A MIXED-METHOD STUDY OF THE IMPACT OF COVID-19 PANDEMIC ON U.S. STUDENTS' EDUCATIONAL ATTAINMENT

by

Mohammadali Beheshti, B.S.

THESIS

Presented to the Faculty of

The University of Houston-Clear Lake

In Partial Fulfillment

Of the Requirements

For the Degree

MASTER OF SCIENCE

in Engineering Management

THE UNIVERSITY OF HOUSTON-CLEAR LAKE

AUGUST, 2021

A MIXED-METHOD STUDY OF THE IMPACT OF COVID-19 PANDEMIC ON U.S. STUDENTS' EDUCATIONAL ATTAINMENT

by

Mohammadali Beheshti

APPROVED BY

_____
Xiaojun "Gene" Shan, Ph.D., Chair

_____
Ki-Young Jeong, Ph.D., Committee Member

_____
Ipek Bozkurt, Ph.D., Committee Member

RECEIVED/APPROVED BY THE COLLEGE OF SCIENCE AND ENGINEERING:

_____
David Garrison, Ph.D., Interim Associate Dean

_____
Miguel A. Gonzalez, Ph.D., Dean

Dedication

I dedicate this dissertation to my father (Hossain Beheshti), my mother (Soheila Beig Mohammadi),my grandmother (Kanoomagha Seidein), and my wife (Matin Amoozadeh). Their unyielding love has inspired me to complete this research.

Acknowledgements

A thank you must go to Prof. Xiaojun "Gene" Shan, the chair of my dissertation committee. Dr. Shan provided his expertise as well as support all along the way so I continued to believe in myself that I could accomplish this journey. Not only did Dr. Shan help me spear ahead my research efforts by keeping me on the right track, more importantly, communications with him made me feel like very much a part of this program and a part of this department.

Besides my advisor, I would like to thank the rest of my thesis committee: Prof. Ipek Bozkurt, and Prof. Ki-Young Jeong, for their insightful comments and encouragement, but also for the hard question which incented me to widen my research from various perspectives.

ABSTRACT

A MIXED-METHOD STUDY OF THE IMPACT OF COVID-19 PANDEMIC ON U.S. STUDENTS' EDUCATIONAL ATTAINMENT

Mohammadali Beheshti
University of Houston-Clear Lake, 2021

Thesis Chair: Xiaojun "Gene" Shan, Ph.D.

In this case study, we implemented a quantitative and sentiment analysis of the effects of COVID-19 pandemic on education, physical, and mental health on college students in the United States. As the students are the future workforce of a society and play a significant role in future prosperity of a country, appropriate measures should be taken to minimize the impacts of adverse events on their education and health. Health disasters could impact education systems in different ways. Natural disasters destroy the infrastructure of education systems such as schools or their access roads. In contrast, health disasters could have more psychological impacts leading to stress and anxiety, as reflected in their educational performance. This study is based on the data that collected with a survey among students at the University of Houston at Clear Lake. The survey consists of twenty-three questions that ask the students about their experiences during the pandemic of COVID-19. Based on the analyzed data, UHCL students' attainment impacted by

COVID-19. Average GPAs of participants shows decreasing trend from Fall 2019 to Fall 2020 and mental health issue that leads to some problems such as lacking behind the study and increasing level of anxiety and nervousness is the most effective factor on achievement of student during the pandemic of COVID-19.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I:

INTRODUCTION

This study aims to identify the relation between public health disasters and educational attainments in the U.S. As education plays a vital role in the society and economy, adverse effects on the education could have significant consequences. Climate changes and pandemics are creating more challenges in sustaining a healthy school environment in the U.S. where over 50 million people, mostly children, spend approximately a third of their waking hours. Dhawan (2020) states that natural disasters and pandemics such as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) or COVID-19 force education systems to turn to online teaching from a traditionally face-to-face teaching mode. Transitioning to online education is not simple as just changing of a word. It changes the infrastructure of the education and lead to many challenges for educational institutions. The transition creates new challenges for the education system in term of the infrastructure, as most of the schools are not ready and able in few weeks to change to online-teaching mode. Also, students have varying degrees of familiarity with the online-teaching mode. Therefore, some of them are experiencing a difficult and new situation during the pandemic of COVID-19. These new challenges for the students may lead to adverse effects on their educational attainments. In this study, we aim to identify their causes and effects on student's education as well as physical and mental health. This impact probably is different from one student to another based on the student's academic background and baseline physical and mental health status. Academic background is the previous formal training that a person has received in one or more areas of knowledge, and related to the degree of their dependence on the integrated educational system. Fan (2004) states that the concept of integrated education emphasizes methods which concentrate on viewing the student as a whole person. The

goal is not about how to find a good job or make large amounts of money, but about how to develop a complete human being. Every part of the individual (e.g., mind, body, emotion and spirit) should be developed at the same time and be integrated into the whole person. The dependence refers to the degree of a student relies on components of the educational system such as a teacher or a tutor for motivation, knowledge, acquisition, and concept explanation. Some students are more independent than others and thus able to manage themselves in difficult situations easier than more dependent students.

CHAPTER II:

LITERATURE REVIEW

Natural Disaster Impacts on Education

Paulson (2016) mention that in public health, we seek to be prepared for a wide spectrum of potential disasters using specific and all-hazards approaches. These may result from both natural (e.g., earthquakes, floods, and influenza pandemics) and man-made (e.g., bioterrorism attacks, exposures to sources of ionizing radiation, and explosions). Baez (2010) state that a recent concern is the adverse impacts of disasters on human capitals. Disasters can affect children's education through different channels. First, detrimental disasters can cause health damage and human loss for families, which could directly affect the education of children. Several studies find a long-term adverse effect of disasters on children's health (e.g., Hoddinott and Kinsey, 2001; Alderman et al., 2006). Second, disasters could destroy education-related infrastructures such as schools and classrooms, thereby increasing the cost of education and reducing access to education. Third, calamities can result in economic loss for households. A decrease in income might cause parents to reduce educational spending for their children and turn to children's labor for additional income (e.g., Grootaert & Kanbur, 1995; De Janvry et al., 2006). Disasters also have adverse effects on students who are perusing their higher education in colleges and universities. Ladd et al. (2007) state that more than 50,000 New Orleans college students, whose campuses were damaged by wind and flood during Hurricane Katrina, were forced to close for the fall semester.

Online Teaching and Methods

During natural disasters, online teaching is a viable option to ensure the continuity in education. Allen and Seaman (2008) refer to courses and programs that meet face-to-face and deliver all educational contents in oral and written form in a "brick-and-mortar"

classroom, where nothing is delivered online as traditional learning. Powell and Patrick (2006) define online learning as "education in which instruction and content are delivered primarily via the Internet." Such online learning may include a range of Web-based resources, media, tools, interactivity via the internet, and specific curricular or instructional approaches. As shown in Figure 2.1, online learning forms a portion of e-learning. E-learning refers to the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance (Rosenberg, 2001). According to Khan (2001), e-learning includes Web-based learning (WBL), Internet-based training (IBT), advanced distributing learning (ADL), and online learning (OL). In a broader perspective, Govindacharya (2002) refer to e-learning as instruction delivered via all electronic media such as the Internet, Intranets, extranets, and hypertext/hypermedia documents. According to Rosenberg (2001), the scope of e-learning also involves networks, higher education, K–12 schools, corporations, government agencies, nonprofit organizations, homes, and public space. With online learning as a type of e-learning, students generally can access online courses at any time and at any place as long as they have Internet access. Online learning typically takes place in an asynchronous or synchronous format. Asynchronous sessions are when students in remote locations work independently at different times, usually with the support of an instructor or tutor (Bernard et al., 2004a). Synchronous sessions are when two or more classrooms in different locations are joined in real time and run, synchronously, usually from an originating site (Bernard et al., 2004a). Kaya (2012) state that in online learning environments, platforms such as Blackboard, WebCT and Moodle are commonly used by colleges and universities. Online teaching contents are developed by corporate vendors, instructional designers or classroom teachers. It can be purchased, leased, or developed in house. Powell and Patrick (2006) mention that there are no current national standards for

content development in online teaching in the U.S. Several states, individual school districts, and schools have created individual online course development standards. The majority of courses in online programs are aligned to district standards for quality control in the U.S. Individual states, companies, and schools identify and measure quality of their online programs.

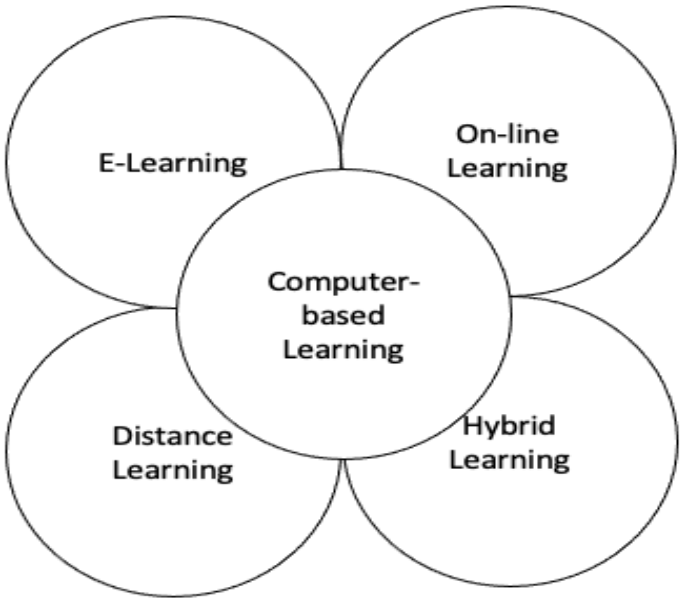

Figure 2.1 Scope of e-learning. Adapted from Hambrecht (2001)

Advantages of E-learning

E-learning provides various benefits. Some of them include advantages of convenience, time and place flexibility, avoiding the commute to campus, a wide variety of course selections, lifelong learning, social equity and access, more advanced information, financial benefits, and multimedia-rich contents (Rosenberg, 2001; Bates, 2005). Studies have shown that online learning can be as effective as traditional face-to–

face classroom learning for students' achievement (Russell, 1999; Johnson et al. 2000; Neuhauser, 2002. Song (2010) states that e-learning technologies can facilitate student-centered learning and also help create a collaborative learning environment. Student-centered learning has been defined most simply as an approach to learning in which learners choose not only what to study but also how and why that topic might be of interest (Rogers, 1983). Student-centered e-learning allows students to be actively involved in the learning process and to determine the pace of their own learning. Sigala (2002) states that benefits of student-centered learning significantly increase when collaborative and constructivist theories are applied, especially in combination with the exploitation of Internet tools. Based on this attitude to e-learning as an integrally diverse, collaborative, and social process, some researchers have recommended the benefits of e-learning as follows:

- Active and constructive learning, deep processing of information, improved individual achievement (Abrami & Bures, 1996).
- Increased store of knowledge, improved communication and listening skills (Cho et al., 2002).
- Development of social attitudes and a collaborative spirit, motivation to learn, critical thinking, diversity of ideas, and long-term retention of students (Flynn, 1992).

Disadvantages of E-learning

Despite the rapid increase in popularity and development of e-learning, especially Web-based learning programs, several critics of e-learning concern the integrity and effectiveness of online learning. These concerns include the lack of face-to-face interpersonal communication, the isolated environment, and questions about the appropriateness of the presented course contents (Carnevale, 2001and Wallace, 2003). It

has been suggested that the traditional model of instructional design may no longer be appropriate for teaching with new technologies (Pelz, 2004). The subject of interactivity has generated controversy among educators, who question the quality of online courses. Reisetter et al. (2007) find online learners describe the lack of interaction as one of the unique challenges. Critics argue that replicating the classroom learning environment on the Internet is difficult in terms of media richness and social presence. They identify problems of plain text-based media and the elimination of nonverbal communications. Proponents, on the other hand, state that interactivity in online learning is just as good as, or even better than, that in the traditional classroom (Weigel, 2002). They suggest that multimedia technologies can provide multisensory experiences to enhance learning. For example, Moore (1989) argued that the text-based online course experience could be supplemented with useful yet inexpensive traditional print media and new media forms such as videoconferencing, voice messaging, video clips, and/or multimedia. In the flexibility of the e-learning environment, students may also find it more difficult to motivate themselves to commit time to their studies. Instructions mediated by a computer can engender distraction and alienation if the student loses motivation in the solitary confines of a remote home computer. Therefore, the success of online courses may depend on students' motivation and perceptions toward online courses.

The Impact of Public Health Disasters on Educational Achievement

Vegas and Winthrop (2020) state that most educational institutions around the world closed the schools in March 2020 in an attempt to contain the spread of COVID-19. Parts of the formal education system did not re-open this academic year in some countries, whereas in others (parts of) the formal education system have progressively re-opened. While the disruption in learning caused by COVID-19 is unprecedented, important insights about its possible impacts can be gained from findings of relevant

existing studies and pre-COVID-19 data. Physical school closure and the adoption of distance education may negatively affect students' learning through four main channels: less time spent in learning, stress symptoms, a change in the way that students interact, and lack of learning motivation.

Less time spent in learning

Most of children's formal learning takes place in schools. The closure of school buildings and the move to a remote learning environment may result in children spending less time in learning. According to the Schul-Barometer (School Barometer) survey, which took place from March 25 to April 5, 2020 and was targeted at Austrian, Swiss and German students aged between 10 and 19 years old, students' weekly learning time during the COVID-19 lockdown was reduced by between 4 and 8 hours, compared to when schools were open (Huber et al. 2020). Additionally, one in five students said that they studied less than 9 hours per week.

Stress symptoms

Students who were confined at home with their parents due to COVID-19 pandemic might feel more stressed and anxious than in the pre-COVID period. Sprang and Silman (2013) show that children who are isolated or quarantined during pandemic diseases are more likely to suffer from acute stress disorder, adjustment disorder, and grief. Such adverse psychological factors may in turn have a detrimental effect on learning (Kuban and Steele 2011). It may be possible to compare these stress symptoms to those developed in the aftermath of hurricanes or earthquakes. For instance, as regards tertiary education, Di Pietro (2018) uses a standard difference-indifferences approach to examine the effect of the L'Aquila earthquake on the academic performance of the students of the local university. In addition, feeling unhappy and depression are other increased symptoms among students, who are affected by natural disasters. According to

data from the Center for Promise's survey, more than one in four young people reported an increase in losing sleep because of worry, feeling unhappy or depressed, feeling constantly under strain, or experiencing a loss of confidence in themselves (America's promises alliance 2020). Rideout (2015) also find that increased loneliness is reported among 42 percent of teens by Common Sense Media, with a higher portion of girls (49 percent). Youth Truth's survey shows an even larger gender division. When asked whether anxiety, depression, or stress makes it hard to complete online assignments, 38 percent of boys respond "yes" compared to 57 percent of girls and an alarming 70 percent of students who identify as neither.

Change in the way of interaction and socialization

Sacerdote (2011) state that it is well known that the school environment influences achievement through peer effects. Being in a classroom and hence having the opportunity to interact with classmates may produce important positive externalities. Peer effects may operate through many different channels. Students may teach each other and improve together. Classmates' high achievements may motivate the student (through competition or social influences) to work harder. The student could also develop an interest in reading or mathematics thanks to their peers. Additionally, classroom activities provide a central role in helping students acquire social skills that have important implications for their future personal and professional growth (Goodman et al. 2015). However, during the pandemic most of the students lose these chances to practice them in regular face-to-face classes.

Lack of learning motivation

The governments of several countries (e.g., Spain, Italy) have announced that due to COVID-19 pandemic, students will not have to repeat the school year regardless of their performance while studying remotely. France has forbidden to use student

assessment results in the formal evaluation of the lower secondary school exam and upper secondary school exam. Although this could be a fair decision (Sonnemann 2020), several studies suggest that students may be more externally motivated to learn if they know that their learning will be assessed. For instance, grades can motivate students to learn (Elikai and Schuhmann 2010). Austin (1978) finds that homework that is assigned and checked is more effective in improving students' achievement than homework that is assigned, but not checked.

CHAPTER III:

PROBLEM STATEMENT

The coronavirus disease (COVID-19) has caused an unprecedented crisis in the world, with significant impacts on many different fields. In the sphere of education, during the pandemic of COVID-19 in the U.S., most academic institutions closed according to the World Health Organization (WHO) to contain the spread of COVID-19. Hence, the institutions had to change their traditional method of education (face-to-face) to online learning. Although many learners were not unfamiliar with the online education system, there were some academic institutions providing online education across the country in previous years. However, implementing it (Online-education) in such a large scale was unprecedent forcing some academic instruction with no or limited prior experience or preparation to quickly transition to online teaching. During the pandemic of COVID-19, for instances in the spring of year 2020, COVID-19 dramatically shifted the way children were being educated. Results from the U.S. Census Bureau's Household Pulse Survey (2020), shows that more than 80% percent of students follow distance learning education mode and using online resources. Hence, it demonstrates that most of the young learners are involved with new modes of education delivery in the country. The purpose of this study is to find the relation between the COVID-19 pandemic and educational attainment of students who are enforced to learn completely online) and its adverse impact on the students physically and mentally. Also, we examine the contributory factors to students' perceived quality of and satisfaction with online courses. In addition, the results provide some insights for policy makers to mitigate COVID-19 pandemic's adverse effects on students' educational attainments.

CHAPTER IV:

MATERIALS AND METHODS

We conducted a questionnaire-based survey that consists of twenty-three questions by asking some faculty at UHCL from different colleges, departments and programs to distribute the survey to their graduate and/or undergraduate students. Also, the research received approval from the university's institutional review board and an informed consent form was attached to the questionnaire in the survey, and each participant gave consents to participate in the survey after reading the consent form. The survey was published using the online survey platform Qualtrics on February 7th, 2021 until February 28th 2021 to ensure that we collect a sufficient amount of data for the study. The questionnaire consists of both open-ended and close-ended questions. It was divided into two specific sections. The first section was general information such as majors of study, education's status of respondents in school, age group, gender, and the devices used for attending the online courses at UHCL. The second section consisted of the questions related to readiness, satisfaction/unsatisfaction of students of the learning materials, efficiency of online resources and materials, instructional design and delivery and learning outcomes/feedback of the participants. The raw data collected from the survey was processed by R language programming (R Core Team ,2020). We removed some outliers (for instance some of the students mentioned their GPAS over 4 or negative and some of them abandoned the survey in the middle). Analyzing and visualization of the collected data was implemented with Statistical Package for the Social Sciences (SPSS) (IBM SPSS v.26).

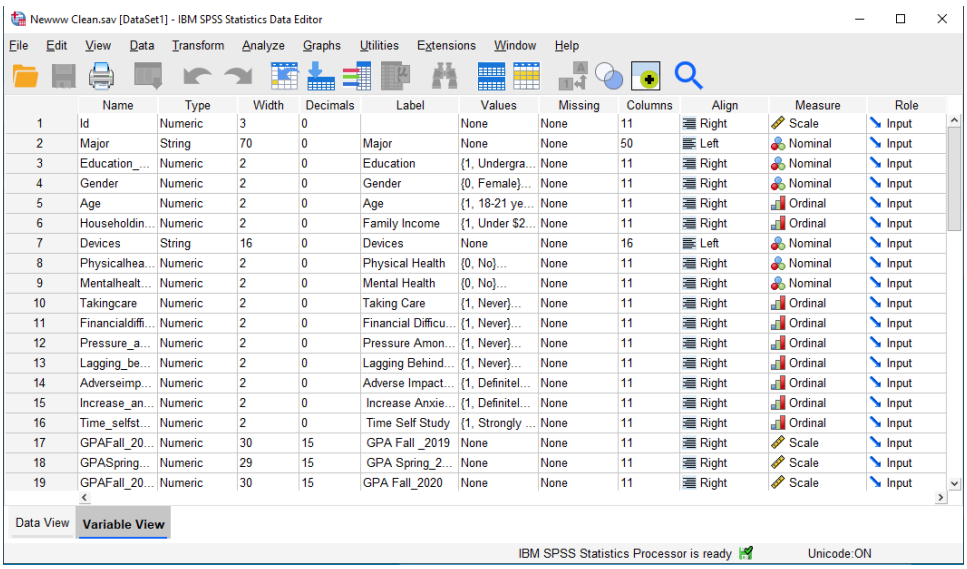

Figure 4.1 Variable view of students observed data

Also, in the survey, we have open ended questions that ask about the opinion of the students about online teaching mode such as the policy that schools follow for grading during the COVID-19 pandemic and their opinion about the effectiveness of online resources and materials. In addition, the data was clustered in five different groups based on their specific common patterns among students (based on the correlation between common variables gathered form students by the survey). All the data collected by these open-ended questions was analyzed with Python language programming software (Rossum, et al. 1995). For analyzing these subjective questions and text comments, I have applied Natural Language Processing (NLP) that is defined as an automatic manipulation of languages. Specifically, sentiment analysis method was implemented in Python to computationally identify and categorize opinions from the subjective information that was gathered by the survey.

CHAPTER V:

ANALYZING THE SURVEY DATA

Participants

Of the 326 university students initially participated in the survey, nine retreated as they did not complete the consent form. Also, 108 of participants, who had missing data, were excluded, and data from 209 participants was used in the analysis. Female participants 142 (67.9%) were approximate more than two folds of male participants 64 (30.6%) participants and three of the students (1.4%) prefer not to reveal their gender. Most participants' ages were between 22 to 25 years old, (i.e., 65 students or 31.1%) and between 18 to 21 years old (i.e., 45 students or 21.5%). Approximately 60% of the participants were undergraduate students. The number of participants from the college of business is 68 (32.5%) and that from the college of science and engineering is 59 (28.2%). Approximately 24% of participants have a family income of $20,000 and under. According to the census government official website (U.S. Department of Commerce, 20202)., median household income (in 2019 dollars) in the city of Houston is $52,338. Hence, based on the collected data approximately 50% of the participants' household income is under the average (Table 5.1).

According to the data collected, most of the students (200, 95.7%) used their own laptops to participate in online-learning during the pandemic of COVID-19. During the COVID-19 pandemic, students can connect remotely to the UHCL lab computers to serve their needs for some specific software based on their majors. In addition, the school provides a one-time reimbursement for up to 80% of eligible expense toward the purchase of a laptop/desktop/tablet for the students have active FAFSA or TASFA on file with Financial Aid, that was helpful for students who have a problem to purchase a computer to support online learning.

Variables		Frequency(n)	Percentage
Gender	Female	142	67.9%
	Male	64	30.6%
	Not to Say	3	1.4%
Age	18-21 years old	45	21.5%
	22-25 years old	65	31.1%
	26-29 years old	31	14.8%
	30-33 years old	30	14.4%
	34 and over	38	18.2%
Education Status	Undergraduate	125	59.8%
	International Undergraduate	1	0.5%
	Graduate	75	35.9%
	International Graduate	8	3.8%
Major(college)	College of Business	68	32.5%
	College of Education	30	14.4%
	College of Human Sciences and Humanities	52	24.9%
	College of Science and Engineering	59	28.2%
Family Income	Under $20,000	50	23.9%
	$20,001-$40,000	41	19.6%
	$40,001-$60,000	28	13.4%
	$60,001-$80,000	40	19.1%
	$80,001-$100,000	13	6.2%
	$100,001 and over	37	17.7%

Table 5.1. Participants' demographic characteristics.

Physical and Mental Health

According to the Table 5.2, a total of 157 (75.1%) students mentioned that they had not experienced any physical issue during the pandemic of COVID-19. In contrast, more than 63% (132) of participants stated that they experienced a mental issue. Unger (2007) sates that, mental health issues are the most obstacle to academic success. Motivation of students, concentration, and social interaction are the factors that have more effects on the academic success of students in higher education. Hence, Mentality problems could have a destructive impact on these factors. Therefore, mental health issues during the pandemic of COVID-19 might be a significant factor in determining students' academic success.

Variables		Frequency(n)	Percentage
Physical Issue	No	157	75.1%
	Yes	52	24.9%
Mental issue	No	77	36.8%
	Yes	132	63.2%

Table 5.2. Participants' mental and physical health issue experienced during COVID-19 pandemic

Taking Care of Family and Financial Difficulty

During the pandemic, some students have to take care of their family members or friends who were infected by COVID-19. From 209 participants, a total of 117(56%) (Table 5.3) of students mentioned that they did not take care of their families or friends during the pandemic. Approximately 62% of students expressed their concerns about

financial difficulty caused by COVID-19 crisis. A total of 21% of participants sometimes experienced this problem, 26.8% often had the financial difficulty and almost 14% of them always experienced the problem during the COVID-19 pandemic. According to the Student Financial aid department at UHCL (2021), in the last year, two of three UHCL students received some kinds of aides and therefore the self-reported data is consistent with official reported data.

Variables		Frequency(n)	Percentage
Taking Care	Never	117	56.0%
	Rarely	28	13.4%
	Sometimes	42	20.1%
	Very Often	18	8.6%
	Always	4	1.9%
Financial Difficulty	Never	56	26.8%
	Seldom	24	11.5%
	Sometimes	44	21.1%
	Often	56	26.8%
	Almost Always	29	13.9%

Table 5.3. Participants that experienced financially difficulty and taking care of a family members or friends.

Pressure About Grades Among Peers and Lagging Behind the Study

Based on the collected data, a total of 147 (75.3%) (Table 5.4) of participants experienced pressure about their grades among peers during the current crisis of COVID-

19. Out of 209 participants, a total of 176 (84.3%) stated that the pandemic has led to lagging behind the study. Both mentalities could lead to an increase in stress and anxiety.

Variables		Frequency(n)	Percentage
Pressure Among Peers	Never	35	16.7%
	Rarely	17	8.1%
	Occasionally	43	20.6%
	Very Often	49	23.4%
	Always	65	31.1%
Lagging Behind the Study	Never	33	15.8%
	Sometimes	76	36.4%
	Half of the Time	33	15.8%
	Most of the Time	34	16.3%
	Always	33	15.8%

Table 5.4. Participants that experienced the pressure of lagging behind their study and their grades among peers.

Increasing anxiety and nervousness level

According to the literature review, increasing the level of anxiety and nervousness are most during a pandemic. Sprang and Silman (2013) show that children who are isolated or quarantined during pandemic diseases are more likely to suffer from acute stress disorder, adjustment disorder, and grief. Table 5.5 shows that when asked the impact of COVID-19 pandemic on the level of anxiety and nervousness, a total of 39.7% (83/209) mentioned that they were experiencing definitely increasing levels of anxiety

and nervousness. Also, approximately 37% of other students experiencing some level of anxiety.

Variables		Frequency(n)	Percentage
Increasing of anxiety and nervousness level	Definitely Not	49	23.4%
	Possibly	19	9.1%
	Neutral	33	15.8%
	Probably	25	12.0%
	Definitely	83	39.7%

Table 5.5. Participants that experienced lagging behind the study and pressure for their grades among peers.

Lack of Self-Motivation and Self-Regulation

Self-motivation or motivation is what pushes people to achieve their goals and missions and leads to better feeling in life. For instance, it could lead to being optimism and persistent in pursuing goals against some failures. Also, people with strong self-motivation could take control of many aspects of their lives. Self-regulation shares some common factors with different meanings. Self-regulation is the process and ability that students understand and manage their behavior to take control and evaluate their own learning. In this process, students use some different techniques such as questioning to approach academic tasks. More than of two thirds of the participants (159/209, 76.1%) described that the pandemic resulted in significant lack of their self-motivation and self-

regulation. It might be Learning from home because of COVID-19 is the reason that leads to lack of students' self-motivation and self-regulation.

Variables		Frequency(n)	Percentage
Lack of self-motivation and self-regulation	Extremely Likely	84	40.2%
	Likely	75	35.9%
	Neither Likely nor Unlikely	17	8.1%
	Unlikely	22	10.5%
	Extremely Unlikely	11	5.3%

Table 5.6. Participants' lack of self-motivation and self-regulation.

Amount of Time that Students Spent on Self-study

More than a half of the participants (108/209,51.7%) (Table 5.7) stated that time of their self-study during the pandemic increased. A total of 58 (27.8%) of students mentioned that the time that they spent during the COVID-19 pandemic and before that are completely the same. Only 43/209, 20.6% of the participants experienced decreasing in their self-study time.

Variables		Frequency(n)	Percentage
Time of self-study during pandemic of COVID-19	Strongly Increased	52	24.9%
	Increased	56	26.8%
	Stay Constant	58	27.8%
	Decreased	30	14.4%
	Strongly Decreased	13	6.2%

Table 5.7. Participants' time that spends on self-study during COVID-19 pandemic.

Interim Grading Policy (Satisfactory/Unsatisfactory)

During the pandemic of COVID-19, many schools in the U.S. such as UHCL implement a new policy of grading for their students. The implementation of the new policy is to relax some tension of students that was caused by the COVID-19 pandemic. A large portion of participants (154/209, 73.7%) (Table 5.8) described that interim grading (satisfactory/unsatisfactory) has no effect on their eagerness to study more. In contrast, a total of 35 participants (16.8%) stated that the new policy had a positive effect on their education. In addition, a total of 9.5% of the participants stated the new policy has a negative impact on their education.

Variables		Frequency(n)	Percentage
Interim grading policy (satisfactory/unsatisfactory)	Strongly Increased	16	7.7%
	Increased	19	9.1%
	Stay Constant	154	73.7%
	Decreased	13	6.2%
	Strongly decreased	7	3.3%

Table 5.8. Participants' reflection to Interim grading policy (satisfactory/unsatisfactory) during COVID-19 pandemic.

Delayed Feedback from an Instructor

In the survey, participants were asked the question of "Did you experience delayed feedback from your instructor that led to misunderstanding a part/s of the course?". The objective of this question is to understand whether limited accessibility of instructors during the transition from in-person to online learning that in which, is leading to some misunderstandings, which negatively impact their learning. Out of 209 participants (Table 5.9), a total of 86 participants (41.1%) described that at least one (occasionally/sometimes) time experienced delayed feedback from their instructors. With considering other responses, approximately a half of the participants were affected by delayed feedback and the other half of them did not experienced this problem (106/209, 50.7%).

Variables		Frequency(n)	Percentage
Delayed feedback from an instructor	Always	6	2.9%
	Almost Every Time	11	5.3%
	Occasionally/Sometimes	86	41.1%
	Almost Never	65	31.1%
	Never	41	19.6%

Table 5.9. Participants' experience of delayed feedback from an instructor.

Experiencing adverse impacts on grades

According to the participants' response about experiencing of adverse impacts on their grades because of transition to online-learning from face-to-face mode, more than half of the participants (119/209, 55.5%) (Table 5.10) described that changing mode to online learning had an adverse impact on their grades. Of the 119 participants, a total of 45 of stated this change definitely had a negative effect on their grades. Also, a total of 23% of the participants stated that this transition has definitely no impact on their grades. However, it should be mention that 47/209 of the participants have not completed three consecutive semesters at UHCL (from Fall 2019 to Fall 2020), it means that for 47 of them Fall 2020 is their first or second semester at UHCL. Hence, if we exclude these participants the frequency of Likert scale of this question it will be changed.

Variables		Frequency(n)	Percentage
Experiencing adverse impact on grades	Definitely Not	48	23.0%
	Possibly	37	17.7%
	Neutral	45	21.5%
	Probably	34	16.3%
	Definitely	45	21.5%

Table 5.10. Participants' experience of adverse impact on their grades.

Based on the new excluded data (92/162, 56.9%) (Table 5.11) of participants stated that transition to online learning had an adverse impact on their grades. Also, a total of 23% of the participants mentioned that the changing mode definitely had no effect on their grades.

Variables		Frequency(n)	Percentage
Experiencing adverse impact on grades	Definitely	38	23.5%
	Definitely Not	37	22.8%
	Neutral	33	20.4%
	Possibly	22	13.6%
	Probably	32	19.8%

Table 5.11. Participants' experience (after exclusion) of adverse impact on their grades.

CHAPTER IV:

FINDING AND ANALYZING THE CORRELATION BETWEEN VARIABLES

Based on the questions the survey, most of the responses are categorical. Hence, conducting the statistical analysis that was usually used for continuous variables such as regression models, T tests and analysis of variance was not applicable. Most of the analysis for categorical data are based on the cross tabulation.

Generally, cross tabulation is used to quantitatively analyze the relationship among multiple variables. Cross tabulations, referred to as contingency tables or crosstabs, group variables together and enable researchers to understand the correlation between the different variables. By showing how correlations change from one group of variables to another, cross tabulation allows for the identification of patterns and trends, within data sets.

When it comes to analyzing survey response data, cross tabulation reports depict the relationship between two survey questions. Survey administrators are provided with a detailed comparison of how different groups of respondents answered particular questions.

Chi- Square Test

The chi-square test is a tool that evaluates whether there is a significant association between the categories of the two variables. The correlation between two or more categorical data is chi-square Test.

χ 2= Pearson's cumulative test statistic, which asymptotically approaches a x^2 distribution

Oi= The number of observations of type *i.*

Ei= Npi= The expected(theoretical) frequency of type i, asserted by the null hypothesis that the fraction of type *i* in the population is pi

n = The number of cells in the table.

$$x^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i}$$

Interpretation of Chi-Square Test

To find dependency among variables, I compare the p-value to the significant level. As a usual significant level or alpha (denoted as α) assumed to be 5%. Hence, a significant level of 0.05 or more indicate that there is an association between the variables.

P-value ≤ α: The variables have a statistical association (Reject H0) If the p-value is less than or equal to the significance level, you reject the null hypothesis and conclude that there is a statistically significant association between the variables.

P-value > α: The variables have no association (Fail to reject H0) If the p-value is larger than the significance level, you fail to reject the null hypothesis because there is not enough evidence to conclude that the variables are associated.

H0: The two variables are independent.

H1: The two variables relate to each other.

Correlation between Gender and Mental Health Issue

According to Table 6.1, observed counts are different form these expected counts. Based on the analysis of the Chi-Square test, as the assumption of Chi-Square test is violated, because based on the Chi-Square test assumption, the percentages of the cells are we anticipate to have it should be counted less than 5 or 20%. Here, it shows 33.3% hence, it should be analyzed by Likelihood Ratio instead of Pearson Chi- Square. The value of likelihood ratio is 10.637 with 2 degree of freedom and its Asymptotic

Significance that is the P-value or significance value is 0.005. We assume that the level of significance be 5%, and thus the result is statistically significant and we accept our alternative hypothesis that there is a significant association between gender and mental health issue variable. In addition, we can conclude that female participants are more affected by health issues than male participants. Also, to find the effect size or correlation coefficient of these variables, the symmetric measures table should be analyzed. The Cramer's V value is 0.217 and the assumed level of significance is 0.005, which suggests that there is a moderate association between gender and mental health issues.

Gender * Mentalhealthissues Crosstabulation

			Mentalhealthissues		
			No	Yes	Total
Gender	Female	Count	44	98	142
		Expected Count	52.3	89.7	142.0
	Male	Count	33	31	64
		Expected Count	23.6	40.4	64.0
	Not to Say	Count	0	3	3
		Expected Count	1.1	1.9	3.0
Total		Count	77	132	209
		Expected Count	77.0	132.0	209.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.803[a]	2	.007
Likelihood Ratio	10.637	2	.005
N of Valid Cases	209		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.11.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.217	.007
	Cramer's V	.217	.007
N of Valid Cases		209	

Table 6.1 Gender vs. Mental Health Issue Cross-Tabulation and Chi-Square Test.

LEVEL OF ASSOCIATION	Verbal Description	COMMENTS
0.00	No Relationship	Knowing the independent variable does not reduce the number of errors in predicting the dependent variable at all.
.00 to .15	Not generally useful	Not acceptable
.10 to .20	Weak	Minimally acceptable
.20 to .25	Moderate	Acceptable
.25 to .30	Moderately Strong	
.30 to .35	Strong	
.35 to .40	Very Strong	
.40 to .45	Worrisomely Strong	Either an extremely good relationship or the two variables are measuring the same concept
.45 to .99	Redundant	The two variables are probably measuring the same concept.
1.00	Perfect Relationship.	If we the know the independent variable, we can perfectly predict the dependent variable.

Table 6.2 Interpreting the value of the level of association (Phi and Cramer's V).

Correlation between Major and Increasing Anxiety

According to Table 6.3, the value of likelihood ratio is 23.952 with 12 degree of freedom and its P-value is 0.021. Since the P-value testing at the 5% (Alpha) level of significance, the P-value of 0.021 is less than the alpha value of 0.05. Hence, there is a significant association between majors and increasing anxiety.

Major * Increase_anxietyandnervousness Crosstabulation

			Increase_anxietyandnervousness					
			Definitely Not	Possibly	Neutral	Probably	Definitely	Total
Major	College of Business	Count	25	4	13	7	19	68
		Expected Count	15.9	6.2	10.7	8.1	27.0	68.0
	College of Education	Count	7	5	7	3	8	30
		Expected Count	7.0	2.7	4.7	3.6	11.9	30.0
	College of Human Sciences and Humanities	Count	6	3	6	9	28	52
		Expected Count	12.2	4.7	8.2	6.2	20.7	52.0
	College of Science and Engineering	Count	11	7	7	6	28	59
		Expected Count	13.8	5.4	9.3	7.1	23.4	59.0
Total		Count	49	19	33	25	83	209
		Expected Count	49.0	19.0	33.0	25.0	83.0	209.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.214[a]	12	.019
Likelihood Ratio	23.952	12	.021
N of Valid Cases	209		

a. 4 cells (20.0%) have expected count less than 5. The minimum expected count is 2.73.

Symmetric Measures[c]

		Value	Approximate Significance
Nominal by Nominal	Phi	.340	.019
	Cramer's V	.197	.019
N of Valid Cases		209	

c. Correlation statistics are available for numeric data only.

Table 6.3 Major vs. Increase anxiety cross-tabulation and Chi-Square test

Also, in Figure of 6.1, the bar chart of majors (aggregated across the four colleges at UHCL) against the increasing level of anxiety and nervousness clearly show that participants from the College of Science and Engineering and the College of Human Sciences and Humanity experienced a higher level of nervousness and anxiety during the pandemic of COVID-19 than the students from the College of Business and the College of Education.

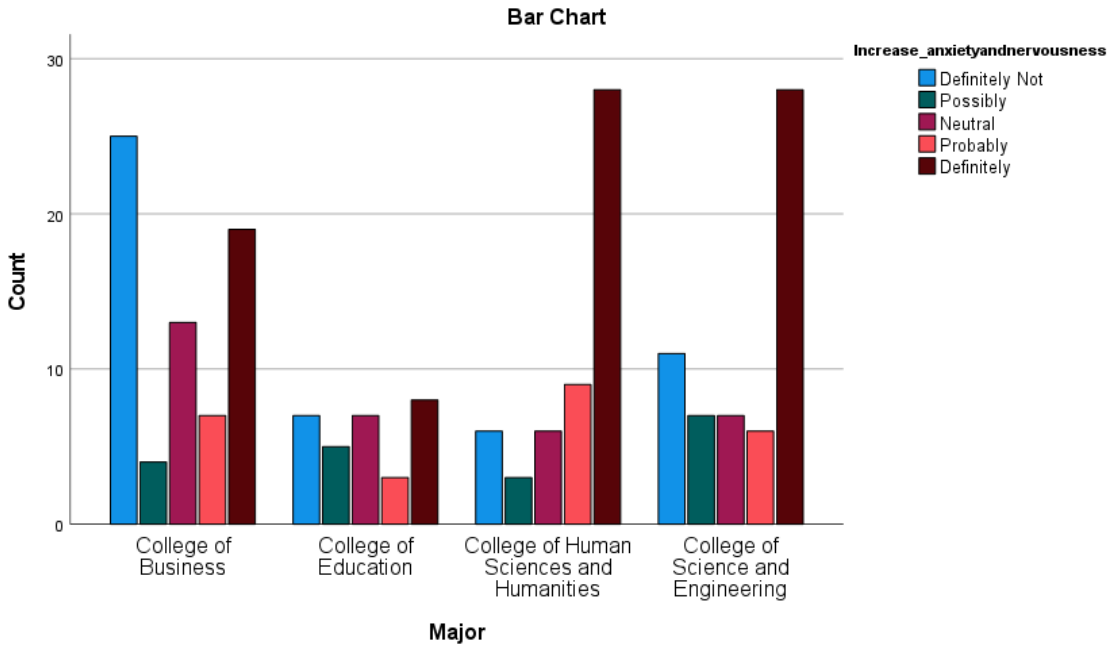

Figure 6.1 Bar chart of Majors/Increasing anxiety and nervousness

Correlation between Family Income and increasing level of anxiety and nervousness

Based on Table 6.4, the value of likelihood ratio is 41.987 with 20 degree of freedom and its P-value is 0.003. Given the 5% (Alpha) level of significance, the P-value of 0.003 is less than the alpha value of (0.05). Hence, there is a significant association between variables of household income and increasing level of anxiety and nervousness among the participants. Also, the value of Cramer's V is 0.220, which means that this is a moderate association between these two variables.

In addition, Figure 6.2 visually shows that relationship between these two variables. The level of anxiety and nervousness decreases consecutively when the household income increases from under $20,000 to over $100,000. In other words, the participants have a higher level of family income experienced less anxiety and nervousness than the participants that have a medium to low level of family income during the pandemic of COVID-19.

Householdincome * Increase_anxietyandnervousness Crosstabulation

			Increase_anxietyandnervousness					
			Definitely Not	Possibly	Neutral	Probably	Definitely	Total
Householdincome	Under $20,000	Count	7	6	5	9	23	50
		Expected Count	11.7	4.5	7.9	6.0	19.9	50.0
	$20,001-$40,000	Count	10	4	6	3	18	41
		Expected Count	9.6	3.7	6.5	4.9	16.3	41.0
	$40,001-$60,000	Count	7	0	2	2	17	28
		Expected Count	6.6	2.5	4.4	3.3	11.1	28.0
	$60,001-$80,000	Count	4	7	12	4	13	40
		Expected Count	9.4	3.6	6.3	4.8	15.9	40.0
	$80,001-$100,000	Count	4	1	3	1	4	13
		Expected Count	3.0	1.2	2.1	1.6	5.2	13.0
	$100,001 and over	Count	17	1	5	6	8	37
		Expected Count	8.7	3.4	5.8	4.4	14.7	37.0
Total		Count	49	19	33	25	83	209
		Expected Count	49.0	19.0	33.0	25.0	83.0	209.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	40.564[a]	20	.004
Likelihood Ratio	41.987	20	.003
Linear-by-Linear Association	8.561	1	.003
N of Valid Cases	209		

a. 14 cells (46.7%) have expected count less than 5. The minimum expected count is 1.18.

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.441			.004
	Cramer's V	.220			.004
Interval by Interval	Pearson's R	-.203	.068	-2.981	.003[c]
Ordinal by Ordinal	Spearman Correlation	-.198	.067	-2.901	.004[c]
N of Valid Cases		209			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Table 6.4 Family income vs. Increase anxiety cross-tabulation and Chi-Square test

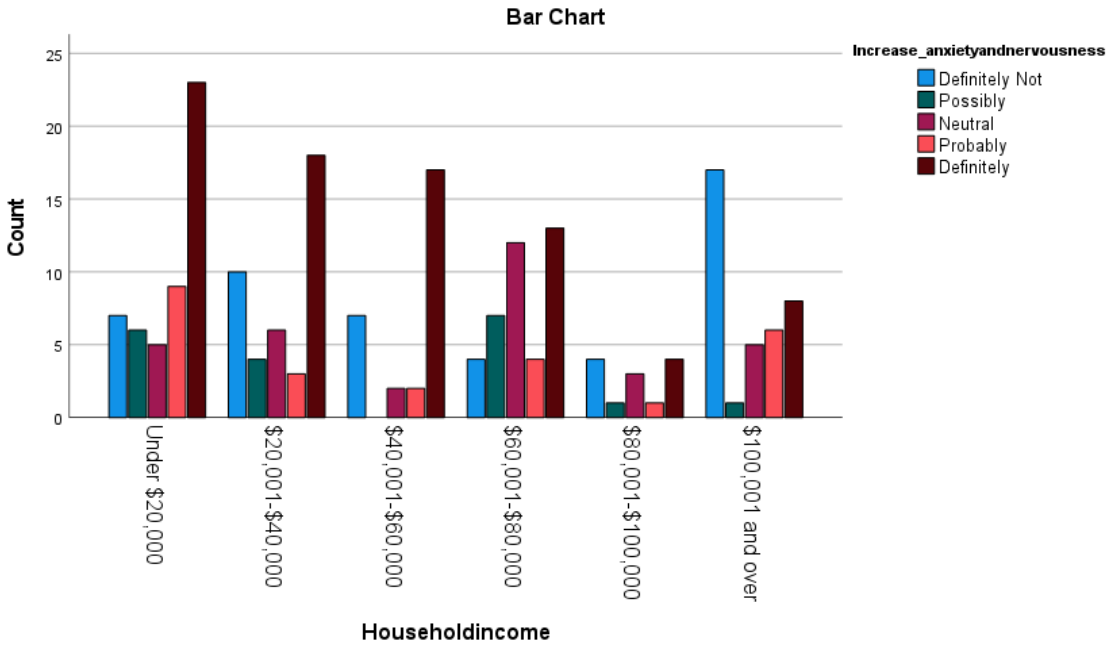

Figure 6.2 Bar chart of Family Income/Increasing anxiety and nervousness

Correlation between Family Income and Adverse impact on grades

According to Table 6.5, the value of likelihood ratio is 33.315 with 20 degree of freedom and its P-value is 0.031. Given the 5% (Alpha) level of significance, the P-value of 0.031 is less than the alpha value of (0.05). Hence, there is a significant association between variables of family income and adverse impact on grades among the participants. Also, the value of Cramer's V is 0.220, which means that this is a moderate association between these two variables.

In addition, Figure 6.2 visually shows that relationship between these two variables. The level of adverse impact on grades decreases consecutively when the household income increases from under $20,000 to over $100,000. In other words, the participants have a higher level of family income experienced a lower level of adverse impact on their grades than the participants that have a medium to low level of family income during the pandemic of COVID-19.

Householdincome * Adverseimpacts_grades Crosstabulation

			Adverseimpacts_grades					
			Definitely Not	Possibly	Neutral	Probably	Definitely	Total
Householdincome	Under $20,000	Count	6	9	9	10	16	50
		Expected Count	11.5	8.9	10.8	8.1	10.8	50.0
	$20,001-$40,000	Count	7	9	9	4	12	41
		Expected Count	9.4	7.3	8.8	6.7	8.8	41.0
	$40,001-$60,000	Count	6	4	4	8	6	28
		Expected Count	6.4	5.0	6.0	4.6	6.0	28.0
	$60,001-$80,000	Count	8	6	13	9	4	40
		Expected Count	9.2	7.1	8.6	6.5	8.6	40.0
	$80,001-$100,000	Count	4	3	4	1	1	13
		Expected Count	3.0	2.3	2.8	2.1	2.8	13.0
	$100,001 and over	Count	17	6	6	2	6	37
		Expected Count	8.5	6.6	8.0	6.0	8.0	37.0
Total		Count	48	37	45	34	45	209
		Expected Count	48.0	37.0	45.0	34.0	45.0	209.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	33.638[a]	20	.029
Likelihood Ratio	33.315	20	.031
Linear-by-Linear Association	14.861	1	.000
N of Valid Cases	209		

a. 7 cells (23.3%) have expected count less than 5. The minimum expected count is 2.11.

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	.401			.029
	Cramer's V	.201			.029
Interval by Interval	Pearson's R	-.267	.067	-3.991	.000[c]
Ordinal by Ordinal	Spearman Correlation	-.263	.067	-3.928	.000[c]
N of Valid Cases		209			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Table 6.5 Family income vs. Adverse impact of transition from face-to-face to online-learning on grades cross-tabulation and Chi-Square test

Moreover, Figure 6.3 shows a bar chart that Likert-scale responses of definite impact on grades is in relation with family income. In other words, with the level increasing of family income the level of impact on grades decreased.

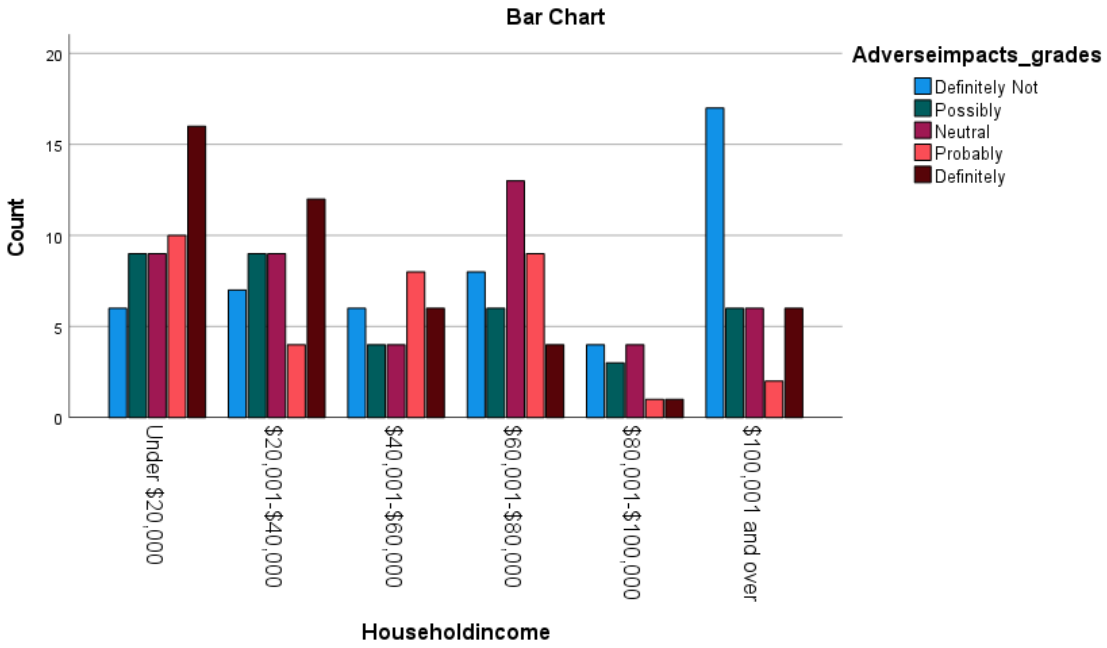

Figure 6.3 Bar chart of Family Income/Adverse impact of transition method of education from face-to-face to online learning on grades

Correlation between experiencing Mental Health issues and Adverse impact on grades

Based on Table 6.6, the value of Pearson Chi-Square ratio is 11.110 with 4 degree of freedom and its P-value is 0.025. Given the 5% (Alpha) level of significance, the P-value of 0.023 is less than the alpha value of (0.05). Hence, there is a significant association between the variables of mental health issues that students experienced during pandemic of COVID-19 and adverse impact on grades. Also, the value of Cramer's V is 0.231, which shows the size of association and that is a moderate association.

Mentalhealthissues * Adverseimpacts_grades Crosstabulation

			Adverseimpacts_grades					
			Definitely Not	Possibly	Neutral	Probably	Definitely	Total
Mentalhealthissues	No	Count	24	18	15	7	13	77
		Expected Count	17.7	13.6	16.6	12.5	16.6	77.0
	Yes	Count	24	19	30	27	32	132
		Expected Count	30.3	23.4	28.4	21.5	28.4	132.0
Total		Count	48	37	45	34	45	209
		Expected Count	48.0	37.0	45.0	34.0	45.0	209.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.110[a]	4	.025
Likelihood Ratio	11.317	4	.023
N of Valid Cases	209		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.53.

Symmetric Measures[c]

		Value	Approximate Significance
Nominal by Nominal	Phi	.231	.025
	Cramer's V	.231	.025
N of Valid Cases		209	

c. Correlation statistics are available for numeric data only.

Table 6.6 Mental health issue vs. Adverse impact of transition from face-to-face to online-learning on grades cross-tabulation and Chi-Square test

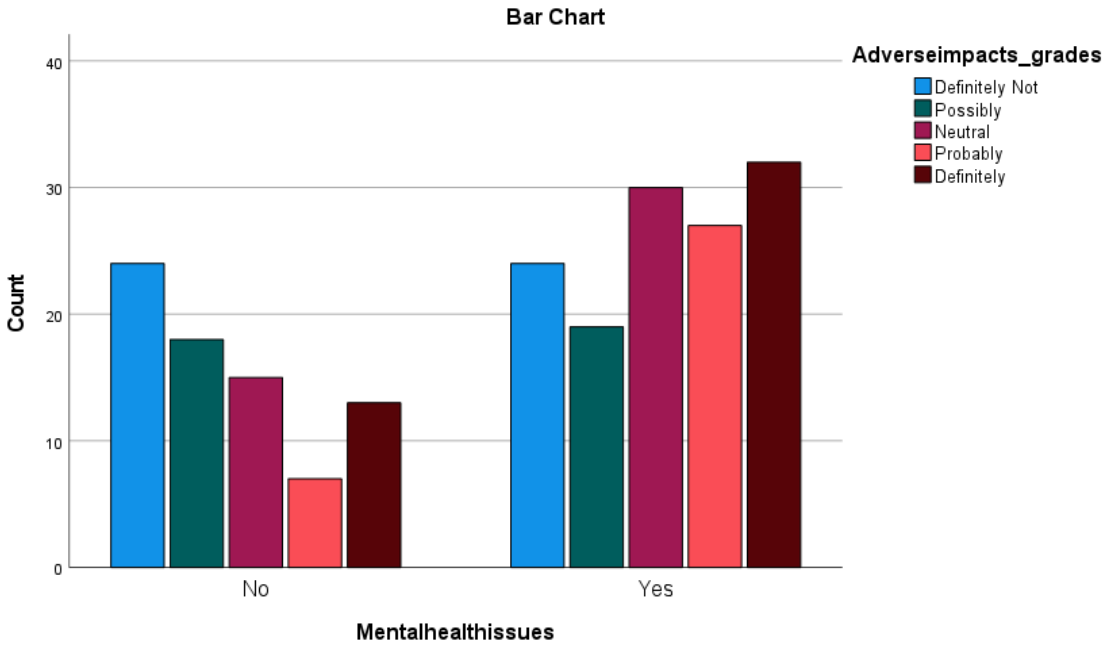

Figure 6.4 Bar chart of Mental health issue/Adverse impact of transition method of education from face-to-face to online learning on grades

Correlation between experiencing Mental Health issue and Increasing level of anxiety and nervousness

According to Table 6.7, the value of Pearson Chi-square value is 14.967 with 4 degree of freedom and its P-value is 0.005. Given the 5% (Alpha) level of significance, the P-value of 0.005 is less than the alpha value of (0.05). Hence, there is a significant association between the variables of mental health issues that students experienced during pandemic of COVID-19 and increasing level of anxiety and nervousness. Also, the value of Cramer's V is 0.268, which shows the size of association and that is a moderately strong association.

Mentalhealthissues * Increase_anxietyandnervousness Crosstabulation

			Increase_anxietyandnervousness					
			Definitely Not	Possibly	Neutral	Probably	Definitely	Total
Mentalhealthissues	No	Count	27	4	15	10	21	77
		Expected Count	18.1	7.0	12.2	9.2	30.6	77.0
	Yes	Count	22	15	18	15	62	132
		Expected Count	30.9	12.0	20.8	15.8	52.4	132.0
Total		Count	49	19	33	25	83	209
		Expected Count	49.0	19.0	33.0	25.0	83.0	209.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.967[a]	4	.005
Likelihood Ratio	15.098	4	.005
N of Valid Cases	209		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.00.

Symmetric Measures[c]

		Value	Approximate Significance
Nominal by Nominal	Phi	.268	.005
	Cramer's V	.268	.005
N of Valid Cases		209	

c. Correlation statistics are available for numeric data only.

Table 6.7 Mental health issue vs. Increasing level of anxiety and nervousness cross-tabulation and Chi-Square test

Moreover, in Figure 6.5 shows that in the group of participants who experienced mental health issues, are more respondents with positive mental health issues responded that they definitely experienced anxiety of nervousness.

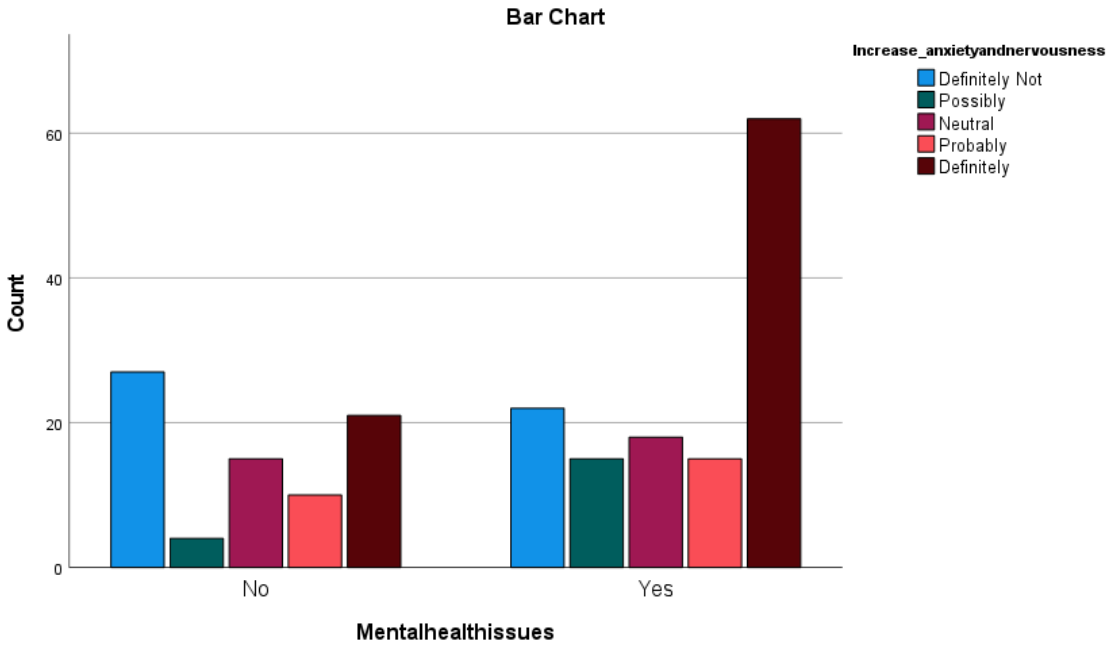

Figure 6.5 Bar chart of Mental health issue/Increasing level of anxiety and nervousness

Correlation between experiencing Mental Health issue and Lagging behind the study

Based on Table 6.8, the value of Pearson Chi-square value is 32.471 with 4 degree of freedom and its P-value. Given the 5% (Alpha) level of significance, the P-value is less than the alpha value of 0.05. Hence, there is a significant association between the variables of mental health issues that the participants experienced during pandemic of COVID-19 and lagging behind the study. Also, the value of Phi is 0.394, which shows the association-based Table 6.8 is very strong. In other words, this very strong correlation shows that the students experienced mental health issue during the pandemic in the period of Fall 2019 to Fall 2020, suffered from lagging behind the study than the participants that never experienced mental health issues.

Mentalhealthissues * Lagging_behindthestudy Crosstabulation

			Lagging_behindthestudy					
			Never	Sometimes	About Half the Time	Most of the Time	Always	Total
Mentalhealthissues	No	Count	21	37	7	10	2	77
		Expected Count	12.2	28.0	12.2	12.5	12.2	77.0
	Yes	Count	12	39	26	24	31	132
		Expected Count	20.8	48.0	20.8	21.5	20.8	132.0
Total		Count	33	76	33	34	33	209
		Expected Count	33.0	76.0	33.0	34.0	33.0	209.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.471[a]	4	.000
Likelihood Ratio	36.133	4	.000
N of Valid Cases	209		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.16.

Symmetric Measures[c]

		Value	Approximate Significance
Nominal by Nominal	Phi	.394	.000
	Cramer's V	.394	.000
N of Valid Cases		209	

c. Correlation statistics are available for numeric data only.

Table 6.8 Mental health issue vs. Lagging behind the study cross-tabulation and Chi-Square test

Moreover, Figure 6.6 shows that the responses to the question on the perception of lagging behind the study from the participants who experienced mental health issues and those who did not. In particular, it shows that the majority of the participants who experienced mental health issues experiencing lagging behind the study as well.

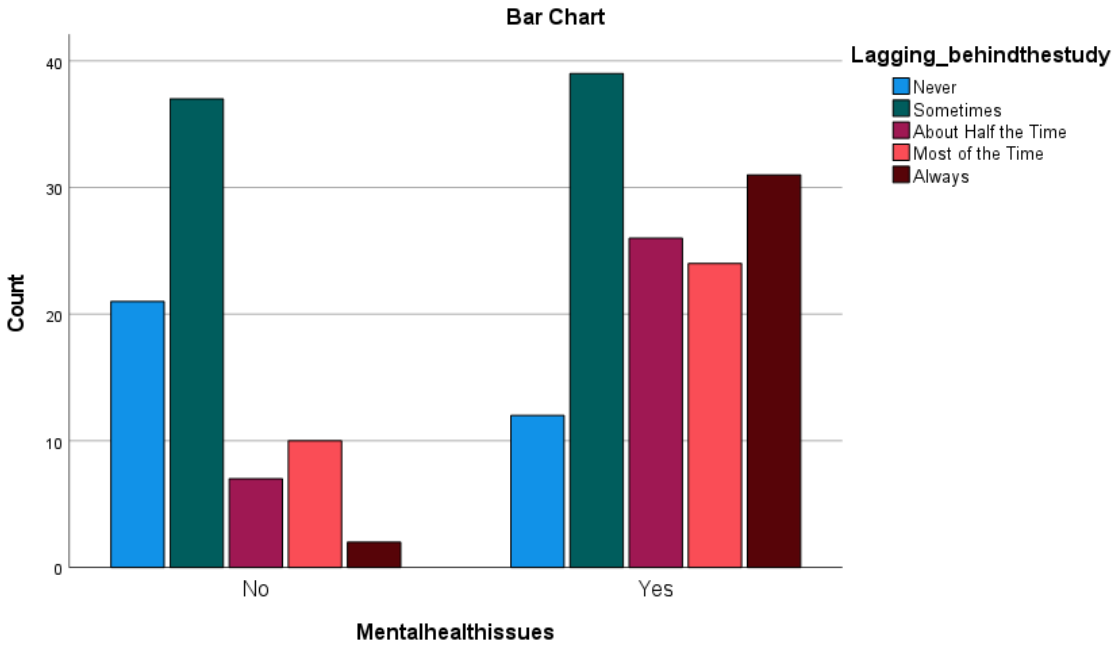

Figure 6.6 Bar chart of Mental health issue vs. Lagging behind the study

Correlation between experiencing Mental Health issue and Lack of self-regulation and self-motivation

According to Table 6.9, I used the Pearson Chi-square as the violation of test's assumption is less than twenty percent. The value of Pearson Chi-square value is 19.757 with 4 degree of freedom and its P-value is 0.001. Given the 5% (Alpha) level of significance, the P-value is less than the alpha value of (0.05). Hence, there is a significant association between the variables of mental health issues that the participants experienced during the pandemic of COVID-19 and lack of self-regulation and self-motivation. Also, the value of Phi is 0.307, which shows the size of association based on Table 6.9 is strong. In other words, this strong association suggests that the students experienced mental health issue during the pandemic, experienced lacking self-regulation and self-motivation as well, against the participants who never experienced mental health issues.

Mentalhealthissues * Lack_selfregulationselfmotivation Crosstabulation

			Lack_selfregulationselfmotivation					
			Extremely Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Extremely Likely	Total
Mentalhealthissues	No	Count	8	13	10	25	21	77
		Expected Count	4.1	8.1	6.3	27.6	30.9	77.0
	Yes	Count	3	9	7	50	63	132
		Expected Count	6.9	13.9	10.7	47.4	53.1	132.0
Total		Count	11	22	17	75	84	209
		Expected Count	11.0	22.0	17.0	75.0	84.0	209.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	19.757[a]	4	.001
Likelihood Ratio	19.448	4	.001
N of Valid Cases	209		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.05.

Symmetric Measures[c]

		Value	Approximate Significance
Nominal by Nominal	Phi	.307	.001
	Cramer's V	.307	.001
N of Valid Cases		209	

c. Correlation statistics are available for numeric data only.

Table 6.9 Mental health issue vs. Lacking self-regulation and self-motivation cross-tabulation and Chi-Square test

In addition, in Figure 6.7 shows that students who have mental health issues acknowledged a high level of lacking self-regulation and self-motivation during the COVID-19 crisis. Alarmingly, a total of 54% (113/209) of the participants reported likely and extremely likely lacking self-regulation and self-motivation.

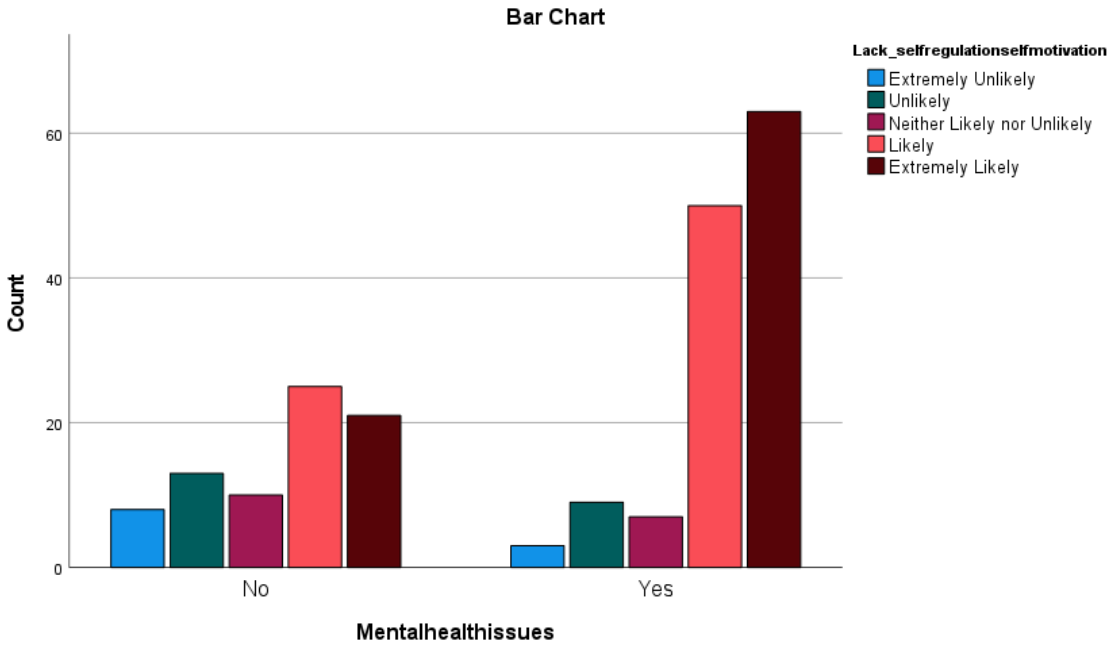

Figure 6.7 Bar chart of Mental health issue vs. Lacking self-regulation and self-motivation

Analyzing of the collected GPAs

From the survey, GPAs of 209 participants are collected from Fall 2019 (the time that the crisis of COVID-19 started) to Spring 2020, and Fall 2020. From these 209 students, a total of 51 students mentioned their GPAs incorrectly (cited their GPAs over 4 or negative) or for some of them, the Fall 2020 semester was their first semester at UHCL. Hence, they are excluded from this part of analysis and the students are considered if they were at UHCL for at least three consecutive semesters (from Fall 2019 to 2020).

According to Table 6.10 based on 158 participants, in Fall 2019, the mean of GPAs was 3.451 and the standard of deviation was 0.537. In Spring 2020, the mean of GPAs and standard of deviation decreases to 3.449 and 0.528, respectively. In Fall 2020

(the third semester in the survey), the mean of GPAs decreases to 3.404. In contrast, the standard deviation increases to 0.564 from 0.528 from previous semester (spring 2020).

During these consecutive semesters, the average GPAs of students decreased. In addition, the standard deviation of the grades fluctuates between Fall 2019 and Spring 2020. In the subsequent semester, it increases to 0.56 and it demonstrates that the dispersion of grades increases from Spring 2020, the semester that COVID-19 crisis started, to Fall 2020.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
GPAFall_2020	158	1.140000000	4.000000000	3.404113924	.5646972355
GPA Fall 2019	158	1.000000000	4.000000000	3.451518987	.5375530514
GPA Spring 2020	158	1.830000000	4.000000000	3.449620253	.5286672175
Valid N (listwise)	158				

Table 6.10 Descriptive Statistics of three consecutive collected GPA, Fall-2019, Spring-2020, Fall-2020

Moreover, Figure 6.8 shows the bar chart of the three consecutive semesters and the dispersion of participants' grades. As mentioned, the average grades of students in comparison with fall 2019 (the time before the pandemic of COVID-19) have been decreasing. Note the similarity in grade distribution between Fall 2019 and Fall 2020, which differ from that in Spring 2020. It suggests that the impact on academic performance due to the onset of the COVID pandemic and the adaption of participants after one semester of experiencing the changes caused by the pandemic.

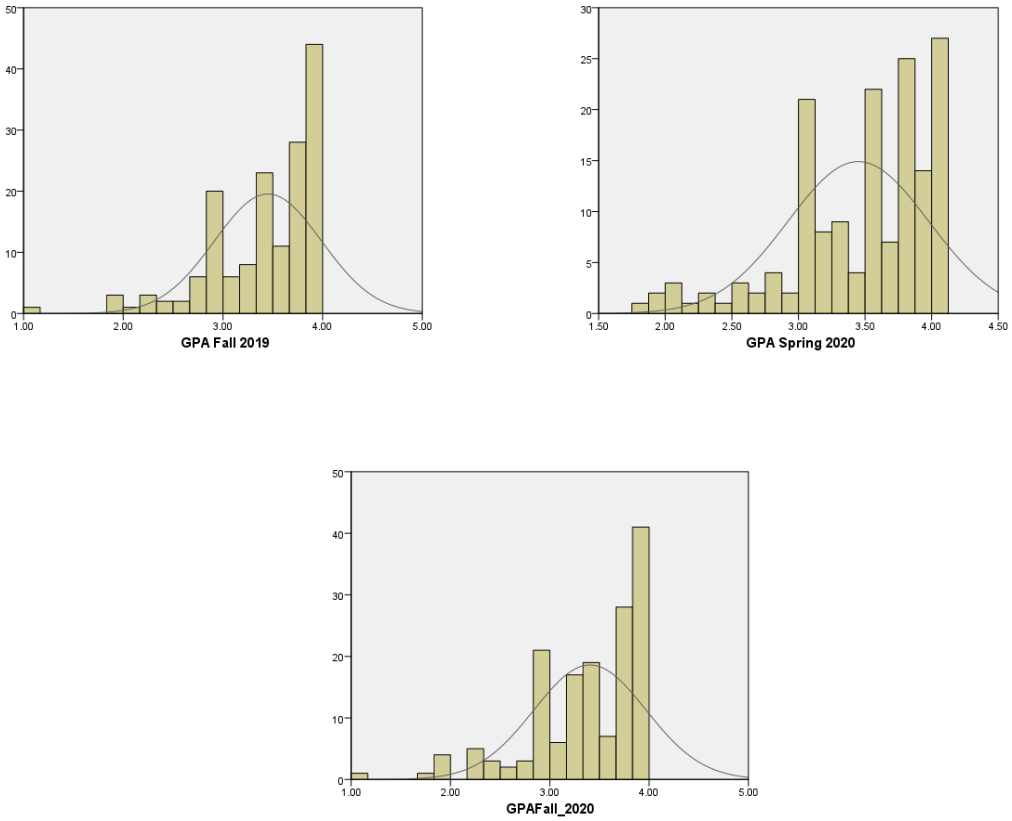

Figure 6.8 Bar chart of the three consecutive semesters (Fall 2019, Spring 2020, Fall 2020)

Analyzing of the open-ended questions

In this section, the three open-ended questions regarding the quality of information and services that UHCL provided and implemented for online learning during the pandemic, satisfaction/unsatisfaction of participants regarding the quality of material or syllabi that the instructors prepared for them, and for any suggestion regarding what support UHCL could provide them during the pandemic of COVID-19.

Analysis of the open-ended questions was performed with the Python programming language. As the responses to the open-ended questions consist of text files, I implemented neutral language processing (NLP) method that defined as an

automatic manipulation of languages. This method is used to computationally identifying and categorizing opinions from the survey. The three open-ended questions were:

1- Are you satisfied with the quality of information and service that UHCL provides for online learning during the lock-down of the school?
2- Are you satisfied with the material or syllabus that teachers prepare for you during online- learning?
3- Do you have any suggestions for what UHCL could do to support you?

In the first phase, all the collected answers from these questions were cleaned to break the text down into a format the computer could easily understand. Hence, data was cleaned and some impractical symbols, texts, characters was removed from the text.

In the second phase, the cleaned text was stored in an Excel file with a CSV format. The needed library for analysis of the Data Frame was imported to the Python script and the file was read by Python.

In the third phase, subjectivity and polarity of the text file was extracted from the Data Frame. Subjectivity in sentiment analysis shows how subjective or opinionated the text is and ranges from zero to one. The positive values indicate that there is some sentiment in that phrase and zeros mean the text is more about facts than about opinions. Polarity depicts how positive or negative the text is and ranges from negative one to positive one. The positive one means the text contains a positive sentiment while the negative one means the text contains a negative sentiment (Figure 6.9).

	Satisfiction_Quality	Subjectivity	Polarity
0	I have been satisfied with the accommodations ...	0.496667	0.216667
1	I suppose that I am satisfied with the quality...	0.431250	0.156250
2	Online learning was rough in the spring of 202...	0.637500	0.137500
3	It is a difficult situation, but i think the s...	1.000000	-0.500000
4	As for the professors quality it is very hit o...	0.647917	0.302083
...	...	...	...
226	YES	0.000000	0.000000
227	No	0.000000	0.000000
228	I always felt like I was missing something. Yo...	0.050000	-0.200000
229	No	0.000000	0.000000
230	Yes i am.	0.000000	0.000000

231 rows × 3 columns

Figure 6.9 Subjectivity and Polarity in the first open-ended question

In the fourth phase, the Word Plot/Cloud (Figure 6.10) of the considered text is created. The word cloud is also knowns as tag clouds or text clouds and fundamentally a visualization where the more frequent words in that text are bigger and bolder. Also, positivity and negativity of each collected answer to the first open-ended question was captured.

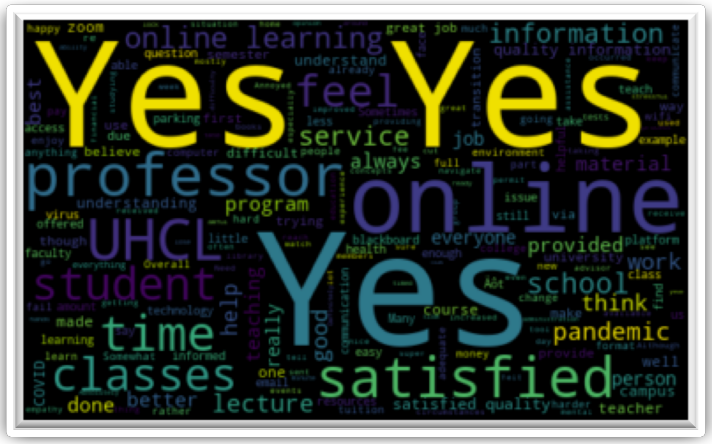

Figure 6.10 Tag cloud of the opinion of participants for the first open-ended question

According to the sentiment analysis of the first open-ended question (Are you satisfied with the quality of information and service that UHCL provides for online learning during the lock-down of the school?), 108 participants (46.8%) have a positive attitude towards the quality of information and services that UHCL provides for online learning. A total of 45.5% of the participants have a neutral attitude and merely 7.7% of the students have a negative attitude towards the quality of services that UHCL provided during the pandemic of COVID-19. Moreover, the scatter plot of polarity/ subjectivity for the first open-ended question (Figure 6.11) shows that most of students' comments have a positive polarity and a subjectivity of more than 0.4, that totally depicted a positive attitude towards provided services by UHCL.

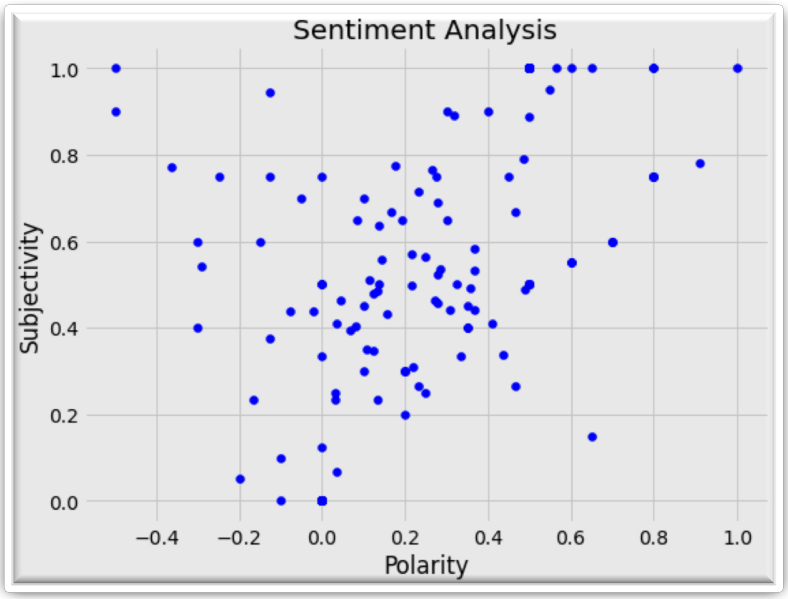

Figure 6.11 Scatterplot of polarity/subjectivity for the first open-ended question

For the second open-ended question (Are you satisfied with the material or syllabus that teachers prepare for you during online- learning?), sentiment analysis shows that from 209 participants 92 (43.8%) have a positive attitude towards the quality of material and syllabus that UHCL's instructors provided for online learning. A total of 46.7% of the participants have a neutral attitude and merely 9.5% of the participants have a negative attitude towards the quality of provided material and syllabus during the pandemic of COVID-19 by UHCL's instructors. Moreover, the scatter plot of polarity/subjectivity (Figure 6.12) shows that most of students' comments have a positive polarity and a subjectivity index of more than 0.4 that indicates a positive attitude towards provided material or syllabus by UHCL's teachers. Note that the zero polarity and strongly negative attitudes in comparison with first open-ended questions increased by expressed negative opinion of students not by the percentage.

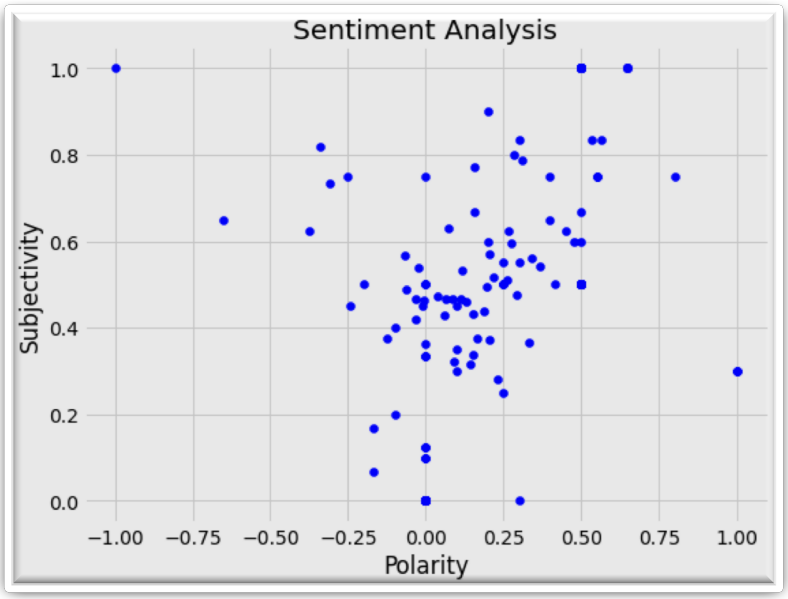

Figure 6.12 Scatterplot of polarity/subjectivity for the second open-ended question

In addition, Figure 6.13 shows the word cloud of the responses to the second question that depicts the bold and more repeated words that students used in their comments to express their opinions about this question.

Figure 6.13 Word cloud of the opinion of participants for the second open-ended question

Clustering the collected data

As the survey results consist of mixed-type data where numeric (the difference between two values is meaningful), nominal (categorical, not ordered) or ordinal (categorical, ordered) data are present, it is not possible to use K-mean method. Because the distance between elements in categorical data is not clear. Hence, during the clustering of our mixed-type data, I used K-medoids algorithm and measuring the similarity across individuals, which is a mathematical concept of distance. Then, the PAM clustering algorithm (Partitioning Around Medoids) as well as a way to select the optimal number of clusters was applied to the collected data. In addition, for measuring the distance, I used the Gower distance method. Gower distance is computed as the average of partial dissimilarities across individuals. Each partial dissimilarity (and thus Gower distance) ranges in [0 1].

$$d(i,j) = \frac{1}{p}\sum_{i=1}^{p} d_{(i,j)}^{(f)}$$

Figure 6.14 Gower distance's formula

Partial dissimilarities $d_{(i,j)}^{f}$ computation depend on the type of variable being evaluated. This implies that a particular standardization is applied to each feature, and the distance between two individuals is the average of all feature-specific distances.

For a numerical feature f, partial dissimilarity is the ratio between (1) absolute difference of observations x_i and x_j, and (2) the maximum range observed from all individuals: $d_{(i,j)}^{f}$ = | x_i - x_j| / |(max_N(x) — min_N(x)) |, N being the number of individuals in the dataset.

$$d_{(i,j)}^{(f)} = \left|x_{if} - x_{jf}\right|/R_f$$

Figure 6.15 Partial dissimilarity computation for numerical features (R_f = maximal range observed)

For a qualitative feature f, partial dissimilarity equals 1 only if observations y_i and y_j has different value. Zero otherwise. To determine the optimal number of clusters, I used the silhouette coefficient. Filaire (2018) mention that Silhouette coefficient is contrasts the average distance to elements in the similar cluster with the average distance to elements in other clusters. According to the silhouette value, objects are well clustered with a high silhouette value. In contrast, the object with low silhouette value may be considered outliers. Based on Figure 6.16, seven clusters are the highest number that is possible for the data; however, I consider five total clusters to simplify and obtain an appropriate visualization.

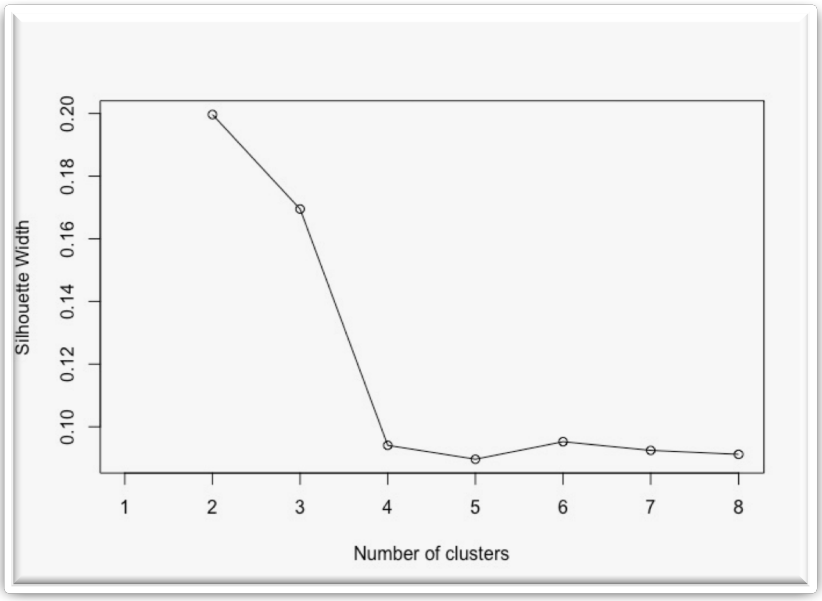

Figure 6.16 Seven clusters have the highest silhouette width. 0.02

Figure 6.17 depicts that whole data clustered to five classes based on some common patterns among participants (similarity and dissimilarity between variables). In other words, the clustering is classified based on the similarity between students' trend during the pandemic of COVID-19 among different variables or factors that have an effect on UHCL students. According to the figure 6.17, based on the PAM clustering algorithm, participants clustered in five different cluster based on their similarity among variables that defined by the survey questions.

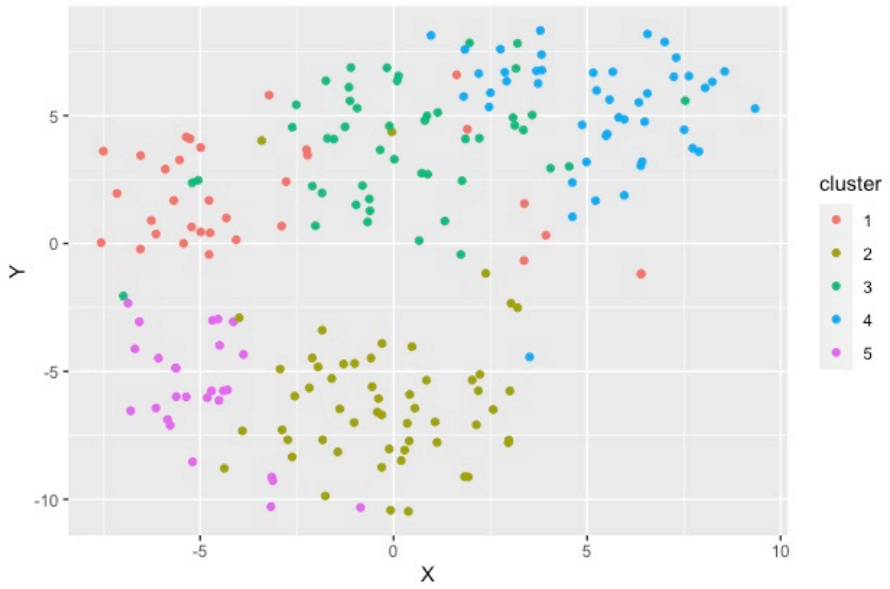

Figure 6.17 Clustering the collected data in five clusters

CHAPTER VI:

CONCLUSION

According to the data analysis in Chapter V, there are some variables that have more effects on students' attainment. Analysis depicts that mental health issues, financial difficulty, pressure about grades among peers, lagging behind the study and specifically increasing levels of anxiety and nervousness are the most significant variables that have an adverse effect on UHCL student's achievement. Also, based on the gathered data, most of the students reported that they suffered from mental health issues during the pandemic of COVID-19 that changed education delivery mode. In other words, the significant correlation between mental health issues and four variables of lagging behind the study, pressure about grades among peers, increasing level of anxiety and nervousness, and lack of self-regulation and self-motivation demonstrated that for the students who experienced mental health issues during the pandemic, this problem has direct effects on lacking self-motivation and self-regulation, both (motivation and regulation) are important factors that help students to pursue their goals and feel better in life, and this lacking leads to an increasing level of anxiety and nervousness, as they are under pressure of competition with their peers and lagging behind the study.

From the study, female students are more affected by mental health issues than male students. Students from the College of Science and Engineering and the College of Human Sciences and Humanity are more affected by the increasing level of anxiety and nervousness than students in the other collages.

Also, students experienced different levels of anxiety and nervousness based on their family income. In other words, the students with a higher household income experienced lower anxiety than the once with medium and low family incomes. Moreover, family income has a direct effect on grades of the students. The level of

adverse impact on grades decreases consecutively when the household income increases from under $20,000 to over $100,000.

In addition, average GPAs of students during the three consecutive semesters from Fall 2019, Spring 2020, and Fall 20202 decreased. But, the standard deviation of GPAs fluctuated between Fall 2019 and Spring 2020. In the subsequent semester, it increased and that demonstrates dispersion of grades which was increased from Spring 2020, the semester that COVID-19 crisis started, to Fall 2020. Moreover, based on the figure 6.8, it shows that the bar chart for Fall2019 the time that situation was normal (before COVID-19) and Fall 2020 (the one semester after starting COVID-19) follow about same trend. That means students after a one semester could manage and conform their self with new situation after a one semester.

Analysis of the open questions illustrates the positive attitude of students towards quality of information and services that UHCL delivered and syllabus and materials that teachers provided during the COVID-19 pandemic based on the analysis of NLP in chapter V.

The last open question, asked students about have any suggestions for what UHCL could do to support students. Based on the collected comments the most important and repeated from the students is listed here:

- The concern of students about the school fee, as most of the courses, were held online but the school fee was based on face-to-face.
- Financial aid that school can provide during the pandemic for students, that help them to have a calm environment for education. Also, asking for more financial support during the current pandemic.

- Ask the UHCL teachers to provide more lectures and online classes instead of just presenting based on a PPT file.

In conclusion, the pandemic of COVID-19 affected UHCL's students in terms of mental health. The mental health issue had an adverse effect on students' attainments and motivations. Moreover, this problem has an adverse effect on the grades of students that in so many institutions count as an achievement of the students during an education semester.

REFERENCES

1. Abrami, P.C., & Bures, E.M. (1996) Computer-supported collaborative learning and distance education. American Journal of Distance Education, 10(2), 37-42. Accessed on July 2021URL: from http://www.sloan-c.org/publications/survey/staying%5fcourse
2. Margolius, M., Doyle Lynch, A., Pufall Jones, E., & Hynes, M. (2020). The State of Young People during COVID-19: Findings from a Nationally Representative Survey of High School Youth. America's Promise Alliance.
3. Anderson, T. (Ed.). (2008). The theory and practice of online learning. Athabasca University Press. Published by AU Press, Athabasa University 1200,10011 – 109 Street Edmonton, AB T5J 3S8
4. Austin, J.D. (1978) Homework research in mathematics. School Science and Mathematics 79: 115–122.
5. Baez, J., De la Fuente, A., & Santos, I. (2010). Do natural disasters affect human capital? An assessment based on existing empirical evidence (IZA Discussion Paper No. 5164). Bonn, Germany: IZA (Institute of Labor Economics).
6. Bates, A. W., & Bates, T. (2005). Technology, e-learning and distance education. Psychology Press.
7. Bernard, R. M., Brauer, A., Abrami, P. C., & Surkes, M. (2004). The development of a questionnaire for predicting online learning achievement. Distance Education, 25(1),31-47.
8. Cho, W., Schmelzer, C.D., & McMahon, P. S. (2002). Preparing hospitality managers for the 21st century: The merging of just-in-time education, critical thinking, and collaborative learning. Journal of Hospitality & Tourism Research 26(1), 23-37
9. De Janvry, A., Finan, F., Sadoulet, E., & Vakis, R. (2006). Can conditional cash transfer programs serve as safety nets in keeping children at school and from working when exposed to shocks? Journal of Development Economics, 79(2), 349–373.
10. Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. Journal of Educational Technology Systems, 49(1), 5-22.
11. Di Pietro, G. (2018) The academic impact of natural disasters: evidence from L'Aquila earthquake. Education Economics, 26(1): 62-77.
12. Elikai, F., & Schuhmann, P. W. (2010). An examination of the impact of grading policies on students' achievement. Issues in Accounting Education, 25(4), 677-693.
13. Fan, M. (2004). The idea of integrated education: From the point of view of Whitehead's philosophy of education. Paper presented at the Forum for Integrated Education and Educational Reform sponsored by the Council for Global Integrative Education, Santa Cruz, CA, October 28-30. Accessed on July 2021 URL http://chiron.valdosta.edu/whuitt/CGIE/fan.
14. Filaire, T. (2018). Clustering on mixed type data. Medium. Accessed on July 2021 URL: https://towardsdatascience. com/clustering-on-mixed-type-data-8bbd0a2569c3 (access date October 18, 2019).

15. Flynn, J.L. (1992). Cooperative learning and Gagne's events of instruction: A syncretic view. Educational Technology, October, 53-60.
16. Gill, D. A. (2007). Secondary trauma or secondary disaster? Insights from Hurricane Katrina. Sociological Spectrum, 27(6), 613-632.
17. Gill, D. A., Ladd, A. E., & Marszalek, J. (2007). College students' experiences with Hurricane Katrina: A comparison between students from Mississippi State University and three New Orleans universities. Journal of the Mississippi Academy of Sciences, 52(4), 262-281.
18. Grootaert, C., & Kanbur, R. (1995). Child labour: A review (Policy Research Working Paper No. 1454). Washington, DC: The World Bank.
19. Hoddinott, J., & Kinsey, B. (2001). Child growth in the time of drought. Oxford Bulletin of Economics and Statistics, 63(4), 409–436.
20. IBM SPSS Statistics (Version 26) predictive analytics software. Accessed on July 2021 URL: https://www.ibm.com/us
21. Johnson, S. D., Aragon, S. R., Shaik, N., & Palma-Rivas, N. (2000). Comparative analysis of learner satisfaction and learning outcomes in online and face-to-face learning environments. Journal of Interactive Learning Research, 11(1), 29-49.
22. Kaya, M. (2012). Distance education systems used in universities of Turkey and Northern Cyprus. Procedia-Social and Behavioral Sciences, 31, 676-680.
23. McElrath, K. (2020). Schooling during the COVID-19 pandemic. United States Census Bureau. Retrieved December, 2, 2020.
24. Moore, M. G. (1989). Three types of interaction. American Journal of Distance Education, 3(2), 1-6.
25. Paulson J.A., Barnett C.L. Public health stops at the school house door. Environ. Health Perspect. 2016;124: A171–A175.
26. Pelz, B. (2010). (My) three principles of effective online pedagogy. Journal of Asynchronous Learning Networks, 14(1), 103-116.
27. Powell, A., & Patrick, S. (2006). An international perspective of K-12 online learning: A summary of the 2006 NACOL international e-learning survey. Vienna, VA: North American Council for Online Learning.
28. R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Accessed on July 2021 URL: https://www.R-project.org/.
29. Reisetter, M., Lapointe, L., & Korcuska, J. (2007). The impact of altered realties: Implications of online delivery for learners' interactions, expectations, and learning skills. International Journal on E-learning, 6(1), 55-80.
30. Rideout, (2015). The Common-Sense Census: Media Use by Tweens and Teens. VJR Consulting Inc. Accessed on July 2021 URL: https://www.commonsensemedia.org/sites/default/files/uploads/research/census_researchreport.
31. Rogers, C. (1983). As a teacher, can I be myself? In Freedom to learn for the 80s. Ohio,US: Charles E. Merrill Publishing Company.

32. Rosenberg, M. J. (2001). E-learning: Strategies for delivering knowledge in the digital age, McGraw-Hill, New York.
33. Sacerdote, B. (2011). Peer effects in education: How might they work, how big are they and how much do we know thus far? In Handbook of the Economics of Education (Vol. 3, pp. 249-277). Elsevier.
34. Sigala, M. (2002). The evolution of internet pedagogy: Benefits for tourism and hospitality education. Journal of Hospitality, Leisure, Sport and Tourism Education, 1(2), 29-45.
35. Smith, D., & Hardaker, G. (2000). E-learning innovation through the implementation of an internet supported learning environment. Journal of Educational Technology & Society, 3(3), 422-432.
36. Song, S. M. (2010). E-learning: Investigating students' acceptance of online learning in hospitality programs. Iowa State University.
37. Sonnemann, J. (2020) Kids shouldn't have to repeat a year of school because of coronavirus. There are much better options, The Conversation, Accessed on July 2021 URL: https://theconversation.com/kids-shouldnt-have-to-repeat-a-year-of-school-because-ofcoronavirus-there-are-much-better-options-134889
38. Sprang, G., & Silman, M. (2013). Posttraumatic stress disorder in parents and youth after health-related disasters. Disaster medicine and public health preparedness, 7(1), 105-110.
39. Student Financial aid department at UHCL (2021). How to apply for financial aid at UHCL. Accessed on July 2021 URL: https://www.uhcl.edu/costs-aid/apply-for-aid
40. Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. Distance education, 22(2), 306-331.
41. U.S. Department of Commerce (2020). QuickFacts provides statistics for all states and counties, and for cities and towns with a population of 5,000 or more. Accessed on July 2021 URL: https://www.census.gov/quickfacts/fact/table/houstoncitytexas#
42. Unger K. (2007) Handbook on Supported Education: Providing Services for Students with Psychiatric Disabilities. Charleston, SC: Book Surge Publishing; 2007.
43. Van Rossum, G., & Drake Jr, F. L. (1995). Python reference manual. Amsterdam: Centrum voor Wiskunde en Informatica.
44. Vegas, E., & Winthrop, R. (2020). Beyond reopening schools: How education can emerge stronger than before COVID-19. Brookings Institution. Retrieved April, 25, 2021. Accessed on July 2021 URL: https://www.brookings.edu/research/beyond-reopening-schools-how-education-can-emerge-stronger-than-before-covid-19
45. Wallace, R. M. (2003). Online learning in higher education: A review of research on interactions among teachers and students. Education, Communication & Information, 3(2), 241-280.
46. Weigel, V. B. (2002). Deep learning for a digital age: Technology's untapped potential to enrich higher education. Jossey-Bass, 989 Market Street, San Francisco, CA 94103-1741.

APPENDIX A:

SAMPLE OF PYTHON SCRIPT IMPLEMENTING NLP METHOD

```
# Import the libraries we need
import tweepy
from textblob import TextBlob
from wordcloud import WordCloud
import pandas as pd
import numpy as np
import re
import matplotlib.pyplot as plt
plt.style.use('fivethirtyeight')

# Load the data
from google.colab import files
uploaded= files.upload()

# Get the data
log = pd.read_csv('###.csv')

#Show the first 5 of data
df.head()

#Creat a function to get the subjectivity
def getSubjectivity(text):
  return TextBlob(text).sentiment.subjectivity

#Creat a function to get the polarity
def getPolarity(text):
  return TextBlob(text).sentiment.polarity

#Creat two new columns
df['Subjectivity']= df['###'].apply(getSubjectivity)
df['Polarity']= df['###'].apply(getPolarity)

#Show the new dataframe with the new columns
df

#Plot the Word Cloud
allWords = ' '.join( [comments for comments in df['###']] )
wordCloud=WordCloud(width=500, height=300, random_state=21,
max_font_size=119).generate(allWords)
```

```
plt.imshow(wordCloud, interpolation= 'bilinear')
plt.axis('off')
plt.show()
#Creat a function to compte the negative, neutral and positive analysis
def getAnalysis(score):
  if score < 0:
    return 'Negative'
  elif score == 0:
    return 'Neutral'
  else:
    return 'Positive'

df['Analysis']= df['Polarity'].apply(getAnalysis)

#Show the dataframe
df
```

APPENDIX B:

SAMPLE OF R SCRIPT CLUSTERING THE DATA

```
#' Load useful packages
library(cluster)
library(dplyr)
library(ggplot2)
library(readr)
library (Rtsne)
#' Load data
df <- read.csv("/###/COVID-19.csv")
#' Compute Gower distance
gower_dist <- daisy (df, metric = "gower")
gower_mat <- as.matrix(gower_dist)
#' Print most similar clients
df [which (gower_mat == min (gower_mat[gower_mat != min(gower_mat)]),
arr.ind = TRUE)[1, ], ]

#' Print most dissimilar clients
df[which(gower_mat == max(gower_mat[gower_mat != max(gower_mat)]),
arr.ind = TRUE)[1, ], ]

sil_width <- c(NA)
for (i in 2:8){
```

```
  pam_fit <- pam (gower_dist, diss = TRUE, k = i)
  sil_width[i] <- pam_fit$silinfo$avg.width
}
plot (1:8, sil_width,
     xlab = "Number of clusters",
     ylab = "Silhouette Width")
lines (1:8, sil_width)

k <- 5
pam_fit <- pam (gower_dist, diss = TRUE, k)
pam_results <- df %>%
  mutate (cluster = pam_fit$clustering) %>%
  group_by(cluster) %>%
  do (the_summary = summary(.))
pam_results$the_summary

tsne_obj <- Rtsne(gower_dist, is_distance = TRUE)
tsne_data <- tsne_obj$Y %>%
  data.frame() %>%
  setNames(c("X", "Y")) %>%
  mutate (cluster = factor(pam_fit$clustering))
ggplot(aes(x = X, y = Y), data = tsne_data) +
  geom_point(aes(color = cluster))
```

APPENDIX C:

POSITIVE COMMENTS OF PARTICIPANTS FOR FIRST OPEN-ENDED QUESTION

- I have been satisfied with the accommodations made for an online learning environment, but I haven't had to make use of any of the curricular amenities such as the writing center. So, I cannot answer in full confidence that it is adequate.
- I suppose that I am satisfied with the quality of information that UHCL provides because I was always aware of any technical difficulties that may occur/have occurred and how to reach out to other people who can help me.
- Online learning was rough in the spring of 2020, but the online services have significantly increased since then.
- As for the professor's quality it is very hit or miss, some are great online, some should not be teaching at all in this format. As for the school itself, I have not needed any services from them so it is hard to say if I am satisfied.
- Quality is mostly the same marginally worse in some scenarios
- I think a fee waiver for tuition would have been nice.
- The transition to online made those who relied mostly on textbook materials to be the entirely reliant on them. It feels that I should pay the publisher rather than the school my tuition.
- I am satisfied
- UHCL Professors are very understanding.
- Yes, most professors are very understanding
- I am somewhat satisfied; I believe some things should change according to the pandemic. For example, I understand group work is essential for our education and our careers. Although I feel it is more complex to have everyone on the same page since not everyone has the same amount of access to internet or their other factors that are disabling our communication.
- i am very happy with the quality of information
- Yes, I am satisfied with the quality of information UHCL has provided for online learning, including resources to better navigate Blackboard which is the primary tool used by our professors.
- Yes, for the most part professors have been good about transferring their lessons to an online format and have been understanding of students when they encounter technology issues.
- I am moderately satisfied.
- UHCL did the best that they could under the circumstances. The time that it will take for me to graduate has increased due to COVID-19.
- Yes, I am satisfied.
- No, we do not, we receive as much information and education as we would if we were in person. I understand we can, I have in person classes but I'm paying a lot of money for a semester that I'm teaching myself.

- No, only because not all teachers are cut out for online teaching. It doesn't matter what services they offer if the teachers can't effectively teach in that mode.
- Not in the least bit am I satisfied with the quality UHCL provides.
- Yes, they seem to be consistent with the communication of information.
- Yes. Many professors conduct lecture using OneNote and I would suggest that they push the written notes out to the students alongside the lecture recordings that they already post.
- I do believe they have done the best that they can. I actually enjoy doing online/virtual and doing more self-study rather than in person instruction and mt grades have improved.
    - Because of this new way of teaching the lectures are being recorded meaning I can re watch them. I had to retake c programming (first time was in person before the pandemic received a D)
    - Took it last semester and received a B+. Because I was able to re watch lectures and more material was available
- UHCL does a good job at providing information for online learning.
- Overall, I would say it is fair.
- The professors in the behavior analysis program are doing a good job since the transition online.
- Yes, I am satisfied.
- It could be better.
- Yes, I enjoy online learning it’s much easier with my schedule and I am able to work from home and attend to my children.
- The online learning is fine, but I often have trouble with receiving quality technological assistance.
- I would've liked to see more support through technology and WIFI help for those of us who had to upgrade or buy personal devices to stay in school.
- Yes, they're very good at having information on their website. and i can always call
- The school did an amazing job in converting to online learning. The faculty has contributed in creative ways too.
- I am satisfied.
- Yes, I like online more than in-person. I also appreciate the zoom meetings.
- I am satisfied with the online learning style and I spend less time commuting and more time studying.
- I feel like they could help out more be more considerate that everyone was losing their jobs yet they are more concerned with parking fees and many other small issues.
- No, professors are trying their best but we are not finding it useful
- Yes, UHCL has done a fantastic job on trying to get students involved via online.
- I wish that information for registration and deadlines was sent sooner than the week or day before it is due. They are good about school events, but when it comes from financial aid, or from whoever sends information about new classes, they are not very punctual.

- I am satisfied.
- Yes, UHCL has done a great job.
- UHCL is doing a great job about being understanding and helpful with the pandemic. It has just been an extreme issue with mental health and money problems.
- A pretty large delay has been added when attempting to access / communicate with faculty members and student advisors.
- In some ways, yes, I am satisfied. I am glad that my teachers and faculty members are easy to communicate with if I have to through email. It would be a better experience if I was able to meet with them in person, but at this time, we cannot do that all the time.
- Not really. I feel like most of my professors have given a lot of busy work so that we can learn the concepts but that doesn't do anything but overwhelm people, especially if you are taking 4 other classes that are also doing the same thing. I understand you have to apply yourself to get anything from online classes, but at the same time I didn't pick to take classes online. COVID did that for me. So, making it a little more digestible and a little less "here, teach yourself the material by reading 7 books and becoming super informed about my class, person who is here for an elective credit" would be nice.
- Yes, I felt like as a student I was very informed with the direction the university was going in regarding COVID and classes.
- Need more financial, mental health and wellness information during these times.
- Yes, I am satisfied with the quality of information and service UHCL has provided.
- I am satisfied with the quality of online information. I am less satisfied with the amount of empathy from the HRM program's administration.
- I am satisfied
- Many professors have done little to make online learning similar to a face-to-face environment. There has been very little lecture, and I've been teaching myself most of the material.
- Major was already online prior to the pandemic, so no change.
- Yes, very satisfied
- Yes. There is always constant communication and updates on what's new and changes being made.
- Sure
- Yes, I am satisfied.
- I was already enrolled in a fully-online program before the pandemic occurred. More guidance would always be helpful; however, very minimal assistance is the expected process. The online programs are very much provided as "self-study" - by design.
- I am satisfied.
- Yes, I am happy with the availability of online class options during the pandemic.
- Yes, i am happy with it.

- I would like to see more synchronize classes offered in the evening for those of us that work full time, we cannot make a morning class work. Sometimes I feel that college is very driven to young adults coming straight from HS or a 2-year college often times the working student who is trying to better themselves gets missed.

- Tutoring has not been as easy to coordinate and I feel as though the quality of information I'm absorbing has declined.

- I believe the professors are doing their best to provide information, but the virus is affecting the ability for questions and additional help. The lock-down is forcing students to really comprehend the material or fail the course. Failing the course means a loss of money and time and now having to repeat a course is demoralizing.

- It could use some improvement. Sometimes I feel as though I'm teaching myself everything and that can be stressful, especially when you are a full-time student.

- Yes, I am satisfied. UHCL has kept me up to date on everything thus far in a very efficient manner.

- Yes. It is very inconsistent, however. It really depends on the Professor's proficiency in online platforms and how to best use online resources.

- Yes, but switching platforms would be better (blackboard to Canvas, for example)

- It's good but it can be better

- Yes, UHCL has been very informative during this pandemic.

- Yes. The professors are very accessible with any questions I might have.

- The presentation is good, however due to the course being more hands on, the information is not as well digested that with hands on experience.

- Yes, professors have been very easy to work with.

- For the most part, yes.

- No, the professor was not trained properly nor ready to lecture online.

- Yes, I do think UHCL is doing a good job.

- I wasn't around when it first was locked down, but the regular emails help understand what's going on.

- Yes, extremely satisfied.

- I do enjoy it, however I dislike the classes that function solely on blackboard collaborate, because it is super unstable

- I find it adequate as they have done their best to continue easy access to on-campus computers and WIFI for those who need it. I do think the school should re-evaluate their current overall WIFI service throughout campus though as sometimes it's impossible to remain connected while on campus. It's also way too slow to keep up or successfully take increasingly limited/timed tests. For example, I can no longer take tests on campus due to the slowness of the connection, causing me to lose minutes on closely-timed tests where I only have around 1 minute per question.

- Yes, everything is decent.

- UHCL has provided an adequate amount of information during the pandemic in my opinion. However, I do not think professors matched that energy.

- More interactive online classes would be beneficial, like asking everyone to put on the camera and participate in the class discussion and forming a group and so for.
- Yes, I think UHCL and professors try their best to provide necessary tools and materials to make learning less stressful.
- Yes, I feel they have made the right choice having classes online.
- The first semester was awful. Granted, no one was prepared and everyone did the best they could with what was available but it was still absolutely awful. The university gave all of the professors and students one week to get ready but it was simply not enough time.
    - The following semesters have been getting better but that first semester, everyone was left to dry by the university in my opinion.
- Yes, there have been plenty of opportunities for me to receive help in most of my classes.
- Yes, I am satisfied.
- It is a good platform and content. Nevertheless, can't be compared with F-2-F classes and interactions.
- Yes, UCT stepped up greatly.
- Sometimes the quality and service are exceptional, however not every teacher is dedicated to online learning and fails to provide us with opportunities to learn.
- I am satisfied with the quality of information and service provided by UHCL.
- I think that UHCL has done a great job helping students transition to online learning.
- I agree to a certain extent. I feel like some professors should be teaching online.
- In many classes I'm not because professors rush over material in online lectures or don't explain the concepts very well.
- I am satisfied with the service, but my issues lie with online learning in general.
- Yes, UHCL did a great job in managing a pandemic that scientists and people struggled to figure out.
- Overall, I am very satisfied with the quality of the information and service provided by professors online.
- No, I don't think there is any substitution for face-to-face learning. You lose the ability to ask questions real time. In addition, your attention span is different at home learning on zoom as opposed to the classroom environment.
- I live in San Antonio, Texas so the lock-down of the school does not impact or affect me.
- Yes, online has done a great job at relying messages to the students.
- Yes, I am satisfied. They have made the process a smooth one.
- Yes, that has become better gradually. It’s really good now
- No, the lack of communication with the school and staff is very chaotic. The teachers do not understand how online work that have never done online.

- I am satisfied with the amount of help that UHCL has tried to offered.
- online learning is great to prevent the spread of the novel virus COVID-19. It is taxing because we are not used to it, however, it is safe for our health. Mentally, it is a struggle not because school is closed, but the virus is still present
- Some service offered before covid is out of reach with trying to social distance Ex: technology use and printing.
- I am satisfied.

APPENDIX D:

POSITIVE COMMENTS OF PARTICIPANTS FOR SECOND OPEN-ENDED QUESTION

- Yes! I actually find I pay more attention to the syllabus now than when I attended college in person and it feels as if the syllabi are more personalized now.
- I am satisfied with what material and the syllabus they provide, but it can get very overwhelming and confusing at times to keep up with all the self-paced assignments for all my classes.
- I'd be more satisfied if there were more lecture times.
- some did good. others not so much. standardizing would have been nice.
- Some professors yes, others no. The art professors are heavily impacted by Stuart Larson which make them good, but when pursuing my marketing minor, I have had issues with every marketing class since the pandemic.
- Yes, but some could do better
- Mostly Satisfied
- Yes, I am satisfied.
- Professors have been clear and consistent about regulations and rule in their syllabuses with clear adoption to an online format, yes.
- Yes, very much. It was very thorough.
- Yes, the syllabus have been detailed and fixated on our situation and I believe the professors are choosing to be more lenient with our work since there are unpredictable complications that may occur.
- i am satisfied with both
- Yes, and I am grateful that teachers have begun to include a timeline of projected due dates so that we can plan for assignments while attending more than one class.
- No. It is a lot of material to cover and class discussions rarely covered the material for the week, it was an instructional meeting, rather than really discussing.
- Somewhat, could be better.
- It is a lot of detailed information; it is thorough and goes through revisions. like life.
- Yes, the plan is the best they can do.
- Yes, very satisfied.
- It all depends on the teacher and the subject, last year I was not satisfied at all.
- Yes, the syllabus seems to emphasize contacting and reaching out to the professors and lays out information more concisely.

- Yes. The education teachers lack a bit of organization, but the math faculty have courses of high quality with clear organizational structures.
- I often feel that they provide too much busy work to make up for loss of class time
- Some of them are awesome and some are confusing. I still do not know what was fully expected in one of my classes so I'm just rolling with it.
- Yes, very satisfied for the most part. There is always the one teacher who is just lazy but that is why we have a census date and a 6-drop rule
- The professors in the behavior analysis program do a great job with the syllabus (e.g., putting a list of what topics we'll be talking about each week and what us due each week) but I know that doesn't happen or is not a requirement in all programs. I think it should be because this has been very helpful.
- I am satisfied
- Yes and No, I understand they were thrown into as well, but some more flexibility and grace would've been nice on behalf of the students. I also think reducing the work/hours would have been nice.
- for the most part yes. I did have to drop one of my classes because there was so much reading. she said that we would have more time to read because we were all stuck at home. but, I have four kids doing online learning so I have experienced the opposite effect of covid-19. I was about four hours into my reading for the first week and I was about half way through and hadn't had a chance to look at my other classes so I decided to drop it because I didn't want my other classes to suffer.
- Yes, it was hard to learn on our own though they do not all teach. The tests are nothing like the book or ppts sometimes.
- I am satisfied.
- The syllabus is very helpful. I like creating a calendar on my own of all my deadlines.
- Yes. They do their best.
- I am satisfied with the material provided and the option to scan homework to the TAs or Profs instead of printing paper to hand in to the prof.
- Yes, they have been useful
- Yes, I am very satisfied. I would just say that I wish the calendars were easier to read sometimes.
- I am satisfied.
- Yes, just sometimes gets a bit overwhelming with a lot of homework and looking back at lecture videos.
- For some classes absolutely. For some of my others I feel like I have no idea of what is going on.
- Yes, it’s pretty much the same as regular online classes. I do not like the mandatory zoom meetings; it is nowhere near the same as attending f2f lecture. They are drawn out and I can’t focus
- I am satisfied with the syllabus my teachers have provided for us and if we have any questions about it, we can email them and they will reply when they can.
- for the most part
- The materials are typically good, but it's hard not to be overwhelmed with the mass quantities.

- It is helpful but we can have more
- Yes, I am satisfied. Although group work is challenging in an academic setting, it mimics the real world more than tests.
- I am satisfied with the syllabus and material for online classes.
- I am satisfied
- No. Most of the material in my graduate program has been reading and taking quizzes with the occasional publisher-provided PowerPoint. I can't perform well in master's-level finance and accounting courses without a lecture from the professor (I'd even be okay with a lecture they record and post on Blackboard). Very few do that. I'm paying for graduate-level instruction from professors at the University of Houston Clear Lake, not lectures from random professors found on YouTube that I can access for free. I feel as though I've been teaching myself the majority of my MBA coursework when I'm paying thousands of dollars for a professor to explain (lecture), but most don't do that for online courses.
- Yes, very satisfied
- Some were better than others.
- Yes, in SOME of my courses. It is evident when professors/adjuncts put time into ensuring that the syllabus and learning materials are relevant and current.
- They could be more detailed, with examples of what is not considered exemplary work submitted.
- No, I have been forced to teach myself as if they are not there for the most part.
- I am satisfied.
- Yes, I am satisfied
- For most teachers yes, some teachers are not specific enough though.
- Yes. They have been consistent.
- Yes, I am satisfied with the syllabus; however, buying or renting 3 books per course is a financial hardship right now.
- Mostly. However, it seems that online learning = self-teaching, as there is little to no direct instruction from instructors.
- It was always detailed and specific but hard to navigate.
- Depends on the teacher. Some feel like they are trying, which is better than not trying at all.
- I am satisfied, I sometimes wish more classes were asynchronous and allowed me to work on my own time
- I think most professors do a nice job
- I feel like since we're at home, I'm being assigned even more work than before.
- Mostly, yes. For all except one.
- No. I wish to see more professor-guided materials, like recorded lectures of the professors explaining the content of the course themselves, as opposed to self-study and student-guided learning.

- For the most part. Some professors do not include everything which makes it confusing.
- Yes, though I would like more study sessions integrated into the schedules
- No. I find that many of my professors are expecting the same amount or more work to be completed despite the pandemic. While they may be understanding, it is difficult to submit all of the work by the due date when my personal schedule and health vary weekly.
- No. I think they could go into further details about how to study the material across the internet and better prepare us for online examinations format.
- You get what you put into it, the material is the same there is just more reliance on your own self-motivation to research.
- Yes, everything is clearly laid out and follows a sufficient timeline. Things are adjusted if the class feels like there needs to be more or less time for a topic
- Yes, for the most part.
- I am satisfied with some of the syllabus, some professors are understanding and helpful while others are being even more rigid and tight with material.
- I am satisfied with the material and syllabus professors provide during online learning so long as they continue to post recordings of their lectures. I am not a fan of the policy that restricts students from recording lectures. This could be problematic for two reasons: 1. if a student cannot attend class for whatever reason, online classes allow for the flexibility of being able to watch recorded lectures rather than rely on scrappy notes from other classmates (professors should take advantage of that) 2. If there are issues involving the professor and students need to provide proof in order to receive any sort of credibility. I personally experienced a situation at the start of COVID-19 where a professor was saying extremely rude things to students in class, not allowing time for learning new concepts that were never initially addressed in the syllabus (students were required to do grad-level work in a 2000 level course), and requiring students to download questionable software onto their personal computers; and the only way for students to prove something was wrong was by being able to record and send in clips from lecture.
- yes, just some classes are better off being in person
- Yes. I am satisfied with the syllabus and material however teacher should use more tools available to make it more interactive.
- I'm ok with it
- Yes, although it would be nice to see more programs with recorded lectures or voice notes in slides
- Yes, they are generally very clear and detailed when explaining the expectations for class.
- I am very satisfied.
- More or less. I'd rather have more interaction with professors like live sessions using zoom and not only being online the whole time.
- Yes, my teachers are very supportive
- I had been lucky so far until this current semester. This one has been challenging because it seems that classroom timing for certain sections and what is covered in F2F timing is not lining up with the online timing, which is leading to some inconsistencies as to what is expected for knowledge and subsequently testing.

- I am satisfied with the material and syllabus that my teachers have prepare for online-learning.
- For the most part
- I am in an online program so there has been no change. Faculty vary greatly in their ability to construct an organized syllabus.
- Mostly
- I am fine with the material.
- Very satisfied with all but one professor's material, or lack thereof, provided during online learning.
- Most professors have prepared me for classes.
- yes, I feel like there is times I can feel extremely lost and get behind however I try my best to keep up
- Yes, I am satisfied.

APPENDIX E:

CONSENT FORM OF PARTICIPATION AND SURVEY QUESTIONS

Consent Form of Participation:

Title: A Mixed Method Study of the Impact of COVID-19 Pandemic on U.S. Students' Educational Attainment

Investigators:

Dr. Xiaojun (Gene) Shan, University of Houston – Clear Lake, Department of Engineering

Mohammadali Beheshti, University of Houston – Clear Lake, Department of Engineering

Key Information

The investigators mentioned above is conducting a research study about the impacts of the COVID-19 pandemic on the higher education in the United States. The purpose of this research is to better understand the factors and their impacts of COVID-19 pandemic on students' educational attainment in the higher education in the U.S. and possibly propose mitigation strategies to minimize the possible negative impacts. You can choose to participate in this research study if you are currently enrolled in a four-year academic institution in the U.S. and are 18 years of age or older, and reside in the U.S.

You might want to participate in this study if you would like to share your experiences during the COVID-19 pandemic. However, you might not want to participate in this study if you are uncomfortable with sharing your personal experiences or do not have the time to complete the survey (the survey takes approximately 5-6 minutes).

You cannot participate in this study if:

- You are not enrolled in in a four-year academic institution in the U.S.
- You are not 18 years of age or older
- You reside outside of the U.S.

This study has been reviewed and approved by an Institutional Review Board (IRB). An IRB is an ethics committee that reviews research with the goal of protecting the rights and welfare of human research subjects. Your most important right as a human subject is informed consent. You should take your time to consider the information provided by this form and the investigators, and ask questions about anything that you do not fully understand before making your decision to participate in the study.

You could stop participation at any time during the study. Your decision will not be held against you. You can ask any questions before or during the study.

This is an anonymous online questionnaire to assess the impact of different factors on educational attainment of the college students during the COVID-19 pandemic. It takes approximately 5-6 minutes to fill out the survey. We also ask, as you answer this survey, that you think of your study behavior before the COVID-19 pandemic. Our goal is to assess and compare study behavior during a normal time period and during the COVID-19 pandemic.

Participants will be presented with the informed consent form once they navigate to the study website. Participants will read the form and indicate that they consent by selecting the appropriate button that indicate they agree to participate in the study. The participants will not be able to proceed with the study until this has been completed. A link to the downloadable informed consent will be provided for participants to download and print the consent form.

A waiver of informed consent documentation is requested for all participants.

What will the Participants Do?

The participant will complete an online survey consisting of 20 questions with two open-ended questions by typing on a computer/tablet/small phone. The survey takes approximately 5-6 minutes.

Possible Benefits

There are no direct benefits for participating in this study. The general population of college students may benefit in the future from the information that is learned in this study. In particular, this study could help the school and policy makers to be aware of the consequences of the health disasters on educational achievement of the students and possibly develop mitigation strategies.

Possible Risks

This study is not expected to cause any additional risks beyond what you would normally experience in your regular daily life. Tasks will include answering survey questions by typing on a computer/tablet/small phone. Participants accessing the online survey via an unprotected wireless network are at greater risk of their confidentiality being compromised. We recommend using private computers to complete the survey. The raw data will never be published. Only analysis based on aggregated data may be published or presented.

Confidentiality

Your confidentiality will be kept to the degree permitted by the technology being used. No guarantees can be made regarding the interception of data sent via the Internet by any third party. NOTE: If participants choose to access an online survey via an unprotected wireless network, their confidentiality and data is more easily compromised. A statement about this risk is included within this informed consent form under “Potential Risks”. The investigators are committed to protecting your rights and privacy as a research subject. All electronic data collected from this study will be stored in a secure UHCL server for at least three (3) years after the end of this study.

The results of this research may be published and/or presented without naming you as a participant. The data collected about you for this study may be used for future research studies that are not described in this consent form. If that occurs, an IRB would first evaluate the use of any information that is identifiable to you, and confidentiality

protection would be maintained. However, no identifiable information will be retained or published in any manner as a part of this research.

While absolute confidentiality of your records cannot be guaranteed, the investigators will make every effort to protect the confidentiality of your records as described here and to the extent permitted by law. In addition, the following entities may have access to your records, but only on a need-to-know basis: the U.S. Department of Health and Human Services and the reviewing IRB.

How will Results be Used and Disseminated?

The raw data will be analyzed with R and python programming languages and the results will be used for reporting in a master's thesis of Ali Beheshti and possibly journal/conference publication and/or presentations. The raw data will never be published and all published analysis will be based on aggregated data without naming you as a participant.

Contact for Questions?

Questions about this research study or reports regarding an injury or other problem may be directed to Dr. Xiaojun (Gene) Shan at shan@uhcl.edu or Ali Beheshti at Beheshtim3216@uhcl.edu. Any questions you may have about your rights as a research subject or complaints about the research may be directed to the Committee for the Protection of Human Subjects at 281-283-3015 or sponsoredprograms@uhcl.edu.

Survey Questions.

Q1. **What is your major of study at UHCL?**
Q2. **What is your education status?**
- Undergraduate
- Graduate

Q3. **What is your gender?**
- Male
- Female
- Prefer not to say

Q4. **What is your age?**
- 18-21 years old
- 22-25 years old
- 26-29 years old
- 30-33 years old
- 34 and over

Q5. **What is your total household income?**
- Under $20,000
- $20,001 - $40,000
- $40,001 - $60,000
- $60,001 - $80,000
- $80,001 - $100,000
- $100,001 or over

Q6. **What devices mostly did you use for attending the online programs at UHCL?**
- UHCL computers
- Own Laptop or PC
- Tablet
- Smart Phone

Q7. **Did you experience physical health issues because of the spread of the COVID-19?**
- Yes
- No

Q8. **Did you experience mental health issues because of the spread of the COVID-19?**
- Yes
- No

Q9. **Did you experience taking care of a family member or a friend infected by COVID-19, which led to a decrease in your focus on studying?**
- Always
- Very Often
- Sometimes
- Rarely

- Never

Q10. **Did you experience any financial difficulty for attending UHCL during the COVID-19 pandemic?**

- Almost always
- Often
- Sometimes
- Seldom
- Never

Q11. **Did you experience or feel pressure about your grades among your peers during the pandemic?**

- Always
- Most of the time
- About half the time
- Sometimes
- Never

Q12. **Did you experience lagging behind the study because of COVID-19 during the pandemic?**

- Never
- Sometimes
- About half the time
- Most of the time
- Always

Q13. **Did transition from in-person to online-learning have adverse impacts on your grades?**

- Definitely
- Probably
- Neutral
- Possibly
- Definitely Not

Q14. **Did transition from in-person to online-learning effect (Increase) your anxiety and nervousness level?**

- Definitely
- Probably
- Neutral
- Possibly
- Definitely Not

Q15. **Has the amount of time that you spend on self-study changed because of the corona-virus epidemic?**

- Strongly increased
- Increased
- Stay constant
- Decreased
- Strongly decreased

Q16. **What were your GPAs in the last three semesters?**

- Fall 2019
- Spring 2020

- Fall 2020

Q17. **What effect has Interim grading policy (Satisfactory/Unsatisfactory Grade Policy) against a traditional letter grading scheme on your eagerness to study more?**

- Strongly increased
- Increased
- Stay constant
- Decreased
- Strongly decreased

Q18. **Did you experience a lack of self-regulation and self-motivation during the pandemic of COVID-19?**

- Extremely unlikely
- Unlikely
- Neither likely nor unlikely
- Likely
- Extremely likely

Q19. **Are you satisfied with the quality of information and service that UHCL provides for online learning during the lock-down of the school? (Please type your idea, at least in one sentence.)**

Q20. **Are you satisfied with the material or syllabus that teachers prepare for you during online- learning? (Please type your idea, at least in one sentence.)**

Q21. **Did you experience delayed feedback from your instructor that led to misunderstanding a part/s of the course?**

- Never
- Almost never
- Occasionally/Sometimes
- Almost every time
- Always

Q22. **According to the current pandemic of COVID-19, did you experience mental health issues?**

- Yes
- No

****The last question is repetitive (is paraphrased) just for finding the participants, who fill the survey carelessly (As an outlier)**