Students who participated in either the BOS or EOS Survey: The results from these larger samples provide similar insight from the previous data set (n=83). Students mentioned their home environment (-15), time, cost, and convenience (-30), time (-25), and convenience (-16) far less in the EOS than the BOS. The positive effects of online learning on education (+49), teaching methods (+32), and the use of technology (+40) were all mentioned significantly more at the EOS than at the BOS.

Fewer students mentioned the negative social impact of online learning and the negative health effects of learning from home. A positive gain can be seen in class interactions, but this means that significantly more students saw class interaction as being negatively affected by online learning. A similar drop was observed in the number of hybrid learning mentions, along with flexibility.

4. Discussion and recommendations

H1: The collection and analysis of use of free answer data can provide valuable insight into higher education student sentiment.

All the students' responses were coded and the students who answered surveys both at the BOS and EOS (n=83) were separated from the total number of responses that were received. In the BOS, the students frequently mentioned how they liked learning in the comforts of their home environments and the time, convenience, and cost benefits associated with online learning. The students also commented how they like the teaching methods that are a part of online learning such as recorded videos, interactivity, and use of technology. Many students did mention their support of hybrid learning as a good compromise between in-class and online learning. These results are very consistent with a Pearson correlation (r) of -0.483 that was done on the survey data at the beginning of the Spring 2021. The test showed that students who experienced more problems with their home environments were more likely to have a more negative online learning sentiment.

The loss of focus was the most mentioned negative effect of online learning. Many students mentioned the negative impact that online learning had on their social and personal lives, as well as a loss of motivation and self-organization. This was also well supported by the survey data that indicated strong loadings towards the negative impact of distractions in the home environment. Group activities, class interaction, technical problems were also areas of online learning where students felt a negative impact.

There are clearly conflicting views regarding many aspects of student sentiment towards online learning. While many students favored the teaching methods, interactivity, and

technology from online learning, others viewed the technical issues, class interaction, education quality, and group activities quite negatively. These diverse responses suggest that students have diverse views regarding university education. The BOS (n=109) and EOS (n=129) surveys that included all the survey participants show very similar results. The analysis of the survey data also corroborates these findings.

The level and quality of student participation in the surveys was both surprising and inspiring. The commitment to write in answers freely as opposed to checking boxes is far greater and offers a much deeper level of insight. We see the use of free answer data as an effective and complementary tool for educators to gain insight from students based on their free answers and not pre-made questions.

H2: The data from the free answer questions from the Fall 2020 and Spring 2021 semesters will show significant changes in student sentiment towards online learning.

At the EOS, there were notable changes in student sentiments toward online learning. The mentions of the home environment, time, and convenience all fell significantly, while mentions of educational benefits, teaching methods, and technology were all much higher. Cost benefits of online learning were mentioned more in the EOS.

The comments about a negative social impact fell significantly, as well as those mentioning a lack of focus. Poor class interaction and group activities continued to be mentioned by a significant number of students. Hybrid learning was mentioned less in the EOS.

Far fewer students saw the benefits of the home environment, time, and convenience at the EOS suggesting that home learning fatigue took place during this semester. Many more students, however, did positively view many aspects of online learning such as the flexibility, teaching methods, and use of technology. After another semester of learning online, more students began to appreciate certain aspects of it as being superior to traditional learning.

The analysis of the survey data again supports the free answer data. The loadings for daily routines and setting daily schedules were higher in the EOS suggesting that these continued to be problems for many students throughout the semester. The data also shows that the students who a negative remote learning sentiment in the BOS, were the ones who also experienced problems with their home environments in the EOS. A more moderate loading was also observed connecting those who have negative remote learning sentiment to those who have a poor home environment sentiment in the EOS. The analyses of the quantitative survey data and the free answer data provide a more detailed and robust insight into student sentiment.

H3: COVID-19 has been very disruptive and student sentiment indicates that technology will play a larger role in the future.

According to these results, we can see fewer students favoring exclusive traditional in-class learning or exclusive online learning. This leaves the majority in the large area that is commonly called blended or hybrid learning. No industry, including education, can ever revert to its pre-pandemic state. The challenge for universities is to accept the fact that they must change and find a path forward that creates the best value proposition to all key stakeholders. The survey data also clearly shows that progress was made away from emergency remote teaching (ERT) towards online learning that is more familiar and with less problems. The difference between the BOS and EOS data demonstrates how quickly student sentiment can change and why universities need must collect and analyze data early and often to better understand the students and environment they are teaching in.

Recommendations for Higher Education

The Fall 2020 and Spring 2021 semesters represented ones of great change due to the disruption caused by COVID-19. While higher education is now in the recovery phase, it is critical to identify what changes will be permanent in a post COVID-19 world. Table 8 shows the variables that became stronger from the Spring 2021 BOS to EOS. The biggest change came from students commenting on the positive educational benefits of online learning. The following variables, technology and teaching methods, are also related to online learning and show an increasing amount of student positivity. The case for online learning, however, is not absolutely positive as students see a decrease in class interaction as a negative and also the communication of information as a negative. The remaining variable that saw a positive increase was related to the cost benefits of online learning.

Table 8. The Codes that Had a Significant and Positive Change Between the BOS and EOS

Coding	BOS Mentions	EOS Mentions	Semester Change
B_P_ED+	38	61	+23
B_P_Tech+	18	37	+19
B_P_TeachMeth+	26	43	+17
B_P_ClassInt-	21	35	+14
B_P_Cost+	5	16	+11
B_P_CommInfo-	6	13	+7

Students found elements of online learning to be superior to traditional, in-class learning and other elements to be inferior. Our recommendations for educator are the following:

1. Like businesses trying to gauge consumer sentiment, higher education must collect more data, more often to understand how to adapt to our rapidly changing world.
2. Recognize that technology will play an increasingly larger role in higher education.
3. Use frequently collected data and secondary data to define what hybrid learning is for your institution (i.e. 20% online, 80% in-class, 80% in-class, 20% online).
4. Identify academic disciplines that require different levels of hybrid learning.
5. In a world threatened by inflation, hybrid learning has the ability to reduce costs.
6. Another pandemic could occur in the future and the higher institutions that have more advanced online and hybrid programs will be better off.

5. Concluding remarks and future work

Our conclusion is in line with former U.S. Education Secretary, Margaret Spellings thoughts commented in her 2006 report that:

> *What we have learned over the last year makes clear that American higher education has become what, in the business world, would be called a mature enterprise: increasingly risk-averse, at times self-satisfied, and unduly expensive. It is an enterprise that has yet to address the fundamental issues of how academic programs and institutions must be transformed to serve the changing educational needs of a knowledge economy. It has yet to successfully confront the impact of globalization, rapidly evolving technologies, an increasingly diverse and aging population, and an evolving marketplace characterized by new needs and paradigms. History is littered with examples of industries that, at their peril, failed to respond—or even to notice—changes in the world around them, from railroads to steel manufacturers. Without serious self-examination and reform, institutions of higher education risk falling into*

> *the same trap, seeing their market share substantially reduced and their services increasingly characterized by obsolescence.* (Spellings, 2006: 9).

Following the financial crisis (2007-2008), Clayton Christensen saw the potential and power of online learning as a force that would ultimately disrupt higher education. While online learning has grown and significance during the past ten years, disruption in higher education has yet to happen. The COVID-19 pandemic, however, forced educational institutions of all sizes all over the world to rapidly adopting emergency remote learning (ERT). As we look to the future and a post-pandemic world, universities must decide whether to revert to a pre-pandemic state or to transition from ERT to a high-end online learning platform. Successful educational institutions, like businesses, will find ways to collect and analyze data frequently to better understanding the needs of students and of the marketplace. This unavoidable fork in the road will spur the disruption that Christensen predicted would happen more than a decade ago.

In the BOS and EOS surveys conducted during the Spring 2021 semester, there is a clear indication that students believe that technology should play a much larger role in their education. These same students, however, value in-class interaction and do not view exclusively learning online as an attractive option. Blended or hybrid learning, therefore, represent the steps away from the traditional system, and the steps towards a new system that includes technology. As it was previously mentioned, different universities and their faculties have various opinions about the benefits and consequences of integrating technology into their curriculums. Christensen's disruption begins to happen when some universities become relatively better at adopting technology than others. Imagine a situation in the future where a university has far less classrooms and overhead cost yet has far happier students. If this is possible, then disruption is possible.

In July and August of 2008, the Economist Intelligence Unit conducted a global survey called "The future of higher education: How technology will shape learning" that included participants from all over the world that included private sector respondents, professors, deans, and other faculty members. The major findings of this survey were that 63% of the survey respondents believed that technological innovation would have a major influence on teaching methodologies and a core differentiator in attracting students and corporate partners. Over half of the respondents (54%) viewed distance education as becoming global and a way for universities to leverage to used advanced technology to offer their education globally (Glenn, 2008). While disruption of higher education began a long time ago, it was more of an incremental change. The pace of change in education post COVID-19 will no longer be incremental and will likely be exponential. To avoid disruption in the future, higher education institutions must become better at adopting technology, better listeners to their customers (the students), more frequent collectors and analyzers of data, and more aware of the competition that can come from anywhere on the planet.

The authors of this article hope that BOS and EOS surveys (were conducted during the Fall 2020 and Spring 2021 semesters) will also contribute to the solution. The data collection continued in the Fall 2021 and in the Spring 2022.

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Appendix A

Students participating in BOS and EOS surveys were from the following countries:

Country	Frequency	Percent
Algeria	2	1.30
Azerbaijan	5	4.55
BURKINA FASO/France	1	0.91
Belgium	2	1.81
Cambodia	1	0.91
China	3	2.72
Finland	1	0.91
France	52	33.77
Germany	12	7.8
Hungary	6	3.90
Ireland	3	2.72
Italy	1	0.91
Kosovo	1	0.91
Kyrgyz Republic	1	0.91
Lebanon	1	0.91
Mexico	11	0.91
Morocco	3	2.72
Poland	1	0.91
Portugal	1	0.91
Romania	4	3.63
Russia	2	1.81
Spain	2	1.81
Switzerland	1	0.91
Syria	1	0.91
The Netherlands	1	0.91
Turkey	1	0.91

Appendix B: Beginning of the Semester (BOS) and End of the Semester (EOS) Surveys

BOS Survey

Q1 – "What is your name?"
Q2 – "What is your age?"
Q3 – "What is your home city and country?"
Q4 – "What is your home university?"
Q5 – "Which of the following best describes the focus of your academic studies?"

- Finance and Accounting
- Communications
- Business and Management
- Engineering
- Computer Science
- Other

Q6 – "How do you feel about remote learning?"

- Very Unhappy
- Unhappy
- Somewhat Happy
- Somewhat Happy
- Happy
- Very Happy

Q7 – "What are the top three things you like about online learning?" (Free Answer)
Q8 – "What are the biggest challenges of online learning?" (Free Answer)
Q9 – "After spending a lot of time learning online, please answer how strongly you agree or disagree with the following?"

- B_MS01 "I like working at my own pace."
- B_MS02 "I am getting more sleep."
- B_MS03 "I miss my friends."
- B_MS04 "I am more easily distracted at home than in the classroom."
- B_MS05 "I like setting my own daily schedule for schoolwork"
- B_MS06 "I miss my teachers."
- B_MS07 "I have difficulty staying motivated to complete my assignments."
- B_MS08 "I am less stressed about my schoolwork."
- B_MS09 "I miss participating in sports."
- B_MS010 "I feel I am learning more than I do in school."
- B_MS011 "It is easier to focus without the distractions of school."
- B_MS012 "It's hard to keep school and home separate - I can't escape!"
- B_MS013 "I sometimes have difficulty understanding online assignments."
- B_MS014 "It's nice to have a break from the stress of the school
- environment."
- B_MS015 "I miss participating in extracurricular activities."
- B_MS016 "I feel that I'm not learning as much as I would in the classroom."
- B_MS017 "I struggle to keep up with a daily routine."
- B_MS018 "Teachers are assigning too much homework for now."

Q10 – "Do you have a reliable internet connection at home to take part in remote learning and complete your assignments without interference or delay?" (Y/N)
Q11 – "Do you have access to a computer that is adequate for your needs, allowing you to take part in remote learning and complete your school assignments?" (Y/N)
Q12 – "In your home university, which of the following learning attributes apply to your previous online experience?"

- Live online lectures
- Pre-recorded online lectures
- Online group activities and presentations
- Interactive online learning games
- Personalized and individual feedback with professors
- Online multiple-choice testing
- Individual essay testing
- Other

Q13 – "What learning method is the one you have experienced the most during your university experience thus far?"

- Traditional Online Learning – Classroom centric
- Only online learning
- Hybrid learning: a combination of traditional and online
- Other

Q14 – "What learning method do you feel is the most effective for your education?"

- Traditional Online Learning – Classroom centric
- Only online learning
- Hybrid learning: a combination of traditional and online
- Other

Q15 – "Please tell us how you would improve university education experience in the future." (Free Answer)

EOS Survey

Q1 – "What is your name?"

Q2 – "What is your home university?"

Q3 – "Do you have a reliable internet connection at home to take part in remote learning and complete your assignments without interference or delay?" (Y/N)

Q4 – "Do you have access to a computer that is adequate for your needs, allowing you to take part in remote learning and complete your school assignments?" (Y/N)

Q5 – "After spending a lot of time learning online, please answer how strongly you agree or disagree with the following?"

- E_MS01 "I like working at my own pace."
- E_MS02 "I am getting more sleep."
- E_MS03 "I miss my friends."
- E_MS04 "I am more easily distracted at home than in the classroom."
- E_MS05 "I like setting my own daily schedule for schoolwork."
- E_MS06 "I miss my teachers."
- E_MS07 "I have difficulty staying motivated to complete my assignments."
- E_MS08 "I am less stressed about my schoolwork."
- E_MS09 "I miss participating in sports."
- E_MS010 "I feel I am learning more than I do in school."
- E_MS011 "It is easier to focus without the distractions of school."
- E_MS012 "It's hard to keep school and home separate - I can't escape!"
- E_MS013 "I sometimes have difficulty understanding online assignments."
- E_MS014 "It's nice to have a break from the stress of the school environment."
- E_MS015 "I miss participating in extracurricular activities."
- E_MS016 "I feel that I'm not learning as much as I would in the classroom."
- E_MS017 "I struggle to keep up with a daily routine."
- E_MS018 "I miss the social environment at school."

Q6 – "Reflecting back on this course, what are the top three things you like about your online learning experience?" (Free Answer)

Q7 – "Reflecting back on this course, what were the biggest challenges of your online learning experience?" (Free Answer)

Q8 – "Reflecting back on this course, did the usage of Voice Over lectures, managed on your time, help you to better understand course materials when using distance learning?"

- Not at all
- A little bit
- Does not add or detract
- Adds some value
- Adds a lot of value

Q9 – "Reflecting back on this course, did the usage of the virtual group activities (sharing resources, ideas) enhance distance learning?"

- No value
- Little value
- Does not add or detract
- Adds some value
- Adds a lot of value

Q10 – "Reflecting back on this course, did the usage of Kahoot games enhance your distance learning experience?"

- No value added
- Adds little value
- Does not add or detract
- Adds some value
- Adds a lot of value

Q11 – "Reflecting back on this course, did the usage of invited judges for final presentations add value to your online learning experience?"

- Not at all
- Somewhat
- Neutral
- Adds value
- Adds a lot of value
- No judge was used

Q12 – "Based on your experience in this class, how are you currently feeling about remote learning? " A score of 1 is "not at all satsified" and a score of 10 is "completely satisfied." Drag the bar from left to right to find your score.

Q13 – "What learning method do you feel is the most effective for your education?"

- Traditional Online Learning – Classroom centric
- Only online learning
- Hybrid learning: a combination of traditional and online
- Other

Q14 – "Why did you select this learning method? Please describe the top three reasons for your selection." (Free Answer)

Q15 – "Now that you have done entire semesters both in class and online, please select all of the statements below that you agree with."

- Traditional in-class learning is outdated
- Traditional in-class learning is important for developing social skills
- Traditional in-class learning is long and boring
- Traditional in-class learning can never be replaced by online learning
- Traditional in-class learning is effective, but class times need to be shorter
- Traditional in-class learning really depends on the subject
- Traditional in-class learning really depends on the instructor
- Traditional in-class learning is more motivational
- Traditional in-class learning better faciitates collaboration
- Traditional in-class learning involves too much travel time

Q16 – "We are grateful to receive your honest input. Please provide any additional suggestions regarding how university education should be improved." (Free Answer)

Appendix C

Table 9. Students who participated in both BOS and EOS surveys (n=83)

Coding	CB BOS 1	SMM BOS 1	SMU BOS 1	ENT BOS 1	DM BOS 1	BOS 1 Total
B_P_HO+	6	9	1	2	8	**26**
B_P_TCCB+	15	19	6	3	2	**46**
B_P_ED+	9	8	9	3	9	**38**
B_P_Time+	10	14	5	1	1	**31**
B_P_Conven+	2	0	2	0	0	**4**
B_P_Stress+	1	2	1	0	2	**6**
B_P_Sleep+	2	9	3	1	4	**19**
B_P_Trav+	9	0	2	0	7	**18**
B_P_Fam+	1	5	0	0	0	**6**
B_P_Covid+	1	1	0	1	1	**4**
B_P_EatDr+	2	10	0	3	0	**15**
B_P_Flex+	7	0	4	0	10	**21**
B_P_Distract+	4	0	1	0	1	**6**
B_P_Cost+	2	0	0	3	0	**5**
B_P_TeachMeth+	8	4	6	3	5	**26**
B_P_Tech+	3	6	3	0	6	**18**
B_P_NoLike	1	4	0	0	2	**7**
B_P_OppLearn+	0	2	0	2	0	**4**
Total	83	93	43	22	58	

Source: *own compilation*

Table 10. Students who participated in both BOS and EOS surveys (n=83)

Coding	CB BOS 1	SMM BOS 1	SMU BOS 1	ENT BOS 1	DM BOS 1	BOS 1 Total
B_P_Soc-	14	6	3	2	2	**27**
B_P_TimeMan-	1	0	0	1	0	**2**
B_P_Focus-	10	15	8	0	23	**56**
B_P_Workload-	3	5	0	0	0	**8**
B_P_SelfOrg-	1	6	0	2	1	**10**
B_P_Motivate-	2	4	1	0	8	**15**
B_P_Technical-	4	5	1	0	3	**13**
B_P_Personal-	4	6	4	1	4	**19**
B_P_ClassInt-	3	9	4	1	4	**21**
B_P_EdQual-	3	6	0	0	1	**10**
B_P_Conven-	1	2	2	0	0	**5**
B_P_CommInfo-	1	4	1	0	0	**6**
B_P_Onlinetran-	1	1	1	2	0	**5**
B_P_Monotony-	1	1	2	1	2	**7**
B_P_Health-	1	1	1	2	1	**6**
B_P_Group-	10	10	5	3	8	**36**
Total	60	81	33	15	57	

Source: *own compilation*

Table 11. Students who participated in both BOS and EOS surveys (n=83)

Coding	CB BOS 1	SMM BOS 1	SMU BOS 1	ENT BOS 1	DM BOS 1	BOS 1 Total
B_P_HYB+	8	11	5	1	4	**29**
B_P_INTERACT+	5	3	1	0	2	**11**
B_P_DISCUSS+	3	1	0	2	1	**7**
B_P_MOTIV+	1	0	0	0	0	**1**
B_P_Flex+	3	7	0	0	0	**10**
B_P_TECH+	3	3	1	2	0	**9**
B_P_Group +	3	1	0	0	0	**4**
B_P_Record+	2	1	0	0	0	**3**
B_P_ONL+	0	0	0	0	0	**0**
B_P_ONL-	1	0	1	0	1	**3**
B_P_TRAD+	1	0	0	1	2	**3**
B_P_TRAD-	1	0	3	0	0	**4**
B_P_Theory-	6	1	3	0	0	**10**
B_P_Pract+	6	1	0	0	0	**7**
B_P_Grades-	1	0	1	0	0	**2**
B_P_Eval+	3	2	0	0	0	**5**
B_P_Class-	1	0	0	0	0	**1**
Total	48	31	15	6	10	

Source: *own compilation*

Table 12. Students who participated in both BOS and EOS surveys (n=83)

Coding	CB EOS 1	SMM EOS 1	SMM EOS 1	ENT EOS 1	DM EOS 1	EOS 1 Total
B_P_HO+	2	5	0	0	5	**12**
B_P_TCCB+	1	2	2	1	11	**16**
B_P_ED+	16	20	7	3	15	**61**
B_P_Time+	0	5	1	1	2	**9**
B_P_Conven+	0	0	1	0	2	**3**
B_P_Stress+	0	0	1	0	3	**4**
B_P_Sleep+	4	1	1	0	8	**14**
B_P_Trav+	4	4	2	1	5	**16**
B_P_Fam+	0	0	0	0	1	**1**
B_P_Covid+	1	3	0	0	0	**4**
B_P_EatDr+	0	6	0	0	1	**7**
B_P_Flex+	0	0	4	2	10	**16**
B_P_Distract+	1	0	1	0	1	**3**
B_P_Cost+	0	16	0	0	0	**16**
B_P_TeachMeth+	15	16	7	0	5	**43**
B_P_Tech+	12	1	3	2	9	**37**
B_P_NoLike	1	1	1	2	4	**9**
B_P_OppLearn+	1	1	1	0	1	**4**
Total	58	81	32	12	83	

Source: *own compilation*

Table 13. Students who participated in both BOS and EOS surveys (n=83)

Coding	CB EOS 1	SMM EOS 1	SMU EOS 1	ENT EOS 1	DM EOS 1	EOS 1 Total
B_P_Soc-	3	1	0	0	3	**6**
B_P_TimeMan-	0	0	0	2	0	**2**
B_P_Focus-	8	8	7	2	15	**40**
B_P_Workload-	0	1	0	2	1	**4**
B_P_SelfOrg-	3	1	1	0	3	**8**
B_P_Motivate-	2	1	1	1	3	**9**
B_P_Technical-	8	7	0	0	1	**16**
B_P_Personal-	10	6	0	0	1	**17**
B_P_ClassInt-	6	13	4	2	10	**35**
B_P_EdQual-	2	1	0	1	4	**8**
B_P_Conven-	0	1	0	0	0	**1**
B_P_CommInfo-	2	7	1	1	2	**13**
B_P_Onlinetran-	3	2	2	1	1	**9**
B_P_Monotony-	0	0	0	0	0	**0**
B_P_Health-	0	0	2	0	1	**3**
B_P_Group-	11	10	5	2	8	**36**
Total	58	59	23	14	53	

Source: *own compilation*

Table 14. Students who participated in both BOS and EOS surveys (n=83)

Coding	CB EOS 1	SMM EOS 1	SMM EOS 1	ENT EOS 1	DM EOS 1	EOS 1 Total
B_P_HYB+	4	6	1	1	5	**16**
B_P_INTERACT+	3	5	0	2	3	**13**
B_P_DISCUSS+	2	4	0	1	0	**7**
B_P_MOTIV+	0	0	0	0	1	**1**
B_P_Flex+	0	1	0	0	0	**1**
B_P_TECH+	0	3	0	0	0	**3**
B_P_Group +	0	0	0	0	1	**1**
B_P_Record+	0	0	0	0	1	**1**
B_P_ONL+	0	0	0	0	0	**0**
B_P_ONL-	1	4	0	0	0	**5**
B_P_TRAD+	1	0	0	0	0	**1**
B_P_TRAD-	0	0	0	0	1	**1**
B_P_Theory-	2	1	0	0	1	**4**
B_P_Pract+	2	1	0	0	0	**3**
B_P_Grades-	0	0	0	0	0	**0**
B_P_Eval+	0	1	0	0	0	**1**
B_P_Class-	0	0	0	0	1	**1**
Total	15	26	1	4	14	

Source: *own compilation*

Appendix D

Table 15. Students who participated in either one or both surveys, answering what are the top three things they like the most of online learning. It should be noted that the sample size in greater by twenty students in the EOS when compared to the BOS (n=109 vs. n=129).

Coding	BOS 2 Total	EOS 2 Total	Change +/-
B_P_HO+	34	19	**-15**
B_P_TCCB+	52	22	**-30**
B_P_ED+	45	94	**+49**
B_P_Time+	38	13	**-25**
B_P_Conven+	20	4	**-16**
B_P_Stress+	4	8	**+4**
B_P_Sleep+	14	18	**+4**
B_P_Trav+	23	22	**-1**
B_P_Fam+	11	2	**-9**
B_P_Covid+	2	1	**-1**
B_P_EatDr+	12	4	**-8**
B_P_Flex+	30	30	**0**
B_P_Distract+	16	4	**-12**
B_P_Cost+	9	1	**-8**
B_P_TeachMeth+	25	57	**+32**
B_P_Tech+	10	60	**+40**
B_P_NoLike	9	18	**+9**
B_P_OppLearn+	4	4	**0**

Source: *own compilation*

Table 16. Students who participated in either one or both surveys, answering what are the top three challenges are with online learning (n=109 vs. n=129)

Coding	BOS 2 Total	EOS 2 Total	Change +/-
B_P_Soc-	28	9	**-19**
B_P_TimeMan-	3	3	**0**
B_P_Focus-	72	69	**-3**
B_P_Workload-	9	8	**-1**
B_P_SelfOrg-	19	12	**-7**
B_P_Motivate-	18	14	**-4**
B_P_Technical-	12	21	**+9**
B_P_Personal-	25	19	**-6**
B_P_ClassInt-	25	51	**+26**
B_P_EdQual-	10	16	**+6**
B_P_Conven-	10	1	**-9**
B_P_CommInfo-	7	16	**+9**
B_P_Onlinetran-	7	11	**+4**
B_P_Monotony-	8	0	**-8**
B_P_Health-	13	3	**-10**
B_P_Group-	36	44	**+8**

Source: *own compilation*

Table 17. Students who participated in either one or both surveys, offering their thoughts on how university education can be improved (n=109 vs. n=129).

Coding	BOS 2 Total	EOS 2 Total	Change +/-
B_P_HYB+	34	22	**-12**
B_P_INTERACT+	12	20	**+8**
B_P_DISCUSS+	7	13	**+6**
B_P_MOTIV+	1	3	**+2**
B_P_Flex+	14	1	**-13**
B_P_TECH+	10	3	**-7**
B_P_Group +	4	1	**-3**
B_P_Record+	4	2	**-2**
B_P_ONL+	1	1	**0**
B_P_ONL-	3	5	**+2**
B_P_TRAD+	3	3	**0**
B_P_TRAD-	7	3	**-4**
B_P_Theory-	11	4	**-7**
B_P_Pract+	8	2	**-6**
B_P_Grades-	1	0	**-1**
B_P_Eval+	6	4	**-2**
B_P_Class-	2	4	**+2**

Source: *own compilation*

Appendix E

Table A. All students who participated in either one or both BOS and EOS surveys (n= 109)

Coding	CB BOS 2	SMM BOS 2	SMU BOS 2	ENT BOS 2	DM BOS 2	BOS 2 Total
B_P_HO+	7	10	3	2	12	**34**
B_P_TCCB+	17	20	8	3	4	**52**
B_P_ED+	11	8	11	3	12	**45**
B_P_Time+	12	15	7	1	3	**38**
B_P_Conven+	2	15	3	0	0	**20**
B_P_Stress+	1	0	1	0	2	**4**
B_P_Sleep+	2	0	4	0	8	**14**
B_P_Trav+	9	0	3	1	10	**23**
B_P_Fam+	1	10	0	0	0	**11**
B_P_Covid+	1	0	0	0	1	**2**
B_P_EatDr+	2	6	2	1	1	**12**
B_P_Flex+	9	1	5	3	12	**30**
B_P_Distract+	4	10	1	0	1	**16**
B_P_Cost+	2	0	7	0	0	**9**
B_P_TeachMeth+	10	0	7	3	5	**25**
B_P_Tech+	3	4	5	3	0	**10**
B_P_NoLike	1	6	0	0	2	**9**
B_P_OppLearn+	0	4	0	0	0	**4**

Source: *own compilation*

Table B. All students who participated in one of the BOS and EOS surveys EOS2 (n=129)

Coding	CB EOS 2	SMM EOS 1	SMM EOS 1	ENT EOS 2	DM EOS 2	EOS 2 Total
B_P_HO+	2	6	0	1	10	**19**
B_P_TCCB+	1	2	2	2	15	**22**
B_P_ED+	18	23	12	8	33	**94**
B_P_Time+	0	5	1	3	4	**13**
B_P_Conven+	0	0	1	0	3	**4**
B_P_Stress+	0	0	2	0	6	**8**
B_P_Sleep+	4	1	1	1	11	**18**
B_P_Trav+	4	5	2	2	9	**22**
B_P_Fam+	0	0	0	0	2	**2**
B_P_Covid+	1	0	0	0	0	**1**
B_P_EatDr+	0	3	0	0	1	**4**
B_P_Flex+	1	6	5	3	15	**30**
B_P_Distract+	1	0	1	0	1	**4**
B_P_Cost+	0	0	0	1	0	**1**
B_P_TeachMeth+	16	20	12	2	7	**57**
B_P_Tech+	13	18	6	8	21	**60**
B_P_NoLike	1	1	2	5	9	**18**
B_P_OppLearn+	1	1	1	0	1	**4**

Source: *own compilation*

Table C. All students who participated in one of the BOS and EOS surveys (n=109)

Coding	CB BOS 2	SMM BOS 2	SMU BOS 2	ENT BOS 2	DM BOS 2	BOS 2 Total
B_P_Soc-	15	6	3	2	2	**28**
B_P_TimeMan-	2	0	0	1	0	**3**
B_P_Focus-	10	15	10	0	37	**72**
B_P_Workload-	4	5	0	0	0	**9**
B_P_SelfOrg-	3	6	0	2	8	**19**
B_P_Motivate-	2	4	1	0	11	**18**
B_P_Technical-	4	5	3	0	0	**12**
B_P_Personal-	4	6	4	1	10	**25**
B_P_ClassInt-	5	10	4	1	5	**25**
B_P_EdQual-	3	6	0	0	1	**10**
B_P_Conven-	4	2	2	0	0	**10**
B_P_CommInfo-	1	4	1	0	1	**7**
B_P_Onlinetran-	2	1	2	2	0	**7**
B_P_Monotony-	2	1	2	1	2	**8**
B_P_Health-	1	1	2	2	7	**13**
B_P_Group-	10	10	5	3	8	**36**

Source: *own compilation*

Table D. All students who participated in one of the BOS and EOS surveys (n=129)

Coding	CB EOS 2	SMM EOS 2	SMU EOS 2	ENT EOS 2	DM EOS 2	EOS 2 Total
B_P_Soc-	3	1	1	0	4	**9**
B_P_TimeMan-	0	0	0	2	1	**3**
B_P_Focus-	8	11	13	2	35	**69**
B_P_Workload-	0	2	0	5	1	**8**
B_P_SelfOrg-	3	2	2	0	5	**12**
B_P_Motivate-	2	2	3	1	6	**14**
B_P_Technical-	10	7	1	2	1	**21**
B_P_Personal-	11	7	0	0	1	**19**
B_P_ClassInt-	6	15	8	3	19	**51**
B_P_EdQual-	2	1	0	4	9	**16**
B_P_Conven-	0	1	0	0	0	**1**
B_P_CommInfo-	4	7	1	2	2	**16**
B_P_Onlinetran-	3	3	2	2	1	**11**
B_P_Monotony-	0	0	0	0	0	**0**
B_P_Health-	0	0	2	0	1	**3**
B_P_Group-	13	12	7	2	10	**44**

Source: *own compilation*

Table E. All students who participated in one of the BOS and EOS surveys (n=109)

Coding	CB BOS 2	SMM BOS 2	SMU BOS 2	ENT BOS 2	DM BOS 2	BOS 2 Total
B_P_HYB+	9	12	7	1	5	**34**
B_P_INTERACT+	5	3	1	0	3	**12**
B_P_DISCUSS+	3	1	0	2	1	**7**
B_P_MOTIV+	1	0	0	0	0	**1**
B_P_Flex+	4	7	0	0	3	**14**
B_P_TECH+	4	3	1	2	0	**10**
B_P_Group +	3	1	0	0	0	**4**
B_P_Record+	3	1	0	0	0	**4**
B_P_ONL+	0	0	0	0	1	**1**
B_P_ONL-	1	0	1	0	1	**3**
B_P_TRAD+	1	0	0	1	1	**3**
B_P_TRAD-	1	0	3	1	2	**7**
B_P_Theory-	7	1	3	0	0	**11**
B_P_Pract+	7	1	0	0	0	**8**
B_P_Grades-	1	0	0	0	0	**1**
B_P_Eval+	3	2	1	0	0	**6**
B_P_Class-	1	1	0	0	0	**2**

Source: *own compilation*

Table F. All students who participated in one of the BOS and EOS surveys (n=129)

Coding	CB EOS 2	SMM EOS 2	SMU EOS 2	ENT EOS 2	DM EOS 2	EOS 2 Total
B_P_HYB+	5	6	1	2	8	**22**
B_P_INTERACT+	4	6	2	4	4	**20**
B_P_DISCUSS+	3	5	2	3	0	**13**
B_P_MOTIV+	0	0	0	1	2	**3**
B_P_Flex+	0	1	0	0	0	**1**
B_P_TECH+	0	3	0	0	0	**3**
B_P_Group +	0	0	0	0	1	**1**
B_P_Record+	0	1	0	0	1	**2**
B_P_ONL+	1	0	0	0	0	**1**
B_P_ONL-	1	4	0	0	0	**5**
B_P_TRAD+	0	0	1	1	1	**3**
B_P_TRAD-	2	0	0	0	1	**3**
B_P_Theory-	2	1	0	0	1	**4**
B_P_Pract+	0	1	0	1	0	**2**
B_P_Grades-	0	0	0	0	0	**0**
B_P_Eval+	0	2	2	0	0	**4**
B_P_Class-	0	1	0	0	3	**4**

Source: *own compilation*