Doctoral School of Regional Sciences and Business Administration

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The Impact and Lasting Effects
of COVID-19 on Higher Education

Doctoral Dissertation

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Highlights of the Dissertation

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1.   Introduction

Higher education in the post W.W. II era has endured a plethora of challenges. Many of these challenges are related to evolving curriculums, re-defining admission policies, rising tuition costs, responding to social issues, job attractiveness its graduates, and how to appropriately adopt technology. These important issues have historically been addressed in a measured way and solutions were identified and implemented gradually over time. It was almost inconceivable before COVID-19 that the global education system could be ever shut down in a matter of days. Since March of 2020, however, higher education no longer has the luxury of taking gradual approaches as institutions all over the world were forced to teach exclusively online with available technology on nearly a moment's notice. Many students had to quickly learn how to learn online, and the classical control of classrooms was scattered into virtual fragments fronting unknown home environments. More than two years later, higher education, like all other industries, is trying to assess the true impact of COVID-19 and how to define the "new normal." While higher education has been remarkably resilient to rapid change in the past, it must now recognize that COVID-19 is the most disruptive force it has ever faced. The higher education institutions that can harness the power of data and technology to offer best education to the most students at the best prices will be the ones that will survive to see the next big challenge.

The purpose of my dissertation is to combine my literature review with the insight gained from teaching in the Spring 2021 and Fall 2021 semesters and the Lean Learn Academy to deliver meaningful recommendations to those currently involved in higher education. As higher education institutions look to the future, they need to recognize that the delivery and pedagogy of higher education in a post COVID-19 world must change to restore and maintain relevance. While hybrid learning has been frequently debated and yet used sparingly for decades, it is now becoming more of a necessity and less of a novelty in a world where future pandemics and geo-political events are a veritable certainty. My research provides credible evidence that hybrid learning represents a constructive compromise that can cost effectively create better learning outcomes for greatest number of students. This compromise is highly consistent with the shift to a hybrid work environment that enables workers to split time between the office and at home and online. There is growing evidence that supports the permanent transition to hybrid working environments and how hybrid learning in higher education is reflective of this trend. Technology in education has undoubtedly advanced significantly since the beginning of COVID-19, but technology itself is only the delivery mechanism. Better education must involve a pedagogy that uses technology to stimulate better and faster interaction between teachers, students, and both the private and public sectors. My research on high school entrepreneurship, using the Lean Learn Academy, provides compelling evidence regarding how activity-based learning is critical for relevant education in a post COVID-19 world that is characterized by rapid and unprecedented change and further supported by my own teaching experience in higher education. The relevance and cost of higher education are in serious question in a world still recovering from the COVID-19 pandemic, becoming transformed by

A.I. and automation, and now feeling the negative effects of a war in Ukraine. The days of incremental change are over and successful higher education institutions will need to use data, technology, activity-based teaching, and unwavering innovation to remain relevant in tomorrow's global economy.

1.1 Has COVID-19 Permanently Changed Higher Education?

Many prominent and well-respected individuals have predicted that higher education would be significantly disrupted by technology. The "founder of modern management," Peter Drucker, famously predicted in 1997 that "big university campuses will be relics" and that "the future is outside the traditional campus, outside the traditional classroom" (Drucker, 1997). Clayton Christensen was a prominent Harvard professor and creator of the widely acclaimed "disruptive innovation" theory. In his work "The Innovative University: Changing the DNA of Higher Education from the Inside Out" (2011), Christensen argued higher education would be transformed by technology. While technology has certainly played an increasingly larger role in higher education leading up to its global shutdown on March 11th, 2020, its adoption was more of a choice than a mandate. The COVID-19 pandemic has uniquely become the first crisis in history that forced educators on all levels worldwide to use technology to keep teaching. By April of 2020, schools, and universities in 191 countries were closed affecting more than 1.5 billion students and approximately 90% of total enrolled learners (UNESCO, 2020). Once educators realized that COVID-19 was not going to be transient, emergency remote teaching (ERT) was the only viable option. ERT can be defined as temporary shift to an alternative teaching method due to circumstances that make traditional teaching untenable such as disasters, wars, and disease outbreaks. This sudden shift to online teaching caused significant stress and anxiety for teachers, students, and administrators as their primary goal was to just "get online" and the quality of learning outcomes was a distant second. Unlike during previous decades and disruptions, there were no other options to consider or debate.

COVID-19 was an unprecedented, global crisis and education on all levels is still trying to assess its impact and understand its lasting effects. As one can clearly see from the history of higher education, disruptions and challenges have always existed and overcome. Technology has not transformed higher education despite very credible people making powerful cases for it. As education returns to normalcy, however, there are so many questions that remained unanswered in the wake of a global pandemic and whether COVID-19 will "this time" truly usher in the long-anticipated era of disruptive change in higher education. Using my literature review and research, I will argue why COVID-19 represents a point of no return for higher education.

The main pillars of this dissertation seek to answer the following research questions:

RQ1: What was the impact of COVID-19 lockdowns and emergency remote teaching (ERT) on higher education students during the Spring 2021 semester?

RQ2: How did online learning during the COVID-19 lockdowns affect the sentiments of higher education students towards the usage of technology in education and what is the significance of remote learning sentiment?

RQ3: Did the return to the classroom during the Fall 2021 result in improved student learning sentiment and lower burnout for higher education students?

I will also deliver my own recommendations in Chapter 8 regarding how higher education institutions can successfully adapt the "new normal."

1.2. Problems identified during the literature review, data collection and gap analysis

The impact of the COVID-19 pandemic is a topic that will be researched for many years to come. The challenge of conducting research during the COVID-19 pandemic involved how to properly design and execute research during such a chaotic period. One big advantage I had from the beginning was my access to a diverse group of international students and did not have to rely exclusively on students from a single university. I consider this to be a significant gap that my research is able to fill.

1.21 Spring 2021 Surveys

Since the conditions during COVID-19 were evolving so quickly, I felt it was imperative to conduct surveys both at the beginning (BOS) and the end (EOS) of the Spring 2021 semester. I consider this to be a research gap as most of the research conducted during COVID-19 did not consider how quickly the conditions were evolving. The Spring 2021 BOS survey provides insight both from the beginning of the Spring 2021 semester and from previous semesters (Fall 2020, Spring 2020) that were affected by COVID-19 to different degrees. The Spring 2021 BOS and EOS surveys were designed to gather data on a wide variety of topics that included technology, home environments, quality of education, and the emotional states of students during the pandemic (Appendix I).

The students in the Spring 2021 surveys were also given the opportunity to respond to free answer questions. I realized that my ability to ask the right questions was limited due to the pace of change that was occurring during COVID-19 and the research needed to include the voices of students. My research is one of the few to use free answer data, which has proved to a useful complement to my quantitative, survey-based research. Once again, I think this is another significant gap that my research was able to address.

Using my Spring 2021 research, I published the journal article entitled "Holistic Online Learning in a Post COVID 19 World" in the Acta Polytechnica Hungaria Journal of Applied Sciences and the journal article entitled "The Influence of COVID-19 on Sentiments of Higher Education Students – Prospects for the Spread of Distance Learning" in the Journal of Economics & Sociology.

1.2.2 Fall 2021 Surveys

Using feedback from the Spring 2021 survey, the Fall 2021 BOS and EOS surveys were extended to include questions related to self-efficacy, resilience, and burnout. It was clear that the stress of COVID-19, home environments, and online learning was affecting all students to varying degrees. These surveys were designed to gain insight about how student sentiments toward their education changed during this still turbulent period.

I published the journal article entitled "Student Burnout in Higher Education: From Lockdowns to Classrooms" in the Education Sciences Journal.

2.   Combined Research Methodology

To shed light on the current state of higher education and its future, the research presented in this dissertation addresses two main areas: education delivery and education pedagogy. Figure 1 offers a flow chart summarizing the flow of this combined research.
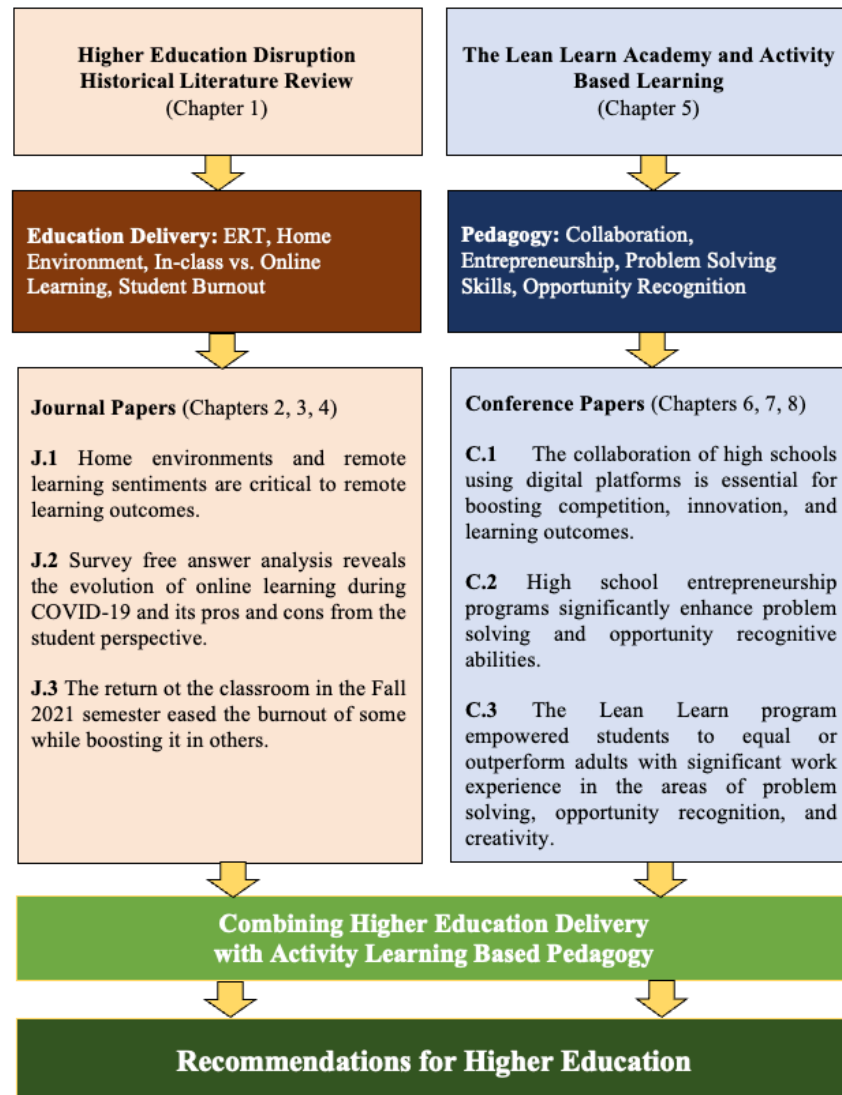

Figure 1: Combined research flow chart

2.1   Higher education delivery

Since the conditions during COVID-19 were evolving so quickly, I felt it was imperative to conduct surveys at the beginning (BOS) and the end (EOS) of the Spring 2021 and Fall 2021 semesters. The BOS surveys provide insight both from both the previous and beginning of that semester.

Using feedback from the Spring 2021 survey, the Fall 2021 BOS and EOS surveys were extended to include questions related to self-efficacy, resilience, and burnout and conducted a during BOS and EOS. It was clear that the stress of COVID-19, home environments, and online learning was affecting all students to varying degrees. These surveys were designed to gain insight about how student sentiments toward their education changed during this turbulent period. Figure 2 shows the flow of research and publishing activities from my higher education experience.
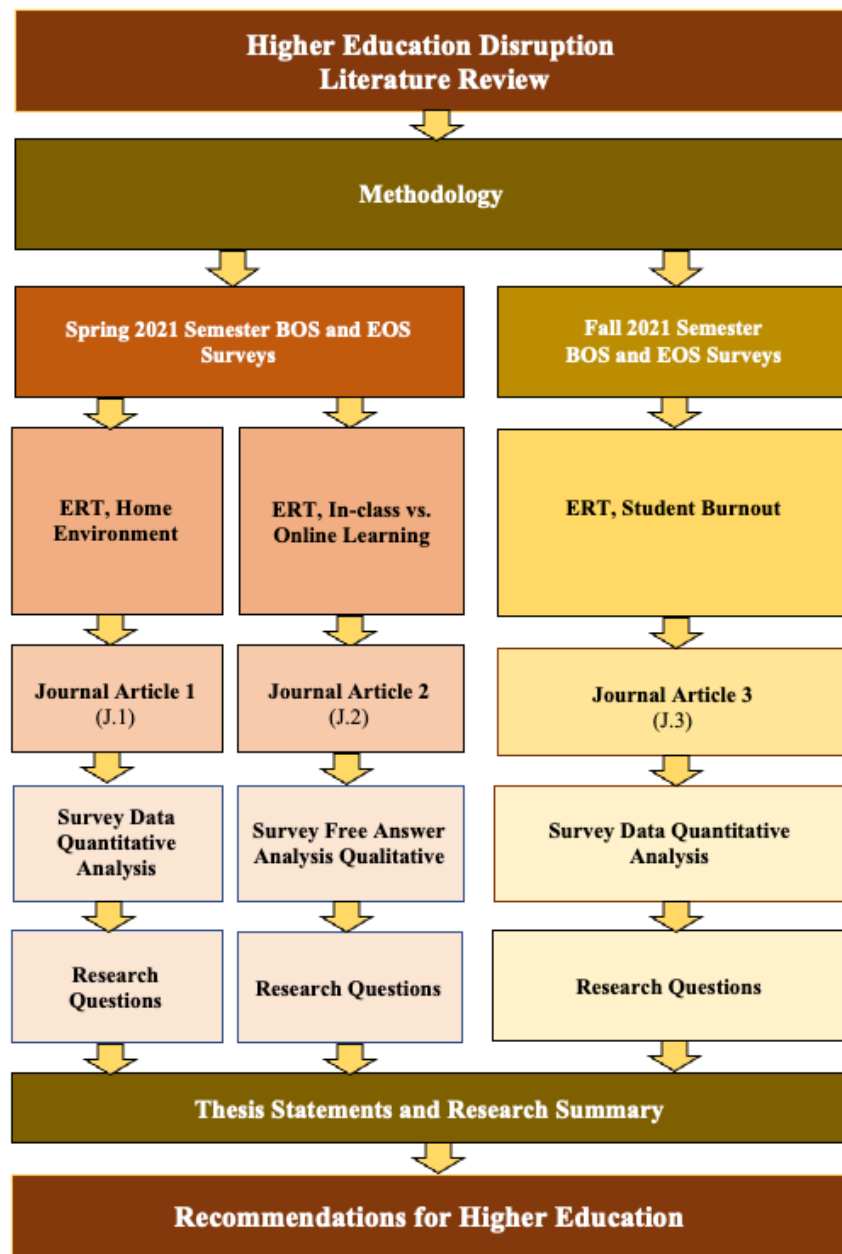
Figure 2: High Education Research Flow Chart

2.2 Higher education pedagogy

The Lean Learn Academy began working with Hungarian high school students in September of 2019 and I published three conferences papers based on this experience. Please refer to Figure 3 for a research flow chart.
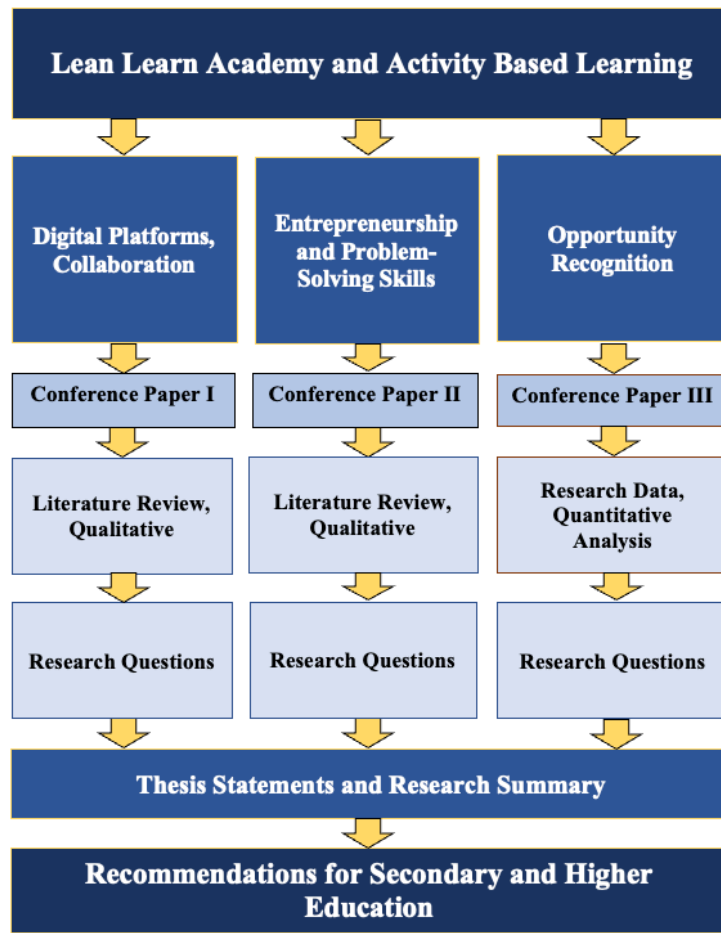
Figure 3: Lean Learn Academy and Activity Based Learning Research Flow Chart

3. Papers included and contribution

My dissertation includes the following journal articles:

J1: "Holistic Online Learning in a Post COVID 19 World"

COVID-19 had the unprecedented effect of higher education institutions losing control of student learning environments. The results indicate that the home environments of higher education students in the beginning of the semester had a detrimental effect on the learning outcomes of many students. Distractions at home, staying motivated, and difficulties with keeping a daily routine were commonly cited. It is important to recognize that the students with lower remote learning sentiments were predominantly less satisfied with their home environments. In contrast, students who had higher remote learning sentiments were also ones who experienced less difficulties with their home environments. Overall, my research indicates that most students rejected the statement that they were learning more online than in the classroom. While emergency remote teaching (ERT) was necessary to keep education flowing during a health crisis, high education institutions must recognize that home environments and remote learning sentiments are critical indicators of how well a student will learn remotely.

J:2 "The Influence of COVID-19 on Higher Education Student Sentiment - prospects for the spread of distance learning technologies"

A student's remote learning sentiment is a function of a multitude of factors. COVID-19 amplified many of these factors and created new ones fueled by unprecedented health issues. To better understand how students viewed their education during the Spring 2021 semester, they were asked to freely express what they like about online learning and what its biggest challenges are both at the beginning and end of the semester. These responses were then interpreted and coded for analysis. The free answer data revealed a mixed picture of online learning student sentiment. While the comforts, time, convenience, and cost benefits of learning from home were frequently and positively mentioned, the negative impact of distraction in the home environment were also frequently mentioned. The free answer data from the Spring 2021 semester clearly shows that there is a polarization of remote learning sentiment where many students either embrace online learning or reject it altogether. This helps to explain why many students responded favorably to hybrid learning as a compromise to exclusive in-class and online learning.

J:3 "Student Burnout in Higher Education: From Lockdowns to Classrooms"

It was fascinating to observe that the return in the classroom during the Fall 2021 semester increased the burnout symptoms of students with a higher remote learning sentiment and lowered the burnout symptoms of the students with a lower remote learning sentiment. The students who valued the comfort and convenience of learning at home found the return to the classroom to be stressful and inconvenient. The students who struggled with the distractions, technical issues, and social isolation of at home learning were elated to return to the classroom and in-person driven, administrative system. A polarization is once again observed where burnout symptoms were both enhanced and relieved by the return to the classroom, the opposite of what was observed in the beginning of Fall 2021 semester where online learning had the opposite effect. These results again underscore how hybrid learning is the most feasible compromise for students who have diverse learning sentiments.

My dissertation includes the following conference papers:

C:1   *"Digital Platforms Significantly Enhance High School Entrepreneurship Programs by Enabling Coaching, Collaboration, and Competition"*

The purpose of this conference paper was to suggest that digital platforms connecting high school programs within countries and between countries is a cost-effective way to promote coaching, collaboration, and competition as is often seen in sports.

C:2   *"Entrepreneurship in Hungarian High Schools and its Positive Impact on Problem-Solving"*

As a solution to the growing job skills gap, this paper outlines how the Lean Learn Academy will create a program to enhance the problem solving and opportunity recognition skills of Hungarian high school students and compare those skills to adults with higher education degrees and significant work experience.

C3: *"The Impact and Urgency of Teaching Opportunity Recognition to High Schools Students"*

This paper is based on a unique methodology that directly compared the progress of active students in the Lean Learn Academy with the skills of adults with significant age and work experience advantages. In the three core areas of opportunity recognition, minimum viable product construction, and creativity.

The research questions and conclusions for the three journal articles are summarized in Table 1.

Table 1: Summary of the research questions presented in the doctoral thesis

	Research questions from journal papers	**Conclusions**
J.1[1] **R.1.1**	Was the level of home and social disruption for university and graduate students significant during the Fall 2020 semester?	The effects of COVID-19 lockdowns did increase home and social disruption for university and graduate students significantly during the Fall 2020 semester.
J.1 **R.1.2**	Did home and social disruption for university and graduate students become more significant during the Spring 2021 semester?	While level of home and social disruption was significant during the Spring 2021 semester where COVID-19 lockdowns were the norm, professors and students gained experience and became better able to adapt to online learning.
J.1 **R.1.3**	Did the usage of emergency remote learning impact the quality of education in the Spring 2021 semester?	The level of home and social disruption did become more significant in some areas, while other areas showed signs of improvement as professors and students gained experience and became better able to adapt to online learning.
J.2 **R.2.1**	Can the collection and analysis of use of free answer data provide valuable insight into higher education student sentiment?	During particularly turbulent periods, like the COVID-19 pandemic, the student sentiment toward their education can change dramatically and analyzing free answer data is a valuable way for higher education to better understand how to appropriately adapt.
J.2 **R.2.2**	Will the data from the free answer questions during the Fall 2020 and Spring 2021 semesters show significant changes in student sentiment towards online learning?	The free answer data does reveal significant swings in student sentiments in some areas while other areas remained largely constant.
J.2 **R.2.3**	Considering COVID-19 disruption, does student sentiment indicate that technology will play a larger role in higher education in the future?	The free answer data clearly indicates that students have become more comfortable with using technology in their education and overwhelmingly support the use of "best in class" technology both with in-class and online learning.
J.3 **R.3.1**	Will the COVID-19 lockdowns during the Spring 2021 semester negatively and disproportionately affect the burnout of higher education students with lower remote learning and home environment sentiments?	The research data clearly indicates that students with lower remote learning sentiments were far more likely to suffer from burnout symptoms.
J.3 **R.3.2**	Will the return to the classroom during the Fall 2021 semester positively impact the burnout of students who struggled with remote learning?	The research data shows that the students who suffered burnout when learning exclusively online were far less likely to experience burnout symptoms when returning to the classroom. The research data also revealed that students who were comfortable learning online were far more likely to experience burnout symptoms when returning to the classroom.
J.3 **R.3.3**	Was the level of a student's self-efficacy significantly and negatively correlated to burnout during the Spring 2021 and Fall 2021 semesters?	In the beginning of the Spring 2021 semester, self-efficacy was significant and negatively correlated with burnout. At the end of the Spring 2021 semester, self-efficacy became less important for students with low remote sentiments while students with higher remote sentiments reported lower levels of self-efficacy due to their unhappiness when returning to the classroom.

The research questions and conclusions for the three conference papers are summarized in Table 2.

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[1] Journal Article 1, Research Question 1

Table 2: Research Questions and Conclusions from Conference Papers

	Research questions from conference papers	Conclusions
C.1[2] **R.1**	Are digital platforms essential for high school entrepreneurship programs by enabling coaching, collaboration, and competition?	Coaching, collaboration, and competition are essential for high entrepreneurship programs and cannot be developed in isolation without interconnected digital platforms.
C.2 **R.1**	Can the Lean Learn Academy significantly enhance the problem-solving skills and opportunity recognition of Hungarian high school students?	See CP3.
C.3 **R.1**	Can the Lean Learn Academy significantly enhance the problem-solving skills and opportunity recognition of Hungarian high school students?	The Lean Learn Challenge proved that high school students, under the same test conditions, can equal or outperform adults with significant work experience in the areas of problem solving, opportunity recognition, and creativity.

4.   Recommendations for Higher Education

Based on the findings of my research, I offer the following recommendations to higher education institutions:

4.1   *The Relevance of Higher Education*

a) A.I. and automation are transforming global business faster than governments, education institutions, and businesses can notice. The skills of the future are constantly be redefined and all higher education institutions must constantly review and adapt their curriculums to ensure that their customers (the students) are prepared and able to take advantages of opportunities in the present and future. The data required for these adaptations is covered in recommendation 5.

b) Secondary and higher education need to collaborate with each other to facilitate the production of entrepreneurial skilled workers that are essential for the creation of high growth enterprises (HGEs) and a source of innovation in existing ones.

c) Higher education institutions must create and maintain a dialogue with both private and public organizations both domestically and internationally to understand what skills education focus on to avoid the creation of job skill gaps.

4.2   *Blended Learning in Higher Education*

a) In a world that is changing rapidly, blended learning creates the connection between the lessons in and class and the relevance of these lesson out of the class. Higher education institutions should avoid the over-reliance on dated learning materials and use cases that hold little real-world value.

b) Higher education institutions should invest in better in-class technology to facilitate blended learning and create the sharing of "best practices" amongst all faculty members through workshops and scheduled in-class visits.

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[2] Conference Paper 1

4.3   *The Personalization of Higher Education*

a) Higher education institutions must find a working balance between collecting data and in-class experiences to create personalized learning experiences.

b) Higher education institutions must avoid "once size fits all" learning experiences that fall into "value trap."

c) While personalized learning is often associated with collecting and analyzing data, there is no substitute was an interactive, in-class experience where students are forced to leave their "comfort zones."

4.4   *Hybrid Learning in Higher Education*

a) Acknowledge the permanent role of technology in higher education and that this role will only become more prominent.
b) Prepare faculty, students, and administrators for further instructional disruptions by requiring that all courses should have a minimum level of hybrid learning (i.e., 20%).
c) Apply technology seamlessly between in-class and online learning in an omnichannel like approach.
d) Identify academic disciplines that require different levels of hybrid learning.
e) Determine the appropriate balance of in-class and online learning for each academic discipline and regularly revise these levels based on recent and relevant data.
f) Quantify how much cost savings can be achieved using hybrid learning while always seeking to improve and never lower academic standards.
g) Recognize that adapting to the disruption accelerated by COVID-19 is mandatory and no longer optional.
h) For higher education institutions offering significant amounts of on-campus learning, hybrid learning is the goldilocks solution in terms of maximizing learning outcomes while minimizing costs.

4.5   *Activity and Reflective Based Learning in Higher Education*

a) Recognize that if the world has changed substantially since 2019, higher education pedagogy must change even more and be forward looking.
b) Give students the opportunity to participate in the creation, delivery, and feedback of course materials.
c) Continually measure and monitor the effectiveness of ABL delivered online and compare it to the learning achieved from in-class learning. Is there a gap? If, yes, how can this gap be quickly narrowed?
d) Educate with the understanding that students can learn as much from each other as from their professors and be dedicated to facilitating the transition from a professor centric to a more student centric education.
e) Consult regularly with industry professionals to ensure that the right education is being continuously based on the most relevant activities to avoid the higher education "value trap."
f) Use hybrid learning to enable both activity based and reflective learning.

4.6   *Data is the "New Oil" in Higher Education*

a) Higher education institutions must collect data earlier and more often to ensure the rapid spinning of their respective flywheels. Please see Figure 4.

b) Data should be continuously harnessed to spin the higher education flywheels faster and faster to facilitate personalized educational experiences for students, empower faculty to teach the most relevant subjects, and to harmonize administrative functions and eliminate cost drivers.

c) Higher education institutions should model themselves after digital platforms like Amazon, Apple, Google, Tencent, and Alibaba to create the flywheel effect across complicated organizational structures to facilitate collaboration, efficiencies, and innovation.

d) Create a culture that embraces the collection and sharing of data to maximize learning outcomes, lower costs, and increase job satisfaction amongst all faculties and staff.

e) Use the flywheel effect to build a bigger, better "tent" to connect and engage high schools, businesses, government agencies, and other key educational stakeholders.
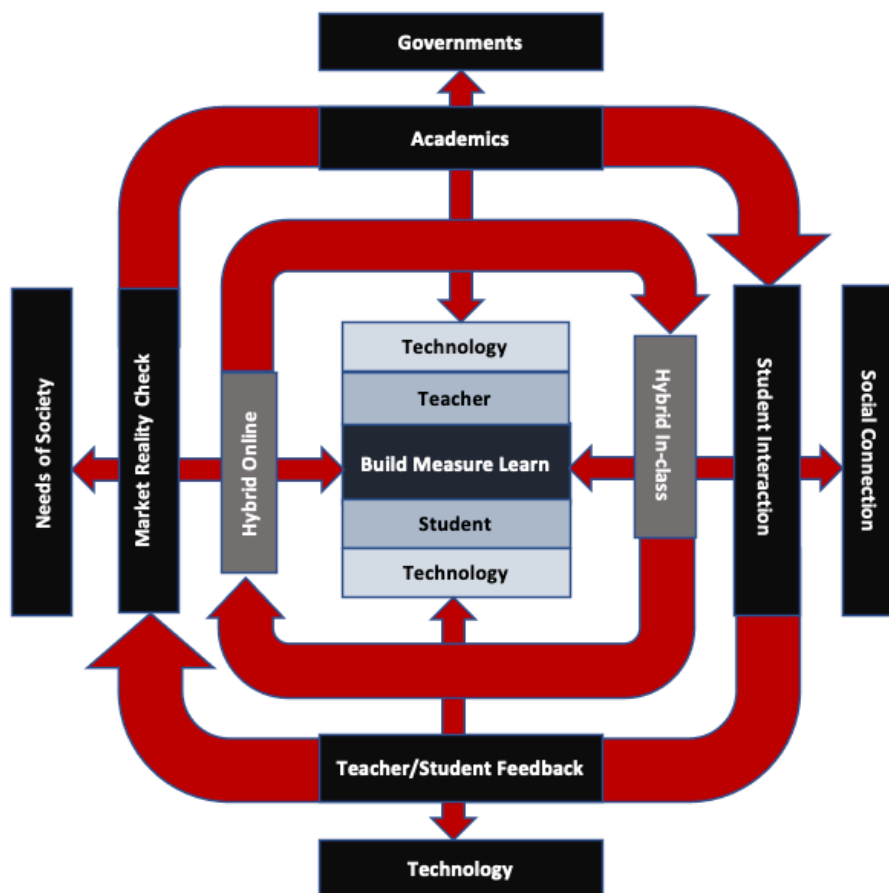
f) Never be satisfied with the status quo.

Figure 4: Higher Education Fly Wheel Model

5. Conclusion

While the COVID-19 pandemic closed the door on my high school entrepreneurship research, it opened the door to my research on higher education students during an unprecedented period of turmoil. The main purpose of my dissertation is to understand how significant the impact of COVID-19 was on higher education and estimate what its lasting effects will be. It should be noted that in my experience the Fall 2020 semester was a mix of in-class and online, the Spring 2021 semester was done entirely online, and the Fall 2021 semester was entirely done in classrooms. To understand and measure the pace of change during the early stages of the pandemic, I conducted surveys at the beginning and end of semesters. The data collection from four surveys (S.1, S.2, S.3, S.4)[3] allowed me to measure the change that occurred within the Spring 2021 and Fall 2021 semesters and the change that occurred between them.

The research for (**RQ1**) and (**RQ2**) can be found in journal article (**J.1**) (Chapter 2) entitled "Holistic Online Learning, in a Post COVID-19 World" and is summarized in Figure 5. This article conducted a quantitative analysis on the survey data collected at the BOS and EOS of the Spring 2021 semester. The research for (**RQ1**) can also be found in journal article (**J.2**) (Chapter 3) entitled "The Influence of COVID-19 on Sentiments of Higher Education Students – Prospects for the Spread of Distance Learning" and is summarized in Figure 6. This article conducted a qualitative analysis on the free answer data collected at the BOS and EOS of the Spring 2021 semester.

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[3] [3] S.1 = Spring 2021 BOS Survey, S.2 = Spring 2021 EOS Survey, S.3 = Fall 2021 BOS Survey, S.4 = Fall 2021 EOS Survey
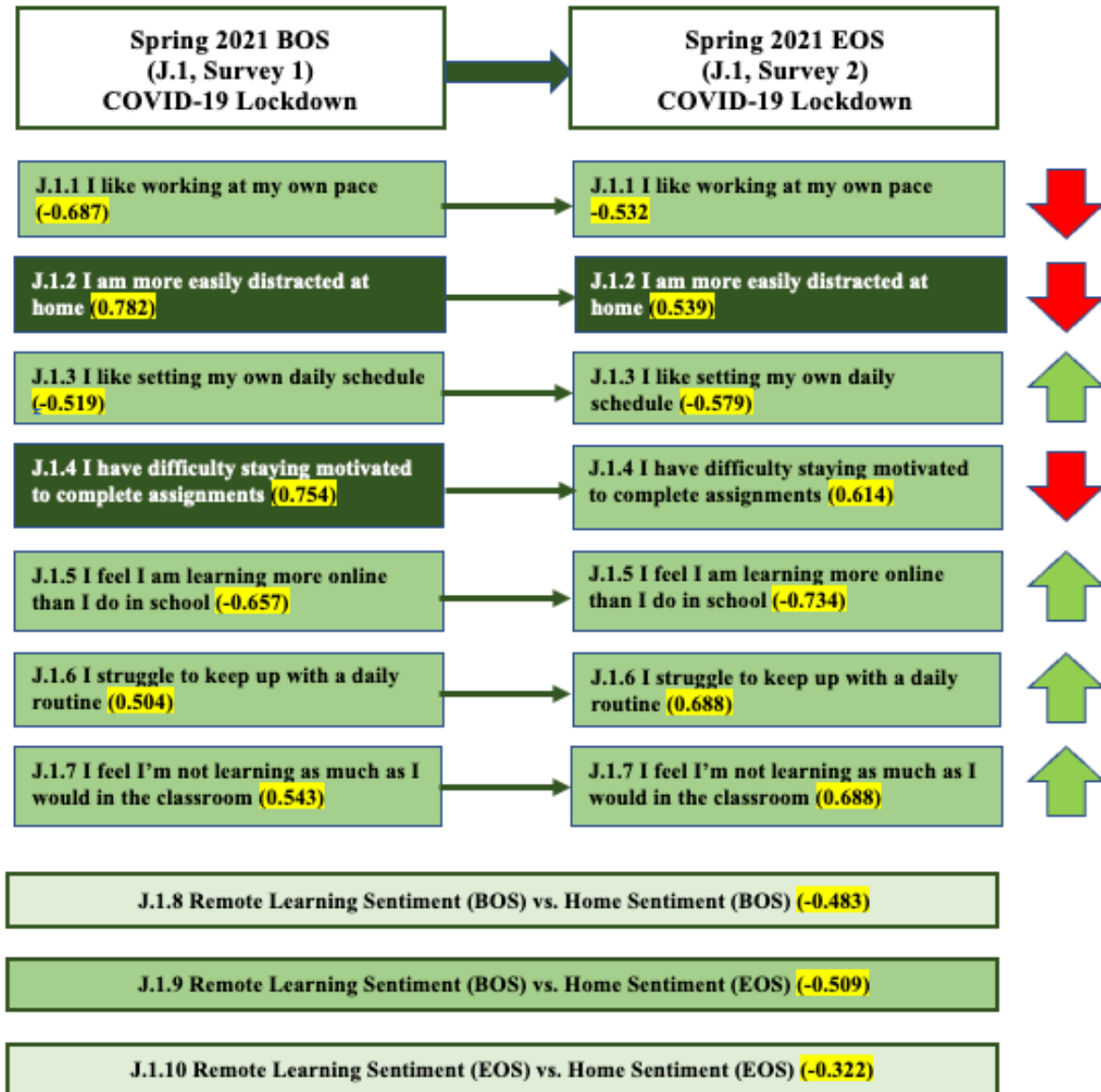
Figure 5[4] Summary of the shifts to student learning sentiment from **J.1.**

5.1   RQ₁: What was the impact of COVID-19 lockdowns and emergency remote teaching (ERT) on higher education students during the Spring 2021 semester?

When looking at the Spring 2021 BOS **J.1** data in Figure 5, it is evident that learning from home during a COVID-19 lockdown was significant shock for many students. Distractions at home were prevalent and many students struggled to maintain daily schedules and stay motived to complete assignments. These factors were certainly detrimental to learning outcomes.

The Spring BOS **J.2** data shown in Figure 6 corroborates the **J.1** findings and indicates that many students freely mentioned that they had trouble focusing while learning at home The ability to stay motivated was also frequently mentioned. Despite the challenging conditions at

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[4] BOS vs. EOS Home Environment Sentiment (Applied rotation method is oblimin.) Principal components analysis (PCA).

Values greater than 0.75 (> 0.75) are "strong" and "dark green." Values from 0.50-0.75 are "moderate" and medium green. Values from 0.30-0.49 are "weak" factor loadings and are light green.

the beginning of the Spring 2021 BOS, students also had quite a few positive things to say about learning from home. There were many students who appreciated the time saving, convenience, and cost saving of learning from home. Some students reported that they were getting more sleep and did not miss commuting back and forth to school. Other students liked the comforts of home and the ability to eat and drink whenever they wanted.

The Spring 2021 EOS **J.1** data indicates that distractions at home and staying motivated became less of a factor at the end of the semester but remained significant. Problems with setting daily schedules and routines became more pronounced at the end of the Spring 2021 semester reflecting that many students missed the structure and organization provided by attending school in-person.

The Spring EOS **J.2** data showed some significant changes from the BOS data. Positive mentions of the time savings, convenience, and cost savings of learning home from fell significantly during this semester. Fewer students positively mentioned their home environment, while mentions regarding the negative impact of online learning on personal lives remained unchanged.

Higher education institutions traditionally create physical spaces that are controlled and optimized for learning. This includes the infrastructure of the classrooms, meeting areas, and offices of faculty members and administrators. Professors can physically see their students in classrooms and know who is there and who isn't. This contrasts with online sessions where digital boxes using Zoom or Teams may or may not have a student behind them. During the rapid move to emergency remote teaching (ERT), the control of the learning environment was transferred to the students. Problems with home environments included distractions at home, poor Internet connections, slow computers, bad furniture and lightning, inadequate heating and cooling, and the list goes on and on. The learning outcomes of higher education students during the Spring 2021 semester were clearly negatively affected by the fact that learning environments that were no longer controlled by higher education institutions and many students did have the resources or motivation to maintain their own learning environments at home. Successful online teaching must include an understanding about the limitations of home environments and the factors that can negatively affect learning outcomes.
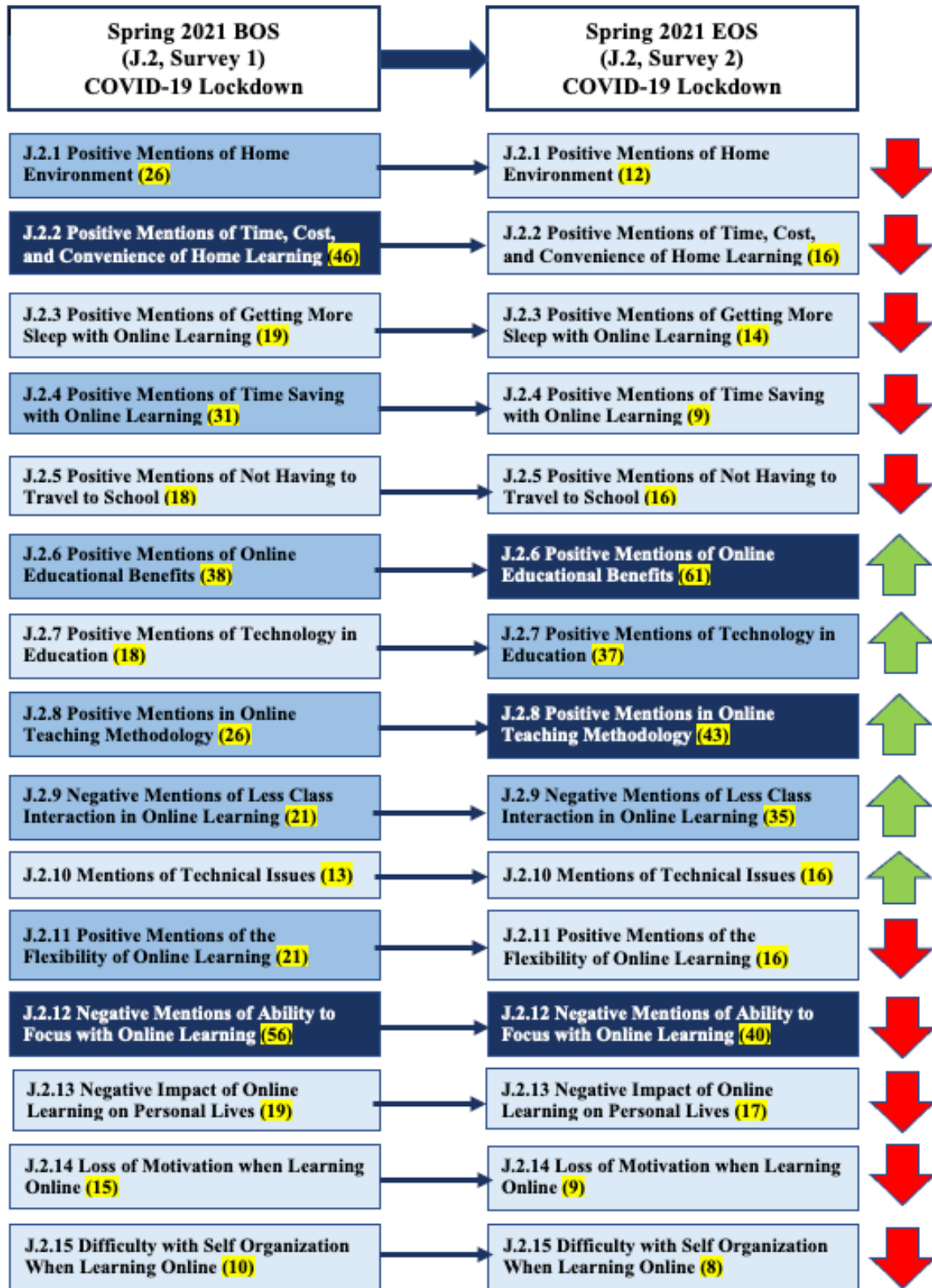
Spring 2021 BOS (J.2, Survey 1) COVID-19 Lockdown	Spring 2021 EOS (J.2, Survey 2) COVID-19 Lockdown	
J.2.1 Positive Mentions of Home Environment (26)	J.2.1 Positive Mentions of Home Environment (12)	↓
J.2.2 Positive Mentions of Time, Cost, and Convenience of Home Learning (46)	J.2.2 Positive Mentions of Time, Cost, and Convenience of Home Learning (16)	↓
J.2.3 Positive Mentions of Getting More Sleep with Online Learning (19)	J.2.3 Positive Mentions of Getting More Sleep with Online Learning (14)	↓
J.2.4 Positive Mentions of Time Saving with Online Learning (31)	J.2.4 Positive Mentions of Time Saving with Online Learning (9)	↓
J.2.5 Positive Mentions of Not Having to Travel to School (18)	J.2.5 Positive Mentions of Not Having to Travel to School (16)	↓
J.2.6 Positive Mentions of Online Educational Benefits (38)	J.2.6 Positive Mentions of Online Educational Benefits (61)	↑
J.2.7 Positive Mentions of Technology in Education (18)	J.2.7 Positive Mentions of Technology in Education (37)	↑
J.2.8 Positive Mentions in Online Teaching Methodology (26)	J.2.8 Positive Mentions in Online Teaching Methodology (43)	↑
J.2.9 Negative Mentions of Less Class Interaction in Online Learning (21)	J.2.9 Negative Mentions of Less Class Interaction in Online Learning (35)	↑
J.2.10 Mentions of Technical Issues (13)	J.2.10 Mentions of Technical Issues (16)	↑
J.2.11 Positive Mentions of the Flexibility of Online Learning (21)	J.2.11 Positive Mentions of the Flexibility of Online Learning (16)	↓
J.2.12 Negative Mentions of Ability to Focus with Online Learning (56)	J.2.12 Negative Mentions of Ability to Focus with Online Learning (40)	↓
J.2.13 Negative Impact of Online Learning on Personal Lives (19)	J.2.13 Negative Impact of Online Learning on Personal Lives (17)	↓
J.2.14 Loss of Motivation when Learning Online (15)	J.2.14 Loss of Motivation when Learning Online (9)	↓
J.2.15 Difficulty with Self Organization When Learning Online (10)	J.2.15 Difficulty with Self Organization When Learning Online (8)	↓

Figure 6[5]: Summary of the shifts to student learning sentiment from **J.2.**

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[5] Students who participated in both BOS and EOS surveys, answering what are the top three things they like the most of online learning and what are the three biggest challenges of learning online (n=83). 0-20 mentions = weak, 21-40 mentions = moderate, 41+ = strong.

5.2 **RQ2:** How did online learning during the COVID-19 lockdowns affect the sentiments of higher education students towards the usage of technology in education and what is the significance of remote learning sentiment?

On one side, the Spring 2021 **J.1** shows that many students expressed an even stronger sentiment at the end of the semester that they were learning less online than in classrooms. Mentions of lower-class interactions fell during this semester but remained significant. On the other side, the Spring 2021 **J.2** data shows a significant rise in the number of positive mentions technology in education, online educational benefits, online teaching methodology, and online learning flexibility.

The **J.1** data also shows that remote learning sentiment was significantly and negatively correlated with home environment sentiment both in the Spring 2021 BOS and EOS. Students who had higher remote learning sentiments were less likely to experience problems with their home environments. This correlation will be affirmed later by the **J.3** Fall 2021 data.

Overall, a positive shift in student sentiment towards online learning can be observed. It is evident that teachers were able to teach more effectively online, and students became more able to learn effectively online during the Spring 2021 semester. It is reasonable to conclude that the remote learning sentiment for many students increased during the Spring 2021 semester. As it was mentioned in the recommendations, higher education institutions must recognize that COVID-19 facilitated change at a rapid pace and this change will be felt for many years to come as educators seek to define the elusive "new normal."
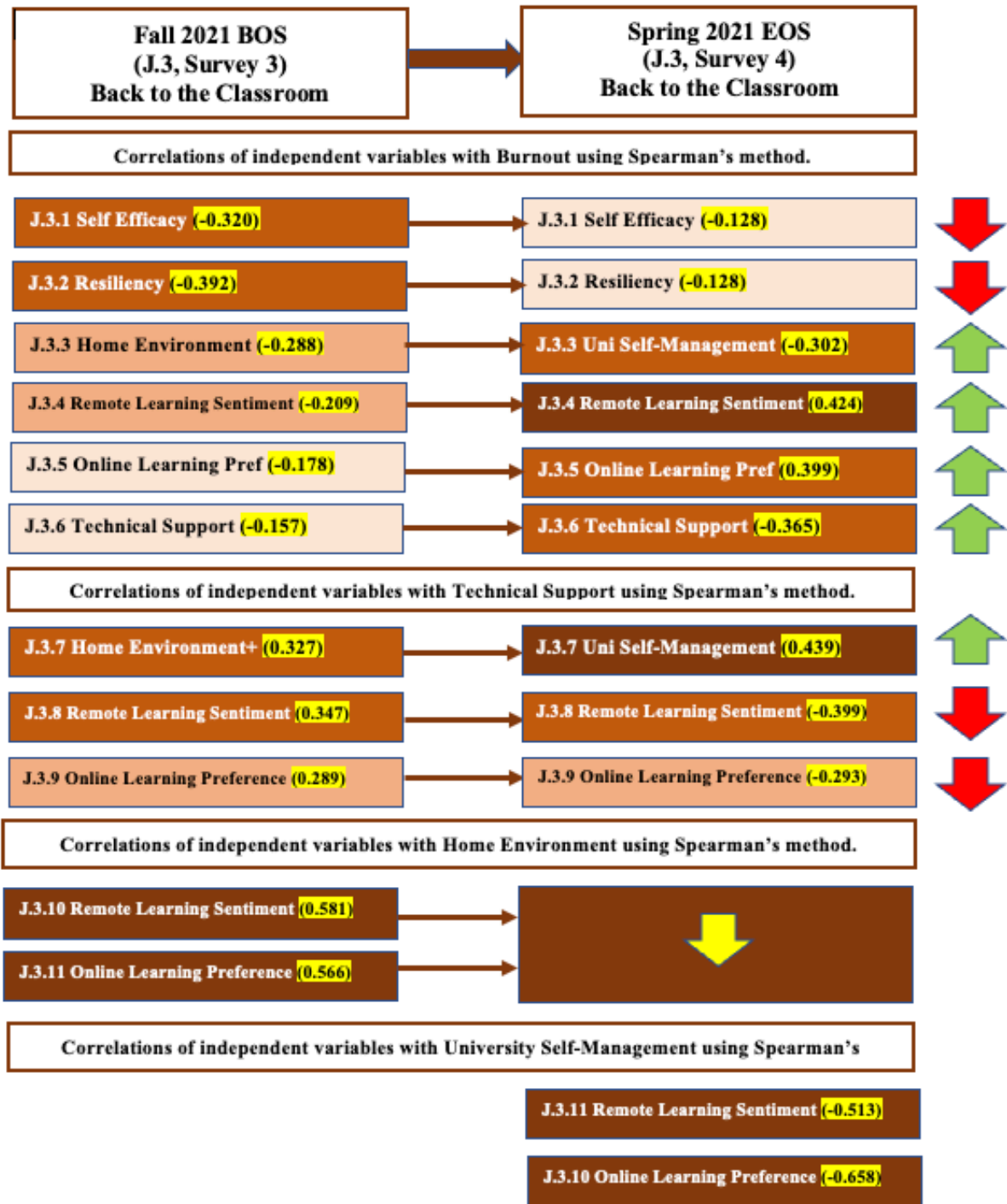
Figure 7[6]: Summary of the shifts in student burnout from **J.3.**

5.3   RQ₃: Did the return to the classroom during the Fall 2021 result in improved student learning sentiment and lower burnout for higher education students?

The Spring 2021 BOS **J.3** data (Chapter 4) in Figure 7 describes a semester where students returned to the classroom following a semester of total lockdown. In the Fall 2021 BOS, self-efficacy and resiliency were significantly, negatively correlated with burnout. This means that students with high self-efficacy and/or resiliency were less likely to experience burnout symptoms.

Consistent with the Spring 2021 research, remote learning sentiment in the Fall 2021 BOS is significantly, negatively correlated with home environment (+), meaning that the higher a student's remote learning sentiment the more likely they will positively view their home environments. Similarly, we can see a strong, negative correlation in the Fall 2021 BOS between online learning preference and home environment (+).

The Fall 2021 EOS J.3 data, however, tells a very different tale than the one presented in the Fall 2021 BOS. While self-efficacy and resiliency became less negatively correlated with burnout, remote learning sentiment went from negatively correlated to significantly, positively correlated to burnout. Online learning preferences also became positively correlated with burnout, while it was negatively correlated in the Fall 2021 BOS. As students returned to the familiarity of the classroom and a learning environment controlled by the university, their reliance on self-efficacy and resiliency lessened. It is very interesting to observe that those with higher remote learning sentiments went from being well adapted to online learning to becoming far more likely to experience burnout symptoms as they returned to the classroom.

The role of home environment was replaced by "university self-management" during the Fall 2021 semester. While higher education institutions lost control of their learning environments during the Spring 2021 semester, they were able to regain control in the Fall 2021 semester. It is also interesting to observe that the correlation between technical support and remote learning sentiment was positive in the Fall 2021 BOS and yet turned negative in the Fall 2021 EOS. This means those who have higher remote learning sentiments were more likely to have problem with technical support after returning to the classroom. The correlation between home environments and remote learning sentiment also went from being positively to negatively correlated between the Fall 2021 BOS and EOS indicating that those who were happy with online learning were not happy with "university self-management" and the services it provided.

The return to the classroom significantly lowered the likelihood of burnout symptoms for some students while simultaneously raising it in others. This represents the opposite of what the data showed in the Spring 2021 semester where those with higher remote learning sentiments were far more likely to view their home environment positively. As I mentioned in my recommendations, high education institutions must constantly gather data to be able to identify and respond to the diverse needs of their students.

5.4   The Big Picture

Peter Drucker once commented that "Knowledge has to be improved, challenged, and increased constantly, or it vanishes." While the COVID-19 pandemic has created unprecedented challenges, it has also forced higher education institutions to reevaluate the learning process and recognize that a return to a pre-pandemic status is not possible. As I have

mentioned in my recommendations (Chapter 8), manageable compromises needed to be made so that education can remain relevant with the needs of society at a competitive price.

5.5   Study Limitations and Future Work

An unfortunate limitation of my research is that the research topic addressed in my conference papers is not the same as the one addressed my my journal articles. Limitations found in my journal articles include the fact that I was the only one teaching these classes. Research collected from other instructors and academic disciplines would add diversity and reliability to my research. Larger sample sizes would have also added greater depth in my analysis. In **J.2**, the coding of the free answer responses of students required applying my judgement therefore includes a measure of bias. In **J.3**, I selected certain items from the Maslach Burnout Inventory (MBI) and the Connor–Davidson Resilience Scale were selected, while others were omitted. While I did this to ensure my surveys did not exceed a certain length, this selection resulted in a divergence from thoroughly tested models.

My future work is related to researching how higher education can be more personalized to account for students who have different learning capabilities, technical skills, levels of education, and cultural backgrounds. Creating and updating individual student burnout profiles is potentially a great way for higher education institutions to better understand each unique group of students and how to adjust education to maximize learning outcomes. More burnout research needs to be conducted to help shape and define this methodology. Research on hybrid and blended learning would also allow me to provide a framework to educators regarding how to create the right balance between online and offline and the optimal way to use technology inside and outside of the classroom. Finally, to conduct research about how to connect grade schools, high schools, higher education, and the private and public sectors so the needs of society are being addressed and supported by education on all levels.

6.   References

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