ABSTRACT

Title of Dissertation: A SOCIOLOGICAL ANALYSIS OF THE IMPACT OF ONLINE EDUCATION ON COMMUNITY COLLEGE COMPLETION: A CASE STUDY OF MONTGOMERY COLLEGE IN MARYLAND

Shinta Herwantoro Hernandez
Doctor of Philosophy, 2021

Dissertation directed by: Dr. Jeffrey Lucas
Department of Sociology

Community college completion is a top priority throughout the U.S. and particularly in the State of Maryland where the College and Career Readiness and College Completion Act (CCRCCA) was passed in 2013. To increase college completion rates, many community colleges throughout the state have prioritized online education by incorporating it into their institutional strategic plans. In doing so, higher education institutions in the state strive to lower social problems associated with college dropout rates, such as limited job or career opportunities, lower earning potential, increased unemployment, greater food and housing insecurity, and decreased community bonds. With more students enrolled in online courses, especially in community colleges, it becomes urgent to understand who is benefitting from online learning and who continues to experience challenges.

In an examination of online education at Montgomery College in Maryland, results from this dissertation show that the delivery of high quality online education can help increase college completion rates. While not statistically significant, the time

to completion for online students is 1.154 years less than fully face-to-face (F2F) students. Yet, middle income students graduate faster than their high income counterparts, Computer Science and Technologies students graduate faster than General Studies students, and online Computer Science and Technologies students graduate faster than their fully F2F counterparts.

On average, there was no significant difference in the average time to completion across five academic years for online and fully F2F students – 4.5 years. Also across this five academic year span, specific online groups – males, Blacks or African Americans, high income and low income students, and General Studies, Business, and Early Childhood Education Technology majors – experienced an average time to completion that was lower than that of their fully F2F counterparts.

The average time to completion at Montgomery College for online students exceeds that of fully F2F students after six online courses. However, for some online student groups – males, Blacks or African Americans, low income students, and Business majors – their time to completion is negatively impacted after 13 and 14 online courses, respectively. The research also suggests that the global COVID-19 pandemic has already positively influenced the way online education is delivered, the way instructors are trained, and the way students are engaged and learning at Montgomery College.

# A SOCIOLOGICAL ANALYSIS OF THE IMPACT OF ONLINE EDUCATION ON COMMUNITY COLLEGE COMPLETION: A CASE STUDY OF MONTGOMERY COLLEGE IN MARYLAND

by

Shinta Herwantoro Hernandez

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2021

Advisory Committee:
Professor Jeffrey Lucas, Chair
Professor Philip Cohen
Professor Patricio Korzeniewicz
Professor Wayne McIntosh
Dr. Michael Mills

# Dedication

I dedicate this dissertation to my husband, Rafael, and my two children, Kylie and Mason. Their endless support of my academic journey, personal growth, and professional development was the source of my motivation and inspiration. Without their eternal love and strong belief in me, this entire chapter of my life – the Ph.D. – would have never been possible.

I also dedicate this achievement to my parents, Hank and Juliati, who sacrificed so much so that I can have what I need and want to succeed in life. I trust my father is looking down from Heaven and smiling because his only child has made it this far.

# Acknowledgements

I thank my dissertation advisor, Jeffrey Lucas, for the mentoring and guidance he gave me throughout the dissertation. I am grateful for the support he provided to get me to where I am today. I also thank Philip Cohen, Patricio Korzeniewicz, Wayne McIntosh, and Michael Mills for serving on my dissertation committee and for providing their insights to help me advance in this work.

I also want to thank my colleagues at Montgomery College, specifically Michael Mills, Eric Benjamin, Sanjay Rai, and DeRionne Pollard for their ongoing encouragement and moral support in getting me through the dissertation process. They never stopped believing in me, and for that, I am eternally grateful.

# Table of Contents

# List of Tables

# List of Figures

# List of Appendices

# Chapter 1: Introduction

*Online Education in the U.S.*

Online education[1] has been a significant part of the higher education storyline since the late 1990s. In a national effort to increase college accessibility, retention, and completion, online education can be viewed as one powerful answer. It has become a game changer in the landscape of higher education, and with technological advancements, it will continue making impressions in this industry. Gone are the days when conventional face-to-face[2] (F2F) lecture formats are the only acceptable methods of instructing students. Various course modalities have become the norm at many institutions, including asynchronous online, synchronous online, and hybrid or blended, among others. Many institutions have prioritized online education by including it in their institutional strategic plans. Among the different types of innovations in higher education is the growing use of emerging technologies to advance institutional missions and improve instructional efficacy. In 2011, 65 percent of institutions in the U.S. reported that online learning was critical to their long-term strategic plans (Allen & Seaman, 2011), implying that online education has been educational mainstream for quite some time. Despite more higher education institutions recognizing the importance of investing in online education, slightly less than half have actually increased their budgets for online education (NCES, 2019).

[1] Online learning is referred to as education in which more than 80 percent of course content is delivered primarily in a virtual classroom with technological delivery of materials, per the IPEDS definition.

[2] Face-to-face (F2F) learning is referred to as education in which more than 50 percent of course content is delivered primarily in a physical classroom and can be augmented with technological delivery of materials, per the IPEDS definition.

In the U.S., online education is not a new concept, but its organizational structure within an institution has the potential to pave the way for greater student success. With an increased nationwide focus on online education in higher education, it becomes even more critical to understand who is benefitting from online learning and who is experiencing challenges. There are numerous sociological implications of the delivery of high quality online education. When online education is delivered well with high quality and academic rigor, there may be increased college accessibility, reduced social inequalities, and better prepared students for the 21st century labor market. Thus, long-term socioeconomic disparities often found in higher education can be diminished. Increasing opportunities in higher education should be top priority, especially if the nation wants to achieve their college completion goals, and by understanding the impact of online courses on student success and college completion, institutions can position themselves to be at the forefront of technological and pedagogical innovation.

Throughout the nation, colleges and universities are experiencing a relentless growth in online education, even in the face of overall decline in total enrollment and a relatively low graduation rate. According to the National Student Clearinghouse Research (2019), U.S. college enrollment has decreased for the eighth consecutive year. Nationally, there was a decline of 1.7 percent, with community colleges experiencing a decline of 3.4 percent, and four-year public institutions seeing a nearly 1.0 percent decline (NCES, 2019). However, an irony currently exists in higher education. While there is overall enrollment decline throughout the nation, there is also an increase in online course enrollment. In the U.S., almost 30 percent of all

students in higher education are taking at least one online course, with 14 percent taking exclusively online courses, and 15 percent taking a combination of online and traditional F2F courses (Seaman & Seaman, 2017a). The percentage of students in the U.S. taking online courses represents an 11 percent increase since 2012, and the majority of them are at the undergraduate level with nearly 6.6 million students across the nation taking at least one online course (U.S. Department of Education, 2018). Public institutions command the largest portion (two-thirds) of all online students, and they have the largest enrollment growth in this area within higher education (Allen et al., 2016).

*Online Education in the State of Maryland*

Throughout the U.S., there are varying levels of student enrollment in online courses. According to the Distance Education State Almanac (Seaman & Seaman, 2017a), higher education institutions in the following states experienced more than half of its students enrolled in at least one online course: Arizona (59 percent), New Hampshire (55 percent), West Virginia (54 percent), and Idaho (50 percent). These states are well above the national average of 30 percent. The smallest enrollment can be found in Connecticut (17 percent), Massachusetts (17 percent), New York (15 percent), and Rhode Island (13 percent). In the state of Maryland, 33 percent of its students are enrolled in online courses, which is a 23 percentage increase since 2012 (Seaman & Seaman, 2017b). This is much higher than the national level of growth of 11 percent. In fact, 19 percent of Maryland students are taking exclusively online courses, which is again a much higher rate than the national average of 14 percent. Of the 19 percent who are fully online students in Maryland, 79 percent of them study in

Maryland – their home state. New national data reveal that more than 1.5 million students took online courses in-state, and more than 1.2 million students took online courses out-of-state (Straut & Boeke, 2020). Some public institutions that offer online courses and/or online degree programs charge out-of-state tuition to non-residents. Students who take these courses out-of-state may do so because the higher education institutions located in their state do not offer what they need for college completion. This is significant information because the numbers indicate that, particularly in Maryland, students have access to online courses and/or online degree programs in the state to help get them to college completion.

A paradox in online education exists in which online courses are both highly concentrated yet highly dispersed. The Integrated Postsecondary Education Data (IPEDS) show that the top one percent of institutions represent nearly 30 percent of online enrollments, and two-thirds of all online enrollments are concentrated in only 10 percent of higher education institutions in the U.S. (Seaman & Seaman, 2017a). The state of Maryland is no exception. According to the Maryland Distance Education State Almanac, Maryland has 62 degree-granting higher education institutions, representing 1.3 percent of such institutions in the U.S. (Seaman & Seaman, 2017b). Throughout the state, there is a small number of institutions that provide an extensive online learning environment for students for a large proportion of all online students, but there are many institutions that offer just some online courses. Nonetheless, there is a lot of teaching and learning that is happening throughout the state in this format, including but certainly not limited to, online degree programs, online certificate programs, and individual online courses. Similar

to the national trend, the majority of higher education institutions in Maryland that offer online education are public, with more than half of the top ten institutions being two-year community colleges (Seaman & Seaman, 2017a).

Maryland higher education institutions have experienced tremendous changes in online education activities over the last few decades. These massive changes have been primarily due to the coordination by and leadership of the founders of the Maryland Community College Teleconsortium (MCCT) and MarylandOnline (MOL). These two organizations eventually merged into an expanded MOL in 1999. During that same year, the University of Maryland University College (UMUC), now called the University of Maryland Global Campus (UMGC), transformed into the nation's leading virtual institution, offering degree programs across numerous disciplines and across undergraduate and graduate levels. To intentionally stress the importance of online education, the Maryland Higher Education Commission (MHEC) has been collecting information on online enrollment and progress since 1997, and this component of higher education has been a consistent part of its regular postsecondary education data collection system. Also notable is that most recently, in 2018, Montgomery College was ranked the nation's twelfth best community college in online education, and in 2020, the number one best online community college in the state of Maryland (Montgomery College, 2020).

*Online Education at Montgomery College*

The role of a community college is different from that of a four-year institution. They are typically open-access public institutions that offer a plethora of courses, certificates, and degree programs that are tailored to meet the wide range of

needs of their communities. Their mission tends to be centered on equity, accessibility, and affordability of high quality education. Community college students in the U.S. tend to be older, part time, female, racial/ethnic minority, lower income, first generation, intend to transfer, and have numerous work, school, and family responsibilities and conflicts (AACC, 2019). Given the various challenges and conflicts that community college students tend to face, these higher education institutions have been cognizant about offering services to students that increase their chances of social and academic advancement. Online education provides community college students the flexibility and convenience of taking courses anytime and anywhere, theoretically helping to progress their academic studies and reduce their time to college completion.

Serving over 54,000 credit and non-credit students through online and F2F courses, Montgomery College is the largest community college in the state of Maryland and has the largest undergraduate enrollment next to UMGC. It is the most racially/ethnically diverse community college in the continental U.S. with students hailing from over 160 countries. Montgomery College is located in Montgomery County – the most populous and most affluent county in the state – whereby more than 1 million people reside and the poverty rate is just under 7 percent (U.S. Census Bureau, 2019). Despite its affluence, pockets of poverty exist throughout the County, mostly in the eastern portion. The racial/ethnic demographic composition in the county is 20 percent African American, 20 percent Hispanic, and 15 percent Asian (U.S. Census Bureau, 2019), which roughly mirrors the student demographic composition at the College. Montgomery College students tend to be predominantly

African American and Hispanic, female, under age 21, part time, and low income (Montgomery College, 2020).

Montgomery College has received a number of accolades at the national and state levels with respect to its online education. It has recently been ranked as the best online community college in the state of Maryland and one of the top online institutions in the U.S. (Montgomery College, 2020). The online education course enrollment growth at the College is reflective of the overall national trend. There are more than 21,000 online student enrollments annually at Montgomery College, an increase of four percent from the previous year. During the past five academic years, online course enrollment at Montgomery College has increased by more than 21 percent. Approximately 20 percent of the courses at the institution are offered online, and the College offers five fully online degree programs. Many of its students take a combination of online and F2F courses. Prior to COVID-19, over 500 faculty were trained to teach online, and today, well over 1,000 faculty are certified to teach in this virtual environment, both in the synchronous and asynchronous settings.

While there are no proficiency standard requirements to take online courses in community colleges, many higher education institutions have invested their time, energy, and resources to the delivery of intensive online teaching training programs for instructors. All online courses offered at Montgomery College are infused with Quality Matters (QM) standards (Office of ELITE, 2020). QM is a faculty-centered, student-centric, peer-reviewed process designed to certify the quality of these courses and their components. It is a nationally and internationally recognized peer-based

approach to quality assurance and continuous improvement in online education in which a rubric consisting of 23 essential standards is used for assessment.

QM-infused courses at the College meet the national standards and are aligned with research-based best practices. These courses are designed to promote student learning in a way that incorporates relevant and appropriate pedagogy. If an online course meets these standards, it is presumably high quality and thus increases the chances of student success. Before instructors teach online courses at Montgomery College, they are required to take an intensive online teaching training, which is essentially based off of the QM standards. This training consists of building a prototype of an online course that includes a syllabus, student orientation, and a learning module. This prototype must meet the College's competency demonstration criteria, which includes the 23 essential QM standards. There is no comparable training required to teach F2F courses.

Research shows that online students are more satisfied in courses that provide appropriate challenges, have interactive discussions across faculty and students, and consist of a respectful learning environment (Bradford, 2011). Recognizing the research, Montgomery College leadership understands that they must deliver high quality online courses if students are to be successful in these classes and throughout their college experience. At the institution, there is leadership oversight of its online education, which promotes quality control, provides resources, and creates accountability of the teaching and learning that occur in the online environment. In understanding the need to increase access to higher education and the desire by students to have scheduling options, Montgomery College offers five fully online

degrees: Business, Criminal Justice, General Studies, Computer Science and Technologies, and Early Childhood Education Technology. Also important to note is that the College continues to incorporate best practices in both online pedagogy and discipline-based pedagogy, thereby keeping its online teaching training programs relevant and innovative. The College also works with other units and departments at the institution to provide students with the necessary academic and co-curricular resources or services in the virtual environment to be successful.

*Statement of the Problem*

To illustrate the crisis experienced by higher education throughout the U.S., it is important to discuss and analyze the trends in college completion and student demographic populations. In 2013, the Maryland General Assembly passed the College and Career Readiness and College Completion Act (CCRCCA). This state legislation established the goal that by 2025, at least 55 percent of Maryland's residents age 25 to 64 will hold an Associate's degree or higher. About 47 percent of Maryland's residents in that age group have an Associate's degree or higher, making Maryland one of the most educated states in the nation (U.S. Census Bureau, 2015). According to MHEC (2020), the graduation rate at public four-year institutions in Maryland is 68.8 percent – higher than the national average of 57.6 percent – and 10.9 percent at community colleges. At Montgomery College, both the graduation and transfer rates are 22 percent (MHEC, 2020), remarkably higher than the statewide average of community college graduation rates. It is important to note that many students transfer out of their institution without formally graduating, thus skewing the graduation rates.

MHEC (2020) stated that in order for colleges and universities to reach the goal that at least 55 percent of Maryland's residents age 25 to 64 will hold an Associate's degree or higher, these institutions will need to increase the number of undergraduate degree awards by 2 percent annually. Community colleges throughout the state of Maryland have developed incentives for students to attain an Associate's degree, including but not limited to more articulation agreements with four-year institutions, intrusive or mandatory advising, scholarships and other types of financial aid, and guided pathways. Community colleges generally provide great access to courses but are not necessarily designed to prepare students to complete their studies to attain a credential and simultaneously prepare for transfer or a career (Bailey et al., 2015). Ultimately, higher education institutions will need to continue being innovative and transformational in their teaching practices and learning environments and be nimble in response to external forces such as the current global COVID-19 pandemic and increasing social and civil unrests.

Another force sweeping across U.S. higher education institutions is the changing student demographic populations that are predicted to have a significant impact on enrollment and fiscal sustainability of these institutions. Grawe (2018) points out that there will be a drop in the number of high school graduates in the coming years, as well as changes in the demographic composition of that population. The impact of these upcoming demographic changes can potentially mean that by 2026, there could be a loss of 15 percent of the typical college-aged population. The magnitude of the impact will vary by institution type. Grawe suggests that the demand for prestigious institutions will grow by more than 15 percent in future years,

while state institutions, including community colleges, are expected to lose more than 11 percent of their students. Grawe (2021) most recently suggests that institutions should effectively respond to these demographic changes by re-considering their institutional strategic plans, recruitment initiatives, retention efforts, curriculum re-designs, and innovative teaching practices and transformational learning environments.

In examining the trends in the labor market, it was estimated that by the end of 2020, 65 percent of the jobs in the U.S. would have required a postsecondary education, and the nation would have fallen short by 5 million workers with postsecondary education (Carnevale et al., 2013). There will be 55 million new job openings in the U.S. economy – 24 million from newly created jobs, and 31 million from Baby Boomer retirements. About 35 percent of these job openings will require at least a Bachelor's degree, and 30 percent will require an Associate's degree or some college. The most desired competencies in this new economy will be decision-making, communications, analysis, and administration skills. Increasingly important is the ability to apply learning to real-world situations, thus the need to appropriately implement innovative teaching strategies that will help all students achieve this outcome. Also increasingly relevant is the charge to higher education institutions across the U.S. to graduate more students from diverse backgrounds, hence the need to provide and expand access to educational opportunities and prepare them for an extremely competitive workforce.

With the global COVID-19 pandemic and the current economic recession, the U.S. may see high rates of long-term unemployment and weakened labor market

outcomes for years to come, and it is too early to assess the true impacts (Stevenson, 2020). If the nation continues to experience relatively high dropout rates from college, consequently, a host of serious social problems will likely persist, including but not limited to increased unemployment, greater poverty, increased use of public assistance programs, increased delinquency, greater food and housing insecurity, and decreased community bonds (Bustamante, 2019; Whistle, 2019). While the consequences of dropping out of college may not be of the same magnitude as dropping out of high school, the implications are grave enough to warrant research and policy attention.

In addition to future labor market expectations and an increasingly digitized global society, the impact of automation has also become even more important to include in the discussion of achieving higher college completion rates. Much of the research on automation has focused on the likelihood that jobs will be displaced by technology, but there has been very little guidance on how to best prepare workers for the impact of automation. Looking beyond the statistics, a comprehensive study conducted by Bughin et al. (2019) of the McKinsey Global Institute examines the potential future of work for different groups of people across the U.S. They found that by the end of 2030, those with a high school degree or less are four times more likely to hold highly automatable roles than those with college degrees, and this group is concentrated among Hispanic and African American workers (11.9 million), along with workers under age 35 (14.7 million) and over age 50 (11.5 million). The industries likely to experience the highest automation displacement rates are office support, food service, production work, and customer service and sales. Higher

education institutions across the state of Maryland have become more strategic and bold in the leadership and support of their initiatives so that greater equitable opportunities are provided to traditionally underserved or disadvantaged populations – African Americans, Hispanics, and women (MHEC, 2020).

Essentially, all American workers need to gain more knowledge and cultivate new skills to maintain relevance in a more digital and globalized economy, and they need to attain the appropriate post-secondary credentials to adequately and effectively participate in the labor market. Otherwise, we may see an increase in the plethora of social issues that have plagued many U.S. communities for far too long, such as unemployment, poverty, homelessness, food insecurity, and family instability. Unlike many previous researchers, Bughin et al. (2019) suggest that automation has implications on higher education. These researchers recommend that to best help American workers become more competitive in the labor market, colleges and universities need to identify career pathways, become better aligned with industry needs, offer more relevant high-impact practices such as apprenticeships or internships, and provide resources and services geared to the specific demographic groups served within their communities.

The strategies such as those described by Bughin et al. (2019) can be beneficial in helping students get the most out of their academic experiences and consequently help them quickly adjust to the rapidly changing economy and labor market upon entry, thereby minimizing the risk of automation displacement. Thus, it is the right, responsibility, and obligation of higher education institutions throughout the U.S. to address what needs to happen to increase college completion rates,

including taking bold steps to systematize the delivery of high quality online education to students and implement additional innovative strategies to increase student success. By increasing equity and access to education, these institutions can help strengthen the economy via the production of a highly educated and skilled labor force. Educators must work collaboratively with local business leaders and policy makers to boost innovation within their respective environments and better align the industries so that students are best prepared to succeed in both higher education and the labor market.

*Broader Implications of Online Education*

As previously noted, the U.S. Department of Education (2018) shows a dramatic increase in the number of students taking at least one online course, and the majority of these students are undergraduates. The increased demand is a result of students whose work and family schedules do not allow them to attend courses on campus, or students who simply want scheduling options and flexibility. The demand is also a function of the changing demographics in student populations, including an increase in the percentages of lower income students, first generation students, and students with disabilities needing accommodations. Many higher education institutions in the U.S. recognize the urgency to respond to the increasingly diverse needs of students and to ensure they are successful in college. Thus, many institutions have placed a high priority on improving equity, such as increasing online courses, certificates, and degree programs. In addition, some institutions have also recognized that virtual student support services, such as advising, tutoring, libraries, and clubs,

must be available for online students to increase their success both inside and outside of the virtual learning environment.

The changing nature, and thus the changing priorities, of higher education have created a unique situation for higher education institutions across the U.S., one that requires institutions to be agile and resilient. Numerous sociological implications exist and must be considered as higher education institutions plan for ways to be nimble, bold, and strategic. When planned well, online education can be an ultimate solution to a competitive higher education market, as well as the sustainability of fiscal and human resources. From the students' perspectives, online courses may increase scheduling efficiency, increase student engagement, and improve student learning (Aslanian et al., 2019). It may also lead to greater student engagement, reduced biases in the learning environment, and improved learning overall, which can eventually lead to greater student success (Linder & Hayes, 2018). From the instructors' perspectives, the flexibility of online education enables instructors to dedicate more time to their teaching (Lei & Gupta, 2010), and with proper training, they have more time and space to focus on each individual student's strengths and weaknesses (Dillon & Greene, 2003).

From an institutional perspective, online courses may increase institutional relevance, improve strategic planning, increase enrollment, and increase revenue, thus allowing institutions to be better equipped to move students closer to completion (Bailey et al., 2018). From a policy perspective, state and local governments may be more likely to include online education as part of their strategic plan and thus allocate appropriate resources to this modality of teaching, thereby increasing the likelihood

of student success in the online environment (Palvia et al., 2018). Lastly, from an environmental perspective, online education plays a tremendous role in reducing the ecological footprint of higher education, since students are less likely to commute to and from campus and also less likely to consume energy from not being in a physical environment (Lei & Gupta, 2010).

However, online education, or the technology associated with its delivery, can arguably be disruptive to higher education. Lucas (2016) argues that higher education institutions that face challenges in properly implementing or effectively executing their technology for online education may very well be the ones that experience significant disruptions to their operations. Consequently, they may be the ones that lose their competitive edge as other more effective and more courageous institutions transform their teaching practices and learning environments. Similarly, Cottom (2017) challenges the notion that not all online institutions are intentionally designed for student success. She argues that for-profit institutions, while they tend to adapt more quickly to social changes than traditional institutions, tend to be more exploitative and predatory by attracting lower-income students and not providing support for a positive holistic student experience. Her research findings suggest that graduates of for-profit institutions tend to have lower earning potential and are less marketable than their traditional higher education counterparts.

Initial research has suggested that online education inhibits college completion. Students in online courses were thought to withdraw or fail at higher rates when compared with their F2F counterparts (Leeds et al., 2013; Hart, 2012; Xu & Jaggers, 2011). The conclusion made in some studies is that technical difficulties

or computer-based issues (Zavarella, 2008), lack of community or sense of belonging (Karp, 2011), poorer course design or structure (Dillon & Greene, 2003), and lack of virtual student support services (Green, 2010; Zavarella, 2008) reduce the likelihood of success. Other studies suggest that students who are categorized as high risk students, such as community college students who take developmental courses,[3] have greater failure rates in online courses (Shea & Bidjerano, 2018; Bettinger & Loeb, 2017).

Additional research also suggests that race and gender bias by the instructor exists in online courses that contribute to greater failure rates, particularly among underrepresented or minority students (Baker et al., 2018). However, there is research to also suggest that some of these factors – poorer course design or structure (Sewell, 2016) and race and gender bias by the instructor (Boysen et al., 2009) – are also present in the F2F classrooms but presumably in a smaller magnitude. These obstacles may not only prevent students from doing well in the online course but may also create fear in taking additional online courses. This dissertation assesses whether or not these demographic factors play a role in increasing the time to completion of students who take online courses compared with students who take exclusively F2F courses.

Online education has expanded rapidly and has the powerful potential to further increase the educational and social opportunities of students throughout the

[3] Development courses are defined as courses designed for students who have not been deemed "college ready." Whether through assessment or previous school performance, they are ineligible to take college-credit courses. Developmental courses are typically offered in the math, reading, and writing disciplines.

U.S., particularly the underrepresented or underserved student population (Bettinger & Loeb, 2017). Over the years, there has been strong focus on enhancing online teaching, with institutions recognizing that teaching in an online environment requires a different type of pedagogy, mindset, and even time commitment. Many institutions either require or encourage their online courses to be certified by national standards, such as Quality Matters (QM), to ensure high quality control and relevance in online pedagogy. Since then, many institutions have experienced high success rates of their online students. A number of studies show that there are no significant differences in success rates between online and F2F students (Bell & Federman, 2013; Means et al., 2010; Bernard et al., 2009). With public policy and government interventions throughout the state of Maryland calling for evidence-based measures to get college students to completion in a timely manner, online education is of growing importance as a means to get students to the end in a way that increases accessibility, retention, and overall success.

Much of the research to date has focused on grades and student perceptions in the online environment, largely because these variables offer an opportunity to capture short-term impacts of online education. There exists a large and meaningful gap in research on the impact of online education on college completion rates. Perhaps the gap may be due to students taking college courses for transfer or for career advancement, and thus, their online course completion rates are not factored into the institution's college completion rates. However, the state of Maryland, through its passing of the College and Career Readiness and College Completion Act (CCRCCA) in 2013, has established the goal that by 2025, at least 55 percent of

Maryland's residents age 25 to 64 will hold an Associate's degree or higher. Currently, in the state of Maryland, that rate is around 47 percent of its residents in that age group with an Associate's degree or higher, making Maryland one of the most educated states in the nation (U.S. Census Bureau, 2015). Nonetheless, this CCRCCA legislation solidified the importance of college completion rates and any initiative that helps to improve those rates.

This dissertation fills in the literature gap by analyzing the impact of online education on college completion in Maryland higher education institutions, specifically at Montgomery College. College completion of Montgomery College students, as measured in number of years, will be examined by race/ethnicity, gender, socioeconomic status, and major of study,[4] and they will be compared with the time to completion of Montgomery College students who take exclusively F2F courses. Ideally, time to completion at Montgomery College is fewer than three years. However, time to completion can range from three to six years, depending on the major of study, student status (i.e., part time vs. full time), and the number of developmental courses (if any), among many other variables (Montgomery College, 2018). While there are other factors in addition to the aforementioned variables that could be examined, this dissertation will only focus on these variables – race/ethnicity, gender, socioeconomic status, and major of study – as these are the most salient in previous research (Rafalow, 2020; Bailey et al., 2018; Baker et al.,

[4] Only majors of study for which there is an online counterpart offering will be included, since the dependent variable is time to degree completion and thus excludes majors of study that do not have a comparable online degree.

2018; Shea & Bidjerano, 2018; Bettinger & Loeb, 2017; Block, 2010; Bernard et al., 2009).

While the changing nature of the workforce and the increasingly digitized economy serve as significant factors that drive the need to increase college completion rates, there currently exists an unpredictable global viral outbreak phenomenon – COVID-19. This coronavirus that reportedly began in December 2019 in Wuhan, China and has since been deemed as a pandemic by the World Health Organization has created upheavals in every social institution known to civilization, including, and most especially, higher education (United Nations, 2020). All around the world, individuals have had to make significant and unprecedented changes to their daily lives, from washing hands more frequently to practicing social distancing. Beginning in March 2020, higher education institutions throughout the world began revisiting its pedagogy, teaching environments, and support services amid fears surrounding the rapid spread of COVID-19. The pandemic has resulted in many school closures or F2F class cancellations to social distancing measures, and many or all classes in impacted areas have been converted into the virtual setting.

While it is still too early to assess the full implications of COVID-19 on higher education, one can assume that many higher education institutions are neither fully equipped with high quality online environments nor have fully trained their instructors to effectively teach in this setting. Students who originally registered for F2F courses during the Spring 2020 semester were likely not prepared to take online courses. Thus, the dangers in converting F2F courses quickly into an online format in the wake of a public health crisis may in fact impede on the instructor's ability to

teach appropriately in this new setting and the student's ability to learn in this new environment. In cases like this, both parties have not likely received the full training often necessary to appropriately participate in high quality online education.

The "emergency remote teaching" that was being practiced by colleges and universities throughout the U.S. as an immediate response to the onset of COVID-19 is a way to prevent total disruption to student learning while simultaneously placing everyone's health as a top priority. These F2F courses were converted almost in their entirety to the virtual setting without any comprehensive support to the instructors or students on how to be effective and successful in this environment. Therefore, one should caution that this new phase of online education not be confused with the established online education that has been mainstream for many years. However, it is important to understand that this emergency remote teaching and learning experience may impact the nature of online environments in higher education institutions in years to come. At the moment, it is too early to evaluate what type of influence or implications the COVID-19 pandemic may have on the nature of online education and the overall college experience.

### *Organization of the Dissertation Paper*

Chapter 1 introduces online education from different angles – national, state, and local. Also included in this chapter is a discussion of the nationwide college completion crisis and the broader implications of online education. This chapter also introduces the discourse on the global COVID-19 pandemic within the context of higher education. Chapter 2 lays out the theoretical framework used to explain the urgency for improvement within higher education. Anchored in a discussion of

various theories on social and educational inequalities, theories of online learning are also emphasized. The connection of all of these theories shows the importance of the online education as a way to achieve higher college completion rates. Chapter 3 examines the literature relating to racial/ethnic, gender, and socioeconomic disparities at all levels of education in both the F2F and online environments. It also includes a discussion of the research on the evolution of online education and the potential impact of COVID-19 on higher education. Chapter 4 describes the research design, including an overview of the research questions and research methodology. There is also an explanation of the significance of the research and why Montgomery College is used as the case study. Chapter 5 describes the results of the research, addressing the three research questions in greater detail. Lastly, Chapter 6 presents the conclusions, applications of the theoretical framework, limitations of the research, and recommendations for future research in this area.

# Chapter 2: Theoretical Framework

*Theories of Social and Educational Inequalities*

Sociological theorists have explained the factors associated with social and educational inequalities. Their theories help to better comprehend the reasons for the differences in student outcomes. Many of the theories are grounded in the concept of social stratification. Kozol (1991) was among the first contemporary social theorists to thoroughly research and describe the difference in access and opportunity to educational resources between underprivileged and advantaged students during their earlier school years. Anchored in the theory of inequity, Kozol's examination of race-based and class-based disparities in education point to the basis of unequal funding and resource allocation across U.S. schools. His research concludes that this inequitable allocation is strongly tied to the lack of access and lack of opportunities that children from lower socioeconomic backgrounds or underperforming schools have. While more equitable funding across primary and secondary schools is one answer, Kozol suggests that schools should also consider curriculum innovations to expand their reach to the most disadvantaged students. While Kozol's research applies mainly to primary and secondary schools, understanding his theory of inequity and his research findings can help to address why there are continued disparities in higher education.

Using Kozol's theory of inequity as a launching pad for this dissertation, additional theoretical frameworks to consider are those that help to better understand the inequities in technological allocation or differences in technological

implementation. Originally stemming from the digital divide theory, an expanded framework more recently developed suggests that this divide is much more than a matter of access, but that it is about how institutions perceive the value of digital media and technology, such as interactive whiteboards, virtual math tools, and educational quiz games, and how it can be negatively used with their student populations. In his exploration of how technology is utilized in different educational contexts, Rafalow (2020) concludes that racism and classism strongly influence how the technology is implemented. He debunks the myth that technology is the solution to address social and educational inequalities by suggesting that teachers, mainly in the primary and secondary schools, utilize their technology differently depending on the race and social class of their student population.

There also exists another strong argument that digital media and technology, such as those described by Rafalow (2020), can be disruptive in higher education. As higher education institutions continue to find ways to maintain relevance and stay competitive in an increasingly global and digitized society, many of these institutions have sought out emerging technology as a potential solution. In his comprehensive exploration of the impact of technology on higher education, Lucas (2016) theorizes that technology-enhanced teaching and learning can reduce social and educational inequalities by positioning students to be active participants in their learning process, thereby improving their academic outcomes. He suggests that if higher education institutions embrace the technology, understand how to implement it, and know how to effectively engage students, then there is the potential for transformation. However, if these institutions ignore the technology, or have limited understanding on how to

implement it and engage their students, then disruption is likely to occur. Lucas offers a word of caution that online education in this context should not be confused with the online education offered by for-profit institutions that are arguably in business to exploit their students, rather than to provide equity and access.

Aligned with Lucas' argument against for-profit higher education institutions, Cottom (2017) provides her own theoretical framework to explain the inequities found in higher education. In her critique of the quality of online education in for-profit institutions such as Strayer University, University of Phoenix, and Walden University, she argues that certain student demographic populations are being exploited by the costly and lower quality online education offered at these institutions. These institutions also do not necessarily provide appropriate holistic student support services that are critical for their success, such as virtual tutoring centers, libraries, or extracurricular activities. Students at for-profit institutions tend to be African Americans or Hispanics, older, female, single parents, and poorer, and they are more likely to have lower earning potential and less likely to be employed years after graduation (Deming et al., 2013). Cottom suggests that the vulnerable demographic nature of the students puts them at greater risk of poorer outcomes. The alarming rise in popularity of online education as a result of the global COVID-19 pandemic has created an increase in enrollment at for-profit institutions that is of significant concern due to the generally poorer outcomes of their graduates (Cellini, 2020).

Having deep knowledge of the theories of social and educational inequalities posed by Kozol (1991), Rafalow (2020), Lucas (2016), and Cottom (2017) helps to

further the understanding that traditional community colleges and universities exist to provide access and equity to students. Even before the global pandemic, online education increased in both popularity and importance within higher education, so delving deeper into the theories of online education is critical. If delivered appropriately and with academic rigor, the knowledge and skills attained from online learning can help pave the way for students to attain equitable opportunities in the labor market and facilitate the promotion of students' social standing in society. Consequently, if online education is a means to advance student success, then it has done its due diligence in helping students and institutions reach their shared goals of college completion. Moreover, college completion then implies a reduced likelihood of social problems that often plague the lives of those who drop out of college or have never attempted college, thereby improving the life chances and social standing of these individuals as well as the health of the society and economy.

### *Theories of Online Education*

As clearly evident in the U.S., there continues to be immense pressure from federal, state, and local governments for higher education institutions to remain responsive, transformational, and proactive to an increasingly growing and diverse student population. This pressure has only intensified during the COVID-19 global pandemic. Because there are inherent differences in student characteristics and numerous barriers for all learners, institutions have to continuously look to new modalities as a way of addressing their needs. If institutions decide to prioritize online education as a major way of meeting these needs and demands, then it is crucial that they do so with the understanding that online pedagogy is very different from F2F

pedagogy. This distinction implies that professional development opportunities, training, resources, and other types of support should be vastly different for online instructors than for F2F instructors. Thus, it is important to consider theoretical frameworks on the effectiveness of online education so that higher education institutions throughout the U.S. can continue enhancing this modality to adequately advance student success and college completion.

Using the basis of the aforementioned theories on social and educational inequalities, particularly Kozol's (1991) claim that curriculum innovations are necessary to reduce inequalities, online learning theories can describe the approach that, if delivered adequately and appropriately, online education can assist to maintain stability in society and can work in harmony with other aspects of higher education to supply what is needed to meet the changing demands of the student populations. These theories also posit that online education provides numerous advantages that benefit society in the short-term and long-term. Various online learning theories suggest that online education is most successful if the micro-level components of the courses, coupled with the macro-level structure of the online environment itself, work in tandem to support student success. The three online learning theories to be examined are the following: 1) transactional distance theory, 2) connectivism learning theory, and 3) Obsidian distributed learning theory.

### *Transactional Distance Theory*

The first attempt to develop a theory on online education was during the 1970s, which was formally called the transactional distance theory. Michael Moore (1997) eventually built upon that theory and stated that "distance education is not

simply a geographic separation of learners and teachers, but, more importantly, is a pedagogical concept" (p. 22). This separation greatly impacts both the teaching practices and learning environments. This spatial distance between the instructor and the students, and even between students, can create misunderstanding between both parties, thus calling on the need to consider an appropriately innovative pedagogy to increase success for all involved. The transactional distance theory is a function of three online education characteristics: 1) instructional dialogue, 2) course design, and 3) learner autonomy.

Moore (1997) suggests that the efficacy of instructional dialogue in online courses depends on the nature of the communications medium. An interactive nature of the medium is a major determinant of student success because it increases productive dialogue and reduces the transactional distance between the instructor and the students. However, argumentative dialogue may make students feel constrained and unsupported, while reasoned discourse is intended to help students respect multiple perspectives in the learning environment (Collison et al., 2000). There are other environmental factors that influence the dialogue, such as the virtual environment in which the dialogue is theoretically occurring, the administrative support provided to online instructors, and the social support for students from their family and workplace social institutions. However, it is important to note that additional personal characteristics can impede on the efficacy of instructional dialogue, such as the personalities and motivation levels of the instructor and the students. Thus, regardless of how interactive the instructional dialogue can be, one must consider the potential intervention of negative personal traits.

In addition to instructional dialogue, Moore (1997) argues that the course design plays a tremendous role in online education. Successful online education is one that is characterized by the delivery of appropriately structured learning materials. It is often stated that instructors in higher education are subject matter experts who are responsible for instructional delivery of materials but without the required formal prerequisite training in student learning theories. Only in some cases do instructors have access to or participate in professional development activities that provide the foundation for understanding and implementing effective student success strategies, including the knowledge of how to use emerging technologies for student motivation and student engagement. In relation to the transactional distance theory, Rafalow (2020) suggested that online instructors who reduce their biases about their students can effectively implement the necessary technology to create a productive learning environment. In his research, he found that teachers in low-income schools limited the use of the advanced digital technology because of their belief that their students would not know how to use them. Perhaps through training can the instructors confront their own biases and focus more on the tools needed to use the technology for student motivation and student engagement.

However, many of these activities tend to be based on pedagogy rather than the general principles of the teaching or learning process itself. This leaves the science of teaching often ignored or overlooked. Research suggests the importance of developing competence in the science of teaching if the instruction of the subject matter is to be optimized and if the impact of learning is to be maximized (Khalil and Elkhider, 2016). Thus, it is important that in any higher education institution,

instructors must invest their time and other resources to developing an intentional instructional model that carefully analyzes the learner's context, including the growing diversity of the online student population, and consequently utilizes appropriate and innovative pedagogy and emerging technologies.

The last variable in the transactional distance theory is learner autonomy, defined by Moore (1997) as the concept that the students determine the learning goals and experiences rather than the instructor. There is also greater control of content creation and course direction by the students. Lucas (2016) similarly posited in this technology-enhanced teaching and learning theory that when students are active participants in their learning process, rather than mere passive learners, they tend to have a more positive learning experience and become more successfully engaged. Simultaneously, the instructor should be willing to function as a facilitator rather than as a lecturer, and in doing so, there are shared roles and responsibilities between the instructor and the students. For this part of the transactional distance theory to be valid, it is assumed that all students have the natural ability to be self-directed learners. Students who are capable of exhibiting learner autonomy is thought to have a higher probability of thriving in online environments that are less structured but more interactive. When learner autonomy exists in an online course, the instructional dialogue becomes more relevant and engaging, and the transactional distance is reduced.

Just like many frameworks, limitations exist with the transactional distance theory. In any online environment, there often exists a potential misunderstanding between the instructor and the students as to the spatial distance necessary to achieve

success in the online environment (Croft et al., 2015). The definition of spatial distance may be different for both parties. There may be vastly different ideas of what spatial distance should look like in an online environment between instructor and student and between student and student. The instructor may prefer a narrower gap in spatial distance than do students. Depending on their level of comfort in the online environment, students may prefer greater spatial distance from the instructor and from one another. While the transactional distance theory addresses this misunderstanding surrounding spatial distance, there is no discussion of what the ideal benchmark is to attain the optimal spatial distance for course success. The transactional distance theory focuses more on spatial distance rather than social relationships, which is why it is important to consider the connectivism learning theory.

### *Connectivism Learning Theory*

Meta-analysis educational studies sponsored by the U.S. Department of Education suggest that primary and secondary public school students are much more likely to learn and retain information from online courses as opposed to a traditional - F2F delivery, and these studies also state that the reason behind the greater success is more linked to the instructional strategies built into the online learning materials and the online learning environment (Means et al., 2010). These studies indicate that online courses that provide a productive platform on which to develop social relationships are much more successful than F2F courses. Online education can also be successful when students are given greater control of their interactions with one another through directed prompts provided by the instructor. It is important to note that these studies are not suggesting that online education is more superior to

traditional F2F course delivery. Instead, these studies are simply suggesting that various instructional materials, emerging technologies, and innovative pedagogical strategies should be considered to enhance online education and improve student success. While these meta-analysis educational studies were conducted on primary and secondary public school students, the findings are suggested to be applicable to online students in higher education institutions. These studies align with Cottom's (2017) framework that a high quality online education has the potential to increase one's earning potential and reduce unemployment, unlike what she found in her study on for-profit higher education institutions.

These meta-analysis educational studies are rooted in the theory of connectivism learning. Developed by George Siemens (2005), this theory explains that the Internet technologies (e.g., online discussion forum, social networks, email) have created new opportunities for people to learn and share information across the World Wide Web. Defined as "actionable knowledge," this theory posits that the learning that happens within this virtual setting is enhanced with the knowledge and perception gained from having a personal network (Siemens, 2005). The online learning materials that enable greater student success are usually designed to have high authenticity, high interactivity, and high collaboration. In asynchronous online settings, students find that they can access the course materials anytime and anywhere. They can also use the Internet to find relevant and timely information instantaneously to further enable their learning in this setting.

More simply, connectivism is defined as "social learning that is networked" (Duke et al., 2013). Connectivism is even more applicable today because society is

changing rapidly and technological advancements happen regularly. This theory explains that student learning improves through the addition of a personal social network, which offers students the opportunity to learn differing viewpoints and opinions to help make critical decisions. The connectivism learning theory also posits that the large volume of information available to students electronically and instantaneously empowers students to seek further knowledge about the topic. This theoretical perspective ultimately suggests that online education is a "direct technological response to different learning cultures, methods, and inspirations" (Duke et al., 2013). It is this instant adaptability in a rapidly changing, technologically driven environment that connectivists argue is the primary reason for greater student success among online students.

However, one major limitation of the connectivism learning theory is that it does not consider the possibility of increased bias when students have a wider volume of information at their disposal (Duke et al., 2013). In many cases, having too much information – some of which is difficult to decipher between fact and fiction – can reinforce stereotypes and prejudice, likely leading to discrimination within the virtual environment and external to it. The biases that can ensue may be between instructor and student or between students. The magnitude of and the speed at which information is retrieved on the Internet can having a damaging impact on the overall course success. Given that online courses are conducted primarily asynchronously, the damage done from the misleading of information can last a long time before damage control can happen, such as a timely and appropriate intervention by the online instructor.

Another limitation of the connectivism learning theory is that it does not explain what may happen to the entire online course structure if at least one student is uncomfortable participating in a heavily networked online environment (Duke et al., 2013). Student learning is theoretically impacted, and this situation can have major implications on the way the instructor had initially planned to deliver the course. The instructor may then have to revisit current pedagogy and seek alternative strategies to increase the level of comfort for participation in the online environment. The instructor may also have to consider emerging technologies or alternative assessments (e.g., group work, reflection assignments) that can help facilitate increased student engagement and improved student learning. Despite the limitations, connections are generally happening within the virtual classroom setting, and those connections must also occur external to that setting, thus the distributed learning theory.

### *Distributed Learning Theory*

While there are many iterations of the distributed learning model, the focus in this dissertation is the Obsidian distributed learning theory. Stephen Victor (2016) suggests that this theory is a flexible learning model, one that can accommodate the changing global economy. Students in online environments are separated by space and time, as well as demographics and learner characteristics, which creates a host of challenges that can impede on their progress. Naturally, online students can, at times, feel socially isolated. Thus, it is necessary to understand that online instructors must create space and comfort for active participation, fruitful collaboration, engaging dialogue, and interactive learning. Consequently, a “warm and supportive learning

community" can generate the highest level of social presence and the shortest transactional distance between all parties involved (Zhao et al., 2014, p. 817).

Online students operating under the premise of the Obsidian distributed learning theory are believed to be more successful because of its three components: 1) technology, 2) experience, and 3) people (Victor & Hart, 2016). These three components are rooted in the transactional distance theory and the connectivism learning theory. For successful application of the Obsidian distributed learning theory, the instructor should include all three components in the online environment. The Obsidian distributed learning theory posits that successful online learning is blended with various technological means, is fully learner-centered, and consists of numerous opportunities for collaboration and interaction.

Victor (2016) states that through appropriate technology, students are empowered to collaborate with each other and seek resources to guide their learning. Just as the connectivism learning theory suggests, successful online environments can occur through the appropriate usage of various Internet-based communications platforms (e.g., online discussion forum, social networks, email). In addition to these tools, learning that can be delivered on mobile devices, such as tablets and smartphones, can facilitate student engagement and promote student success. Many of these tools and resources have become necessities during a time period when college students are often working multiple jobs, juggling home and work responsibilities, attending school part time, and now, practicing social distancing measures in response to the COVID-19 pandemic. These external demands in their lives have

created the urgency for technology to help facilitate their online learning and assist in their college completion.

In addition, a variety of learning experiences and opportunities can lead to increased student engagement and can foster the necessary skills to be global members of society. In the Obsidian distributed learning theory, brief learning videos, meaningful simulations, and guided collaborative projects are effective methods to engage students in the online environments (Victor & Hart, 2016). These types of activities, if executed appropriately, may better meet the needs of dispersed students. According to the Obsidian distributed learning theory, to achieve optimal online learning, related activities must be assigned before coming to the virtual classroom (i.e., pre-diagnostic), again inside the classroom (i.e., diagnostic), and lastly, outside of the classroom over a prolonged period of time as reinforcement of the topic learned (i.e., post-diagnostic). This theory also posits that online students who engage in real-world practice and skill-building opportunities through internships, even virtual internships, can improve student success (Victor, 2016). Whichever the learning experience, the online instructor must ensure that these activities are learner-centered, meaningful, and applicable to the workplace (Gegenfurtner et al., 2014).

Lastly, collaborative learning is key in online education, and thus the people and networks formed in these virtual settings are vital to the success of these students. To maximize opportunities for collaboration, activities should warrant different types of interactions: student-to-student, student-to-instructor, instructor-to-student, student-to-content, and student-to-world (Victor & Hart, 2016). Evidence-based practices include online discussion boards, empathy-based exercises, and feedback

forums. Just as the connectivism learning theory suggests that learning includes knowledge gained from the Internet, the Obsidian distributed learning theory also claims that appropriate social networking tools in online courses can support appropriate self-directed learner autonomy. Building off of the transactional distance theory, the Obsidian distributed learning theory purports that active learning and healthy dialogue in the virtual setting can also support learner autonomy and student success.

Like many frameworks, limitations exist with all types of distributed learning theories, including the Obsidian distributed learning theory (Victor & Hart, 2016). The biggest criticism is that these distributed learning theories do not account for emerging technologies and the way they may reshape the structure and delivery of online education. They do not explain how instructors can help facilitate in the transformation of online education in the wake of changing technologies to enable student success. These theories are solely concentrated on the students and not enough emphasis on the instructors who, after all, are the facilitators of the very technologies described in these frameworks. Moreover, these theories generally do not account for the micro-level traits, such as demographic characteristics and learning styles, of the students that may shape their experiences and success. Nonetheless, these theories, and specifically the Obsidian distributed learning theory, provide a sound understanding of the role that students play in their own success in the online learning environments.

# Chapter 3: Literature Review

*Educational Inequalities in Primary and Secondary Schools*

It is important to examine the vast literature on how social institutions and individual experiences within those institutions impact educational outcomes. Education has historically been perceived as a fundamental component in bettering the lives of communities and has often been the vehicle by which to achieve greater social equality and status. There is a significant amount of sociology of education literature in the realm of primary, secondary, and post-secondary education, specifically in the F2F learning environments.

Research has shown that in the U.S., throughout the primary and secondary school years, there continues to be racial/ethnic, socioeconomic, and gender disparities in standardized test scores, grades, and even graduation rates, and those inequalities can be seen as early as pre-kindergarten (Garcia & Weiss, 2015; Darling-Hammond, 1998). It has been suggested that these differences are deeply rooted in the "separate but equal" doctrine from the *Plessy v Ferguson* Supreme Court decision of 1896 (Von Bergen et al., 2020; Hannah-Jones, 2014). While no longer legal to practice, the philosophy has made a comeback – or in some cases, it was never truly banned – and thus, the U.S. education system, from pre-kindergarten to higher education, continues to be flawed. These flaws are deeply rooted in the socioeconomic, racial/ethnic, and gender inequities in education, which can then lead to increased disparities in major of study and eventually, career paths and income.

The socioeconomic disparities in student outcomes throughout the primary and secondary school years can be traced back to Pierre Bourdieu's (1986) theory of cultural capital, suggesting that children from middle class families – who tend to be White – are more likely to have access to educational opportunities that are largely absent in lower class families – who tend to be of racial/ethnic minority backgrounds (Sullivan, 2001). Thus, the children from these lower class families may not have the resources at home or in their schools to compete with their middle class counterparts. Research has also shown socioeconomic disparities in elementary school practices, such as less physical activity and fewer extracurricular opportunities, in the curriculum of poorer schools (Carlson et al., 2014). The negative academic, health, and social outcomes often found among these primary and secondary school students often lead to poorer outcomes in their later educational years.

There is an abundance of research explaining the racial/ethnic disparities in educational outcomes. Academic experiences and educational opportunities for racial/ethnic minorities continue to be separate but equal, despite nationwide efforts such as affirmative action and data-informed public policy (Von Bergen et al., 2020; Hannah-Jones, 2014; Darling-Hammond, 1998). As suggested by Kozol (1991) in his research, there exists striking differences between schools that serve predominantly racial/ethnic minorities and schools that do not. In many of these schools, the curriculum, class size, resources, extracurricular opportunities, and even textbooks are in no comparison to those found in suburban schools or schools that serve predominantly White students. For instance, the course materials found in suburban schools are not racially inclusive and thus the curriculum does not create

opportunities for students to learn about the contributions of marginalized populations. Consequently, this achievement gap continues into their later educational years, and it becomes even more challenging to un-do the impact of these structural differences.

Additional research has shown that female students have poorer educational outcomes in the U.S. than their male counterparts, for many of the same reasons related to bias that exist for racial/ethnic minority students and low-income students (Cimpian, 2018; Buchmann et al., 2008). Studies have long shown that beginning in their early elementary school years, particularly in second or third grade, girls tend to perform poorer than boys in areas such as math, suggesting that factors may be occurring in the schools that influence this gender achievement gap (Cimpian, 2018; Carter et al., 2013; Flores, 2007). These factors are suggested to be tied to the lack of opportunity that girls experience compared to their boy counterparts, which is then correlated with their lower levels of achievement. The gender disparities found in the research are supported by feminist theories, positing that educational systems are characterized by unequal treatment toward and lack of opportunity for female students. For many feminist theorists, the solution to reducing gender disparities in student outcomes lies in altering gender socialization practices, changing cultural attitudes and individual perceptions, and capitalizing on public policy that increases educational equity (De Welde & Stepnick, 2015; Lorber, 2010; Acker, 1987).

Research also shows that because of the differential treatment and consequential student success outcomes from earlier years, certain demographic populations tend to follow specific majors of study or career pathways (Jackson &

Holzman, 2020; Garcia & Weiss, 2015). Female students tend to specialize in non-technical fields, such as the humanities and social sciences, while male students are more likely to major in STEM fields (Buchmann et al., 2008; Acker 1987). Low-income students tend to focus on the humanities and social sciences, while higher-income students may focus more on more technical disciplines (Jackson & Holzman, 2020). Racial/ethnic minorities, specifically African American and Hispanic students, tend to major in the humanities and social sciences, whereas White and Asian students are more likely to major in STEM disciplines (Garcia & Weiss, 2015).

*Educational Inequalities in Higher Education*

While many of the aforementioned research focuses primarily on primary and secondary education, there is an abundance of research on the disparities found in higher education, though it is important to note that many of these studies examined F2F environments (not online environments). The research points to similar racial/ethnic, socioeconomic, and gender disparities in higher education. In fact, researchers suggest that higher education reinforces the inequality that began in the earlier years (Freedman, 2013; Alon, 2009). Many of these studies point to the finding that the demographic backgrounds of minority students in higher education institutions largely determine their college experiences, both inside and outside of the classroom. The differences in student outcomes have also widened as a result of the global COVID-19 pandemic, based on a study of one of the largest public universities in the U.S. – Arizona State University (Aucejo et al., 2020). The implications of reinforced inequality in higher education include lower college completion rates,

lower earning potential, lower wages or salaries, and higher unemployment rates (Jackson & Holzman, 2020).

Given the academic experiences and situational circumstances that many students, particularly those in disadvantaged populations, have during their academic years, the probability of dropping out of college remains high for these groups of students. Students who are at greatest risk of dropping out of college include low income students, first generation students, African Americans, Hispanics, and women (Bustamante, 2019). Research continues to show extensive negative implications of dropping out of college. Students who drop out of college are much more likely than their college graduate counterparts to be unemployed, to experience personal income instability, to be in poverty, and to rely on public assistance programs (Whistle, 2019). Also important to note is that a "ripple effect" happens when college completion rates remain relatively low. This ripple effect suggests greater economic instability, greater dependence on public assistance programs, and greater national debt (Whistle, 2019).

Goldrick-Rab (2016) studied approximately 3,000 students who used federal financial aid to attend college and found that half of the students in the study dropped out of college, primarily due to the high tuition costs, coupled with expensive textbooks and high living expenses. Boysen et al. (2009) found that microaggressions, defined as subtle indignities toward minority students, were experienced in the college classrooms, and that students were more likely to be aware of such bias than were the instructors. Similarly, a study conducted by Jack (2019), in which he interviewed more than 100 disadvantaged students, points out that when lower

income students attend an elite higher education institution, they experience significant challenges in their orientation to the college culture, thus likely setting them back during the first semester or first academic year. He also attests that race/ethnicity and gender exacerbate the difficulties.

McNair et al. (2020) and Jack (2019) offer real-time strategies for higher education institutions to consider in their policies, practices, and procedures on creating and fostering an equity-minded culture, such as examining disaggregated institutional data on achievement gaps to take intentional action, leveraging resources to increase participation in high impact practices, and building capacity to improve the success outcomes of low-income and first-generation students. With the transfer in the U.S. presidential administration, there is also a potential impact that the political discourse on free community college may have on the future of higher education, particularly as it relates to college completion rates (Winograd & Lubin, 2020; Quilantan, 2019). Providing free community college can reduce some of the inequities, such as labor market discrimination (Gaddis, 2015; Pager, 2003), that have long existed because it allows students to take courses without the financial barriers that are often cited as the obstacle to college completion (Goldrick-Rab, 2016). Many of these studies align with Marx's (1848) conflict theory, positing that education is designed to create greater social inequality and that access to education is not always equal. This is especially true for high quality education and even more true for online education. Accessibility may be more difficult for certain demographic populations based on race/ethnicity, gender, or socioeconomic status.

Online education in higher education institutions can perpetuate the digital divide because not all students have access to the Internet or a device on a regular basis to conduct their studies (Rafalow, 2020; Block, 2010). For students who do have access, it may be more of an issue with the reliability of Internet access in which technical difficulties or disruptions are likely to occur. Online education, particularly in less developed regions of the U.S. or in developing nations, may be less accessible to female students, thus widening the gender achievement gap (Acker, 1987). Furthermore, online education in for-profit institutions such as Strayer University, University of Phoenix, and Walden University have been evaluated to be of lower quality and absent of holistic student support services (Cottom, 2017). These various situations can ultimately lead to generational social class reproduction and perpetual educational stratification.

Grounded in Emile Durkheim's (1893) structural functionalism theory, online education can help advance student success and college completion. Emerging technologies, coupled with changing student demographics, make for a feasible solution for higher education institutions worldwide. Students may perceive online education as a way to continue their academic progress without much disruption to home and work schedules, particularly now with limitations imposed by the global COVID-19 pandemic. Also, for students, online education has provided them with flexibility and numerous scheduling options. In doing so, students theoretically can progress in their academic studies without much disruption to their home and work schedules and thus may not have significant impact on their financial stability. From an institutional perspective, online education enables higher education institutions to

stay relevant in their overarching mission of innovation and transformation, as well as their ability to be resilient post-pandemic. Since online teaching requires a different pedagogy than that of F2F teaching, such modality often encourages the institution – and the instructors – to stay on the cutting edge with emerging technologies and effective pedagogical strategies. Thus, professional development or training for these instructors should be innovative and transformative, in and of itself.

Specifically in the U.S., where there has been declining total college enrollment for quite some time, increasing online enrollment provides a cushion to institutional stability and increases student options toward college completion (Grawe, 2018). Many of these institutions would have financially struggled had it not been for the growth in online education, and many of these students would not be able to graduate sooner, if at all. So it becomes urgent for higher education institutions to focus their energy and resources to innovative strategies such as high quality online education. Otherwise, the anticipated drop in the number of high school graduates in the coming years, as well as changes in the demographic composition of that population, may gravely impact higher education institutions and disrupt them so significant that they may not be saved (Grawe, 2018; Lucas, 2016).

In addition to the patterns and behaviors often experienced in higher education, the global COVID-19 pandemic has created a norm that is unprecedented in U.S. education history – online or remote courses for all institutions for an indefinite period of time. For instructors and students who have never taught or taken online courses, respectively, this experience may be one that can make or break a situation. However, for the purpose of the dissertation research, this emergency

remote teaching and learning experience should be categorized as an outlier in the discourse on online education. It is important to note that there are future research implications on the COVID-19-induced remote environment because of the potential short- and long-term consequences. Many higher education institutions, along with their instructors and students, were simply not prepared to convert their teaching and learning into the virtual setting in a very short period of time. Nonetheless, high quality online education can still be perceived as the great equalizer in society because it enables many students from all over the world to gain greater access to education and consequently be on a less disrupted path to college completion.

### *The Evolution of U.S. Online Education*

Online education has its roots in the adult education movement. In the U.S., this movement began during the late 1600s and stemmed from countless individual needs and interests, institutional goals, and social pressures. This movement is characterized by a number of traits: 1) the process by which adults continue learning after their formal schooling has ended, 2) a set of organized activities for which adults carry out to achieve academic goals, and 3) a group of people concerned with providing learning opportunities for adults and advancing the general culture of the society (Knowles, 1962). Specifically during the 1800s, the adult education movement became responsible for the curriculum changes seen throughout higher education institutions in the U.S. One of the tangible outcomes during the earlier part of the movement was the emphasis on the humanities and the social sciences during the undergraduate years. Also an outcome worth noting was the separation of professional schools, such as medical, law, and other specialty areas. It became

apparent that higher education was evolving into a much more holistic social institution that was addressing the needs and demands of the changing society and its changing people.

Adult education shifted significantly after World War I in that higher education institutions became more connected with and more deeply engaged in their communities. Having faced two world wars, an economic depression, and a postwar economic boom, colleges and universities intentionally served the various social institutions within their communities, such as the labor market, politics, and the military. Consequently, enrollment in colleges and universities drastically increased, administrative and faculty roles and responsibilities changed, physical facilities expanded, and services and resources for students improved. Also, philanthropic foundations, specifically the Carnegie Corporation, the Kellogg Foundation, and the Ford Foundation, were created to further research and development (R&D) within higher education. The emphasis placed on R&D within higher education by these foundations strengthened the need to expand adult education into other social institutions, such as science and medicine, mass media, and the government.

During this segment of the adult education movement, government agencies became heavily involved in re-training their employees, so incentives were created for government employees to continue their education. The G.I. Bill was also an incentive for qualifying veterans and their family members to receive financial assistance for their education. Computer-based education – a precedent of online education – was first created in the 1960s to employees of the U.S. Department of Defense. During the 1970s, a small number of higher education institutions, including

the University of Phoenix, began developing and offering online courses as a flexible option for students. Shortly thereafter, other higher education institutions, including community colleges, began to follow suit. Elite universities, including Duke University and Cornell University, have also started offering online degree programs, particularly in their graduate schools.

The sociological implication of online education is tied to the needs of the global economy whereby it enables students to develop the knowledge to sustain economic growth (Spring, 2006). This educational revolution created the potential for the development of new pedagogical strategies and greater access to knowledge. The increased supply in online courses and degrees was a response to the need to re-evaluate the "learner college" paradigm most commonly found in community colleges and other teaching-based higher education institutions (O'Banion, 1997). This paradigm was designed to meet the personal and academic needs of the students in an effort to make them more successful. To re-imagine the student learning experience, these higher education institutions need to invest a tremendous amount of effort and energy in the appropriate places. Many institutions have placed great investment in the virtual environments, specifically online education, online advising, online library resources, online tutoring, and more. With advances in instructional technologies, a competitive workforce, changing student and community demographics, and progressive social institutions, there is no better time than now for higher education institutions, and most especially community colleges, to re-assess its online education within their learning college paradigm.

Online education has been increasing in popularity and enrollment growth in the U.S. since 2005, growing faster today than they have the last several years. The number of online students overall in the U.S. grew by 5.6 percent, or 6.3 million students (Seaman et al., 2018). Online enrollments are highly concentrated in a relatively few number of higher education institutions, with nearly 70 percent enrolled in public institutions (Seaman et al., 2018). In fact, about 31 percent of community college students, or 5.8 million, have taken an online course at some point during their academic career (Seaman et al., 2018). Online enrollments remain local – more than half of students (1.5 million students) taking online courses also took a F2F course in an institution located in their home state (Straut & Boeke, 2020). In the wake of total declining enrollment in higher education institutions and changing demographic student populations across the U.S., these enrollments would decline further if it were not for online education (Grawe, 2018; Lucas, 2016).

According to the Distance Education State Almanac, the national average rate of students enrolled in at least one online course is 30 percent (Seaman & Seaman, 2017). States experiencing more than half of its students enrolled in at least one online course include Arizona (59 percent), New Hampshire (55 percent), and West Virginia (54 percent). States experiencing the smallest percentage of its students in online courses include Massachusetts (17 percent), Connecticut (17 percent), New York (15 percent), and Rhode Island (13 percent). In the state of Maryland, nearly 33 percent of its students are enrolled in at least one online course, which is higher than the national average rate. Much like the national data, the majority of these online students are undergraduates enrolled in public institutions, and 80 percent are

studying in the state of Maryland. While the dissertation focuses on Montgomery College, the findings of the study can influence the policies and practices of other higher education institutions in the state of Maryland, given that Montgomery College is the largest community college in Maryland. A statewide community of practice can be formed to help inform other higher education institutions in the state to learn what has worked and what needs improvement.

*Research on the Impact of Online Education*

Despite exponential enrollment growth and rapid advancements in online education and virtual learning environments, many scholars, educators, and public policy analysts continue to question the efficacy of online learning, particularly for students who are at higher risk of failure, such as underserved community college students (e.g., first-generation students and Pell Grant recipients) or community college students who take developmental courses. Some barriers to student success widely cited in research include technical difficulties or computer-based issues (Zavarella, 2008), lack of community or sense of belonging (Karp, 2011), poorer course design or structure (Dillon & Greene, 2003), lack of virtual student support services (Green, 2010; Zavarella, 2008), high risk student characteristics such as community college students taking developmental education courses and Pell Grant recipients (Shea & Bidjerano, 2018; Bettinger & Loeb, 2017), and race and gender bias toward students (Baker et al., 2018).

Yet, there is existing research that points to greater student success rates in online courses than F2F courses (Bailey et al., 2018; Shea & Bidjerano, 2018; Shea & Bidjerano, 2014). As many of the nation's higher education institutions continue to

embrace and prioritize online education, researchers will also continue to conduct extensive studies and provide strategies on enhancing online learning. There is great potential to re-imagine the online student experience during a time characterized by advanced technology, predictive student data analytics, and advances in adaptive learning. This re-imagining process can include strategies, such as artificial intelligence, to provide access to students who never would have considered online courses or would not have the opportunity to do so (Lucas, 2016). This re-imagining process can also point to the urgent need to improve course quality and increase student engagement rather than to eliminate the online modality itself, particularly now as more higher education institutions throughout the U.S. are embarking on this path due to the COVID-19 viral outbreak.

Under the concept of the re-imagined teaching and learning experience, Lucas (2016) suggests that a high quality online education means changing the way disciplines are taught. What is essential in the evolution of technology-enhanced learning is the genuine understanding that online pedagogy is vastly different from F2F pedagogy. Without this acknowledgement, instructors may be under a false assumption that their teaching practices, including course design and curriculum, can remain status quo. In his comprehensive analysis of the impact of technology on higher education, Lucas proposes that online instructors focus more on being facilitators rather than lecturers, as well as consider various modalities of teaching, such as asynchronous, synchronous, or blended. In doing so, the likelihood of student motivation and student engagement increases. Lucas' suggestions are aligned with the frameworks presented in the transactional distance theory (Moore, 1997),

connectivism learning theory (Siemens, 2005), and the Obsidian distributed learning theory (Victor, 2016).

Shea and Bidjerano (2014) examined national data from the National Center for Education Statistics of community college students with and without online education experiences. Contrary to popular belief, they conclude that college completion rates are higher for students who take online courses. More specifically, they found that women who take online courses are likely to graduate faster than their male counterparts. In fact, men who take exclusively F2F courses fare the worst among their peers. In addition, Shea and Bidjerano (2018) conducted research on 30 community colleges in the State University of New York (SUNY). They found that community college students who take more than 40 percent of their courses online are much less likely to attain a degree. They conclude that among community college students, the group with the highest chance of degree completion are students who take a combination of online and F2F courses in any given semester. The group with the greatest risk of not completing college are those who are enrolled in developmental education courses, which are typically math, reading, or writing courses for students who have been deemed underprepared for college-level courses.

Shea and Bidjerano (2018) believe that there is a “tipping point” at which taking too many online courses (i.e., more than 40 percent of total course load) results in a diminishing return of investment. They also suggest that the ratio of online and F2F courses depends heavily on the institution itself and whether the institution is fully equipped to deliver high quality online courses. For institutions that are not fully equipped with resources to help instructors deliver effective online education (e.g.,

professional development or training), they suggest students at those institutions take far fewer online courses. Ultimately, they recommend that community college students, particularly those who are categorized as having the greatest risk of failure, should be advised to take primarily F2F courses with only a few online courses. While this study is informative to better understand the optimal load of online success, the researchers do not take into consideration the demographic variables of the students, such as race/ethnicity, gender, and socioeconomic status, which can play a significant role in why the ratio of online and F2F course matters. This dissertation contributes to the current literature by examining the optimal online course load across these demographic variables, defined as the proportion of online courses taken out of the total number of credits taken by students.

Likely the most significant research to date on the impact of online education on student success is a study co-sponsored by the Boston Consulting Group and the Arizona State University Foundation. This study was conducted on six public leading universities and community colleges that have a strong reputation in online education, serve socioeconomically diverse student populations, and have nationally-recognized best practices in student success work in both F2F and virtual environments (Bailey et al., 2018). Simultaneously, these institutions are also very different. Arizona State University, University of Central Florida, and Georgia State University are public research institutions that represent different geographic populations. Houston Community College, Kentucky Community and Technical College System, and Rio Salado Community College are public open-access two-year institutions that also represent various student populations.

Arizona State University (ASU) is composed primarily of working adults and non-traditional students from throughout the U.S., serving nearly 90,000 undergraduate students, of whom 36 percent are Pell Grant eligible. Nearly half of the students at ASU are White, almost 20 percent at Hispanic, and 7 percent are Asian. The University of Central Florida (UCF) serves about 70,000 undergraduate students, primarily from the state, of whom 38 percent are Pell Grant eligible. More than half of the students at UCF are White, one-quarter of the population is Hispanic, and 11 percent are Black or African American. Georgia State University (GSU) has an undergraduate enrollment of 33,000 students, primarily from within the state, of whom 59 percent are Pell Grant eligible. Nearly 40 percent are Black or African American, almost 28 percent are White, and 12 percent are Asian. As one of the nation's largest community college systems, Houston Community College (HCC) serves 56,000 undergraduates, and 36 percent of these students are Pell Grant eligible. At HCC, almost 34 percent are Hispanic, 28 percent are Black or African American, and 13 percent are White. The Kentucky Community and Technical College (KCTC) System serves more than 100,000 community college students, of whom over 60 percent are Pell Grant eligible and 86 percent are White. Rio Salado Community College (RSCC) has approximately 47,000 students, of whom 18 percent are Pell Grant eligible. Nearly half are White, and one-quarter are Hispanic.

Prior to conducting their study on these six public leading universities and community colleges, Bailey et al. (2018) did a meta-analysis study of the research already done on the impacts of online education. What they found were mixed reviews on the effects on students' academic performance and very little evidence on

the financial impacts of online education to the students and the institutions. In this extensive study, the researchers found that the primary reason why these six institutions were highly successful in their delivery of online education is because they took a strategic approach to online learning, which was heavily supported by the institution's leadership. Some of these approaches include widespread online degree offerings, implementation of open educational resources,[5] and common use of adaptive technology.

With leadership support and resource allocation, these six institutions invested upfront in the design and development of high quality online courses and degree programs. In doing so, these institutions were able to achieve the following outcomes: 1) higher retention and completion rates for students who took a portion of their degree program online, 2) increased educational accessibility, particularly for Pell Grant eligible students, older students, and female students, and 3) increased institutional revenues. It is these highly effective institutions that have the appropriate infrastructure and strong leadership in place that Shea and Bidjerano (2018) would likely suggest that students can successfully take a greater load of online courses and move more quickly toward college completion.

While each of the six institutions was unique in its approach to and execution of online education, they all had commonalities that may explain their greater success in this domain. These institutions recognize that the greatest potential to improve educational access and student success during the undergraduate years is by offering

[5] Open educational resources are defined as course materials for teaching and learning that are freely available in the public domain and have been commonly licensed for widespread use and adaptation. In the context of higher education, students do not have to pay to access these course materials, thus reducing financial barriers, increasing college affordability, and improving equity and access.

both F2F and online courses and degree programs. The mixed modality provides students with flexible scheduling options that can help minimize the disruptions to their home-work-school schedules. Institutions can also advise students not to surpass the "tipping point" course load ratio described in the research by Shea and Bidjerano (2018), depending on the students' individual circumstances. These institutions also recognize the importance of delivering high quality online education by providing the support necessary for instructors to design innovative and pedagogically relevant online courses. Such course design includes having appropriate student learning outcomes, connected learning opportunities, relevant digital pedagogy, appropriate assessments, and benchmarks for high quality teaching, all of which is supported by the three online learning theories described in Chapter 2 – transactional distance theory (Moore, 1997), connectivism learning theory (Siemens, 2005), and the Obsidian distributed learning theory (Victor, 2016).

These six institutions have also been successful in online education because of their strategic and holistic delivery of virtual student support services and resources throughout the students' time at the institution, which are largely absent in for-profit institutions (Cottom, 2017). These critical services and resources include online tutoring, predictive analytics, and coaches or mentors. Coaches or mentors at these institutions offer holistic yet personalized support to help online students navigate through their courses and help them achieve an appropriate work-home-school balance. These institutions have also intentionally incorporated instructor-student touchpoints in the online environments through their learning management system, so that there exists frequent check-ins, timely feedback, and targeted support. In fact, at

Rio Salado Community College, department chairs are alerted when their online instructors do not provide timely responses to students' emails or assignments.

An additional element of success at these six institutions is the creation of and support for a virtual infrastructure, including long-term leadership and a centralized team to advance, sustain, and scale the work. The dedicated leadership team also understands the importance of predictive analytics and online education assessment. Given the fast-paced nature of technology and online environments, these institutions have successfully put in place a strong data infrastructure through the use of a dashboard. This dashboard includes the ability to monitor the progress of online students versus F2F students, student enrollment demographic changes, seat utilization rates, and many more relevant variables. Some of these institutions also use adaptive learning to personalize the student learning experience, increase student engagement, and improve overall student success.

Considerable innovations in online education continue to occur in higher education throughout the nation. Colleges and universities look to high-impact practices to achieve institutional goals related to student success. Community colleges in particular have considered the educational high-impact practices that were first coined and introduced by George D. Kuh (2008) and have since been endorsed by the Association of American Colleges & Universities (AAC&U). Some of these high-impact practices are similar to those outlined in the literature on transactional distance theory (Moore, 1997), connectivism learning theory (Siemens, 2005), and the Obsidian distributed learning theory (Victor, 2016), such as collaborative assignments

and projects, learning communities, service learning or community-based learning, internships, and global learning activities.

While high-impact practices are not new concepts in the F2F settings, the scaled and sustained implementation of these strategies in online environments is relatively new. Currently, there is no comprehensive research on the impact of implementing high-impact practices in online education. Linder and Hayes (2018) have begun the conversation through an extensive body of work that addresses the importance of high-impact practices in online education. They compiled work from a number of different educators across the U.S. who have explored and implemented some of these high-impact practices in their online classrooms. Some of the high-impact practices explored include global learning assignments, collaborative projects, writing-intensive assessments, and service learning. Critical in this literature is the understanding that these practices can be adjusted to meet the diverse needs of online learners to achieve greater student success.

What has significantly changed in recent years is the rapid growth of technological usage among new college students. There is wide evidence that technology has become a pervasive element in the lives of many new college students. Among students entering college in 2015, 83 percent cited that they at least occasionally use online materials to learn, and more than half were required by their high school teachers to use online materials to complete assignments (Keup, 2018). Effective orientation of new online college students into the world of academics includes the types of activities mentioned in the literature on transactional distance theory (Moore, 1997), connectivism learning theory (Siemens, 2005), and the

Obsidian distributed learning theory (Victor, 2016). Components such as interactive learning modules to orient new students to online education, development of an online community through group projects or peer review assignments, and active learning exercises can improve student success, all of which were explored by Linder and Hayes (2018) in their examination of high-impact practices in online education.

Another high-impact practice cited in the literature that can improve learning among new college students are first-year seminars (Linder & Hayes, 2018), a pedagogical strategy that dates back to the late 19th century embedded in new student orientations. During the 1970s, first-year seminars in U.S. higher education institutions were detached from orientations and inserted into degree programs. Online instructors who can effectively teach virtual first-year seminars have the potential to instill a successful mindset from the very beginning of a new college student's journey, thus it is important for higher education institutions to consider implementing and scaling this strategy in their online environments so that their students start off on the right foot. This is an especially important strategy for students who are considered most at risk of failure in the online environment, such as first-generation students and community college students who take developmental courses.

Researchers who have found positive findings on the impact of online education on student success have suggested that truly effective online courses are more demanding than F2F courses (Cottom, 2017; Lucas, 2016). Unlike F2F students, all online students are expected to engage in discussion to some degree, whether the engagement is via discussion boards or group assignments. Also unlike

F2F courses, online courses place heavy emphasis on strong time management skills and self-discipline because of the autonomous nature. In addition to the demands placed on the students, online environments significantly alter the role of the instructor. Online instructors are expected to be a deliverer of content and performance evaluator – as is the case in F2F courses – but they are also supposed to be an instructional architect of the learning environment and astute observer of student behaviors. If executed appropriately, online education can create more learning opportunities that are unique and difficult to replicate in F2F courses.

A comprehensive study conducted by Aslanian et al. (2019) included a survey of 1,500 prospective, current, and recently graduated fully online college students across the U.S. The purpose of the study was to gain a better understanding of the landscape of online education, the portrait of online students, and emerging trends in online learning. This survey sample consisted primarily of female students (60 percent), students between age 18 and 24 (32 percent), unmarried or single students (55 percent), students with no children (60 percent), full time workers (59 percent), and White students (64 percent). These researchers found that the majority of the online students in the study stated that they gained the necessary skills for the labor market, such as critical thinking and problem solving (85 percent), teamwork (69 percent), and oral communication (62 percent). The study also found that more than half of the students used or wanted to use mobile devices to complete their online coursework. However, unfortunately for the students, not all of the institutions represented in this study provided complete support for mobile-friendly tools or platforms. Thus, those students – and those institutions – experienced the significant

disruptions that Lucas (2016) cautioned. Additionally, the study found that students age 45 and older were significantly less likely to use or want to use a mobile device for coursework, signifying a generational difference. Much of the information concluded in this research, including demographic data, is extremely useful for higher education leaders and state and local governments to help retain and graduate their students.

While there is clearly some literature on the positive impacts of online education on student success, very little research has been done on its effects on completion rates among community college students and completion rates among a diverse student population. This dissertation will fill in that gap by analyzing the impact of online education on the time to degree completion (as measured in the number of years) of Montgomery College students. The research will use data to compare graduates who took at least one online course with those who took exclusively F2F courses over five academic years. Focusing on two student groups – online vs. F2F – allows this dissertation to remain consistent with the way data are collected in numerous national and state datasets. The study will also examine the data by race/ethnicity, gender, major of study, and socioeconomic status. While other variables noted in previous research would be valuable, such as marital status and parental status, this dissertation will focus on those four categories because they are most salient in previous research.

This case study approach is appropriate and relevant because of the characteristics of Montgomery College and the communities it serves. This in-depth examination of Montgomery College is beneficial for a number of different reasons.

The College has the general infrastructure and strong leadership in place to scale and sustain online education. There is a plethora of resources and support available to the institution to invest in online education both short-term and long-term. Much like the higher education institutions examined in many of the studies cited in the literature (Bailey et al., 2018), the College has a large and diverse student population, and it has a nationally well-renowned online education system. While a case study of Montgomery College may not lend itself to full generalizability, overall, this approach can provide the opportunity for other higher education institutions across the U.S. to extensively learn what Montgomery College has done successfully in the online education space and what area needs improvement. These conclusions can help Montgomery College leaders and other higher education institution leaders improve in the virtual teaching and learning environment.

### *The Current State of Online Education and College Completion*

As previously described, there is growing emphasis on prioritizing high quality online education in U.S. higher education institutions. Thus, it has become increasingly important to assess its impact on student success and college completion. There is a growing number of online courses, degree programs, and certificates being offered in higher education institutions throughout the U.S. Consequently, over the last several years, there has been growing interest in creating degree pathways for students so that they can seamlessly transition from a community college to a four-year institution. Thus, there have been more articulation agreements being formalized between community colleges and four-year institutions that provide significant online education than in the past. State governments have also backed up the efforts that

have been put in place through these articulation agreements as a mechanism to secure the transfer of students from the community college to the four-year institution.

Western Governors University (WGU) and Southern New Hampshire University (SNHU) – ranked as the two largest accredited virtual institutions in the U.S. – are continuously seeking to recruit successful community college graduates. Most appealing to these institutions are students who have taken and performed well in online courses at their community college. While WGU is a fully virtual institution, SNHU has nearly 94 percent of its student population taking online courses (NCES, 2019). In the state of Maryland, the largest virtual institution is the University of Maryland Global Campus (UMGC) with nearly 90 percent of its student population taking online courses (NCES, 2019). These four-year institutions continue to seek high quality online degree programs through which these students will emerge.

Many of these four-year institutions, such as SNHU, UMGC, and Arizona State University, have recently been focusing on creating articulation arguments with community colleges across the nation. In particular, SNHU just completed articulation agreements with all 14 community colleges in Pennsylvania. These agreements will allow students in the state to transfer up to 90 credits toward a Bachelor's degree, in addition to a tuition discount. SNHU also created similar deals with Kentucky, Massachusetts, and Maryland. Through this formal opportunity, students from community colleges in the state of Maryland, including Montgomery College, will be able to experience similar transfer and tuition discount benefits as

those in Pennsylvania. Statewide deals are generally unique, but over time, this may become the norm in higher education for many virtual four-year institutions that have high online enrollments. Thus, it is important that community college students are well-prepared and demonstrate success in online environments. These articulation agreements can also serve as a major incentive for students to take online courses during their community college years.

*Broader Sociological Implications*

Higher education is at a crucial junction with many social institutions. It has been called upon, traditionally and present-day, to be the source for the production and dissemination of knowledge and innovation. The changing nature of the workforce, a more globally competitive economy, changing student demographic populations, and, now, a global coronavirus outbreak have all called scholars to re-examine the significance of online education within the context of higher education. It has been strongly argued that higher education should be repositioned as a global commodity to include digitized or virtual teaching practices and learning environments (Naidoo, 2010). The survival of higher education relies heavily on adapting to global trends of greater flexibility and openness to innovation (Lucas, 2016), and its sustainability challenges the assumptions of who students should be, rather than who they really are (Young & Muller, 2010).

There is ample evidence cited in the research on the exploitation of students by for-profit institutions delivering online degree programs (Cellini, 2020; Cottom, 2017). Research also shows that online students fare more poorly than F2F students due to factors such as technical difficulties or computer-based issues (Rafalow, 2020;

Zavarella, 2008), lack of community or sense of belonging (Karp, 2011), poorer course design or structure (Lucas, 2016; Dillon & Greene, 2003), lack of virtual student support services (Cottom, 2017; Green, 2010; Zavarella, 2008), high risk student characteristics (Shea & Bidjerano, 2018; Bettinger & Loeb, 2017), and race and gender bias toward students (Baker et al., 2018). There is also discourse that there is potential disruption of technology by higher education institutions who are unwilling or unable to embrace the rapidly evolving virtual teaching and learning environments (Lucas, 2016).

There are broader sociological implications of online education in higher education that should be carefully examined. Perhaps then what is gathered and learned about online education in higher education institutions can be used to improve their infrastructure and pedagogy, as well as to increase resources and other types of support. The information can also be adapted to the primary and secondary education settings. If developed properly and sustained resourcefully, online education can be the ultimate game changer needed to increase college accessibility, reduce social inequalities, and prepare students for the 21st century, all of which will mean numerous benefits for individuals and society as a whole.

The implications of online education are far and wide. From the students' perspective, online courses may increase scheduling efficiency, increase student engagement, and improve student learning (Aslanian et al., 2019). Students are less likely to worry about schedule conflicts when choosing online courses, and they do not have to take time off from work and consequently lose some pay when taking such courses. They are able to take these courses whenever and wherever they want

without adjusting too much to their regular routine. For students who are also parents, they may not have to find child care during class time. In addition, students can potentially learn more information and retain knowledge more effectively because of the technologies and other tools utilized in the virtual setting.

From the instructors' perspective, online education may help to improve pedagogy through the incorporation of relevant and appropriate high-impact practices. It is well-known that online education calls upon a much different teaching style and pedagogy. Experienced online instructors often seek the latest technologies that will enable them to effectively teach (Lei & Gupta, 2010). Non-conventional teaching strategies such as video reflections, recorded lectures, e-portfolios, and other high-impact practices can lead to greater student engagement, reduced biases in the learning environment, and improved learning overall, which can eventually lead to greater student success (Linder & Hayes, 2018).

One of the most significant distinctions is that online instructors generally become facilitators of student learning rather than lecturers, as is commonly found in F2F courses (Lucas, 2016; Collison et al., 2000; Moore, 1997). Through appropriate facilitation, online instructors can help students construct the necessary knowledge through a carefully guided virtual discussion. They also have more time to spend in their virtual classrooms due to the nature of this setting, thus theoretically there can be increased instructor-student time. Just like students, the flexibility of online education enables instructors to dedicate more time to their teaching (Lei & Gupta, 2010).

Also, because online teaching is often asynchronous, the instructors have the opportunity to integrate a number of different teaching methods and utilize a variety of emerging technologies to regularly engage and motivate their students. With proper training, an abundance of resources, and institutional support, online instructors can and must gain the unique skill of motivating the class as a collective by focusing on each individual student's strengths and weaknesses (Dillon & Greene, 2003). However, there are no data to suggest that online instructors are widely trained on diverse student populations, so there is clearly a gap in research that can be filled in the future to further contribute to the literature on improving student success in the online environments.

More broadly, from an institutional perspective, online courses may increase institutional relevance, improve strategic planning, increase enrollment, and increase revenue (Bailey et al., 2018). As many higher education institutions struggle with total declining enrollment, online education has provided enrollment growth for many. Also, given the need to increase relevance as the landscape of higher education changes, institutions often look to online education as a way to improve their innovation with respect to their teaching practices and learning environments. Institutions can invest in the necessary technologies to allow for improved teaching and learning. On a resource level, online education can help to reduce space utilization by allocating and maximizing resources differently (Lei & Gupta, 2010). If institutions dedicate a strong infrastructure for online teaching and learning with bold leadership and support, then they may be able sustain long-term momentum. Institutions that have been successful with their online education have reported

increased revenues (Bailey et al., 2018). Higher education institutions that adopt a more entrepreneurial approach to online education can make technological and pedagogical innovations a part of their culture (Naidoo, 2010).

From a policy perspective, there exists a number of implications of online education. As information keeps growing and as technologies keep emerging, online education has become more feasible to incorporate and implement in higher education as a way for states to achieve their college completion goals. When governments create or revise regulations on education, they are now more likely to include online education as part of their strategic plan (Palvia et al., 2018). In the U.S., states have been collecting data on online education for many years as a way to monitor enrollment as well as to determine funding. As more states experience the benefits that online education provides to students, instructors, and higher education institutions, it is likely that federal, state, and local governments will be more likely to create data-informed public policies that enable online enrollment growth and create the necessary infrastructure to sustain that growth.

From a much larger and broader environmental perspective, online education may be one answer to saving the planet. Not only are the aforementioned implications noteworthy, but online education plays a tremendous role in reducing the ecological footprint of higher education (Lei & Gupta, 2010). When students take online courses, the commuting is significantly reduced. Instead of driving to and from school, they can reduce air pollution by participating in class from home or work. Having online courses also means reducing energy consumption. Institutions that offer online courses can save money and resources on heating, cooling, and lighting

that would otherwise be used in F2F courses. Online education can also reduce the amount of paper used – thus, the number of trees saved – when instructors and students conduct nearly all business in the virtual setting. In turn, these benefits help the institutions save money on costs of utilities and paper and can allocate those resources elsewhere. Ultimately, online education can be a panacea for sustainability of the planet as well as higher education.

*The Potential Impact of COVID-19 on Higher Education*

Given that the nation is in the midst of a global pandemic, it is important to include literature on the current and future impact of COVID-19 on higher education. While it may be too early to assess the long-term impact of the virus, here is what we do know. Higher education institutions throughout the U.S. are witnessing an even further decline in enrollments. Parents of recent high school graduates rank online learning very poorly, citing poor course design, little collaborative learning, and poor instruction preparation or training (Bustamante, 2020). Among recent high school graduates who intended to attend college in the Fall 2020 semester, 44 percent were unlikely to change their minds about attending their selected institution, while only 11 percent decided they were going to postpone college matriculation because of COVID-19 (Bustamante, 2020). Among current college students, 97 percent switched to virtual learning, and 63 percent believe that online instruction is worse than pre-COVID F2F learning (Bustamante, 2020).

Community colleges were hardest hit by the global pandemic, which is counter to a typical enrollment pattern during an economic recession (Gardner, 2020). The most recent data from the National Student Clearinghouse show that during the

Fall 2020 semester, these institutions experienced a 10.1 percent decline in enrollment, equivalent to 540,000 students, while enrollment at for-profit institutions rose 5.3 percent, or 789,888 students (Berrett, 2020). The decline in male enrollment was seven times that of female enrollment, a long-running trend that is likely due to more men going into technical schools or entering the labor market during economic recessions (June & Elias, 2019). The drop seen in community colleges is mostly attributed to a decline in enrollment of freshman students. While the nation is witnessing a downward trend in college enrollment across higher education institutions, the pandemic could open the door of opportunity to a more digital future. As Lucas (2016) pointed out in his comprehensive evaluation of technology, institutions that know how to embrace technology will succeed, while those who are unwilling or unable to embrace it will suffer. Particularly now when there are financial, physical, social, and mental health implications on students, it has become that much more important for institutions to invest their energy and resources and to dedicate strong leadership to connecting with their students in the virtual environment so that retention rates can be as steady as possible.

What the pandemic has uncovered for us in higher education is that there are extreme disparities in race/ethnicity and socioeconomic status. COVID-19 has exacerbated existing inequities and revealed to society these disparities in greater numbers. For many racial/ethnic minority students and students from lower socioeconomic groups, their decision to enroll in fewer classes during the pandemic may result in an increased time to degree completion. One probable reason is the inequities that COVID-19 has had on household expenses and responsibilities for

these groups of students. About 35 percent of Hispanic households and 25 percent of African American households with college students reported increased expenses in food, housing, and tuition, and they are far more likely to need financial assistance and academic flexibility (Polikoff et al., 2020). Thus, higher education institutions, particularly those that serve higher percentages of these student demographics, should pay particular attention and may want to take extra steps in providing more equitable opportunities.

# Chapter 4: Research Design

*The Setting*

The dissertation is a case study of Montgomery College in Montgomery County, Maryland. Montgomery College was established in 1946 as a public two-year institution. It is a fully accredited community college, situated in the most populous and most affluent county in the state. It has now evolved into a multi-campus institution serving over 54,000 credit and non-credit students annually and over 21,000 online student enrollments annually (Montgomery College, 2018). Montgomery College is the most diverse community college in the continental U.S., is the largest community college in the state of Maryland, and has the second largest undergraduate enrollment in the state after the University of Maryland Global Campus (UMGC). Montgomery College has been recently ranked as one of the best online community colleges in the nation and the top online community college in the state of Maryland (Montgomery College, 2020).

More than 1,600 faculty – full time and part time – teach at the institution. Over 500 faculty were trained to teach online prior to the global COVID-19 pandemic, and now over 1,000 faculty are trained to teach in the virtual environment. Its training program is deliberately comprehensive and is infused with Quality Matters (QM) – the internationally recognized faculty-centered, student-centric, and peer-reviewed process to quality assurance in the online environment. Online courses delivered at the College meet the national standards and are aligned with research-based best practices. As a result of COVID-19, the institution revamped its online

teaching training program for faculty so that it now includes additional elements of relevant online pedagogy, discipline-based pedagogy, and virtual student support services that are critical for student success. Montgomery College is a part of the MarylandOnline (MOL) Consortium, along with 19 other public two-year and four-year institutions in the state. Through its expertise, networking, and advocacy, MOL provides support to institutions that offer online learning opportunities for students to complete courses, certificates, and degree programs.

Montgomery College has seen tremendous growth in online enrollment at a time when F2F enrollment is declining, much like the rest of the nation. Approximately 20 percent of Montgomery College courses are offered online (Montgomery College, 2018). The institution offers more than 230 credit online courses and has five fully online degree programs, one of which has been recently ranked as top twelfth in the U.S. – Computer Science and Technologies. There are more than 21,000 online student enrollments annually at the institution. During academic year (AY) 2019-2020 alone, there were over 25,500 online student enrollments, which is a significant growth from the previous academic year when there was just under 24,000 online student enrollments. These online students[6] take courses that are infused with QM standards, and they have access to virtual student support services, such as counseling and advising, library resources, exam proctoring, and tutoring. Moreover, the global COVID-19 pandemic has changed the landscape of higher education in unimaginable ways. Thus, Montgomery College has focused

[6] In this study, online students refer to students who take a combination of online and F2F courses, as opposed to students who take exclusively F2F courses. At Montgomery College, much like the rest of the nation, there exists a very small number of fully online students; the majority take both online and F2F courses.

its energy and prioritized its resources to ensure that the creation of a virtual campus means that students in future semesters will have all of the necessary services and support in the virtual environment as traditionally delivered in the physical environment.

*Montgomery College Population*

Montgomery College has a current enrollment of over 54,000 students in its credit and non-credit courses, and more than 21,000 online student enrollments annually. Almost two-thirds of the student population are part time, and the majority of students are female (54 percent), Blacks (27 percent), and Hispanics (25 percent) (Montgomery College, 2018). Nearly half of the students are age 20 or younger, and almost 90 percent are Montgomery County residents. To give a snapshot of the Montgomery College student population, Table 1 provides a demographic breakdown of the students who have attended Montgomery College during the last five academic years.[7] The General Studies Degree Program is the largest degree at the College, with Business and Computer Science and Technologies as the next largest programs. During AY 2015-2016, there were 21,741 online enrollments, and this past AY 2019-2020, there were 25,564 online enrollments,[8] so there was a 17.6 percent growth over the last five academic years. It is important to capture the experiences of these online students, particularly during a time when Montgomery College witnessed tremendous

[7] Table 1 consists of the total number of students actively enrolled in each academic year. However, since the research is examining the time to degree completion between F2F and online students, the study includes only students who graduated in majors of study for which there is an online counterpart offering. Therefore, graduates of F2F certificates and other F2F only degrees are excluded. These excluded groups could potentially be subjects in an area of future research.

[8] The online enrollment for academic year 2019-2020 does not include students enrolled in courses that were originally delivered as F2F but converted into an emergency remote teaching modality as a result of the global COVID-19 pandemic.

growth in its online enrollments during these last five academic years. Some of this growth is attributed to Extended Winter,[9] which is a five-week session dedicated solely to online education at the College.

**Table 1**. **Percentage of the Student Population at Montgomery College by Race/Ethnicity, Gender, Age, Course Load, Socioeconomic Status, and Academic Year**

| | AY 2015-2016 | AY 2016-2017 | AY 2017-2018 | AY 2018-2019 | AY 2019-2020 |
|---|---|---|---|---|---|
| **Total Number of Students** | 59,901 | 58,912 | 57,410 | 55,190 | 54,335 |
| **Race/Ethnicity** | | | | | |
| Blacks or African Americans | 19 | 19 | 21 | 24 | 27 |
| Hispanics | 18 | 19 | 20 | 22 | 25 |
| Asians or Pacific Islanders | 7 | 6 | 12 | 11 | 11 |
| Native Americans | 1 | 1 | 1 | 1 | 1 |
| Whites | 39 | 35 | 22 | 22 | 22 |
| Other | 16 | 20 | 24 | 20 | 14 |
| **Gender** | | | | | |
| Females | 51 | 52 | 52 | 53 | 54 |
| Males | 49 | 48 | 48 | 47 | 46 |
| **Age** | | | | | |
| 20 and Under | 27 | 27 | 30 | 41 | 45 |
| 21 - 29 | 37 | 40 | 45 | 39 | 37 |
| 30 and Over | 36 | 33 | 25 | 20 | 18 |
| **Course Load Status** | | | | | |
| Part Time Student | 60 | 63 | 67 | 67 | 65 |
| Full Time Student | 40 | 37 | 33 | 33 | 35 |
| **Socioeconomic Status** | | | | | |
| Low Income | 49 | 43 | 51 | 53 | 54 |
| Middle Income | 46 | 52 | 45 | 43 | 41 |
| High Income | 5 | 5 | 4 | 4 | 5 |

Source: Montgomery College, Office of OIRE, 2015-2020

[9] The Extended Winter session was implemented in the academic year 2016 as an alternative online-only option for students. Courses offered during this session have a duration of five weeks. These students will not be a part of the study because the sample size is smaller, and many of them are visiting students.

It is equally important to gain an understanding of the Montgomery College faculty. This is a large institution that employs over 1,600 full time and part time faculty, and over 1,000 faculty are now trained to teach in the virtual environment. The majority of faculty are White (61 percent), female (58 percent), and between age 40 and 59 (51 percent). Nearly half of the faculty have been employed by the College for fewer than five years, and more than half have a Master's degree. Learning about the online instructors' teaching experiences, including faculty development, online teaching training, and level of comfort in this virtual environment, can offer insight into why some students succeed while others fail, potentially aligning with research done by Dillon and Greene (2003) on poor course design and Baker et al. (2018) on perceived and gender bias toward students. To give a snapshot of the Montgomery College faculty population, Table 2 provides a demographic breakdown of the faculty who have taught at Montgomery College during the last five academic years.

**Table 2. Percentage of the Faculty Population at Montgomery College by Race/Ethnicity, Gender, Age, Educational Attainment, Employment Status, Duration of Employment, and Academic Year**

| | AY 2015-2016 | AY 2016-2017 | AY 2017-2018 | AY 2018-2019 | AY 2019-2020 |
|---|---|---|---|---|---|
| **Total Number of Faculty** | 1,620 | 1,603 | 1,605 | 1,618 | 1,610 |
| **Race/Ethnicity** | | | | | |
| Blacks or African Americans | 15 | 12 | 10 | 15 | 17 |
| Hispanics | 2 | 2 | 2 | 3 | 3 |
| Asians or Pacific Islanders | 5 | 6 | 6 | 7 | 7 |
| Native Americans | 1 | 1 | 1 | 1 | 1 |
| Whites | 70 | 74 | 72 | 63 | 61 |
| Other | 7 | 5 | 9 | 11 | 12 |
| **Gender** | | | | | |
| Females | 60 | 58 | 58 | 59 | 58 |
| Males | 40 | 42 | 42 | 41 | 42 |
| **Age** | | | | | |
| 20 - 39 | 20 | 21 | 26 | 27 | 29 |
| 40 - 59 | 33 | 34 | 38 | 46 | 51 |
| 60 and Over | 47 | 45 | 36 | 27 | 20 |
| **Educational Attainment** | | | | | |
| Master's Degree | 76 | 72 | 65 | 63 | 60 |
| Doctorate or Other Terminal Degree | 24 | 28 | 35 | 37 | 40 |
| **Employment Status** | | | | | |
| Part Time Faculty | 61 | 60 | 61 | 61 | 60 |
| Full Time Faculty | 39 | 40 | 39 | 39 | 40 |
| **Duration of Employment** | | | | | |
| Fewer Than 5 Years | 15 | 27 | 35 | 48 | 49 |
| 5 - 10 Years | 30 | 20 | 18 | 15 | 20 |
| More Than 10 Years | 55 | 53 | 47 | 37 | 31 |

Source: Montgomery College, Office of OIRE, 2015-2020

***Research Questions***

While not necessarily new to higher education, online education has recently gained more attention as statistics show an exponential growth in enrollment in higher education throughout the U.S., long before the global COVID-19 pandemic. Institutions offer either a collection of online courses or comprehensive online degree programs. As technology continues to rapidly advance, and online education becomes even more prevalent and mainstream in higher education, it has become that much more important to examine and analyze the impact that this delivery format has on student success, including and most certainly, college completion. In this dissertation, the focus is on the impact of online courses – compared to F2F courses – on college completion as measured in number of years. More specifically, I examine the time to completion of students who have taken at least one online course versus those who take exclusively F2F courses, as well as a tipping point of what may be considered too many online courses. The benchmark is one online course so that the dissertation is consistent with the benchmark used in national and state data sources such as the National Center for Education Statistics and the Maryland Distance Education Survey. Qualitatively, the study also examines the influence of COVID-19 on online education at Montgomery College.

Montgomery College in Montgomery County, Maryland will be the case study because of its very diverse and large student population, along with its national online education reputation. Through a conceptual understanding of online students and their behavioral patterns and/or student characteristics, the following three

research questions (and accompanying hypotheses and null hypotheses[10]) have been established for this study:

- *Research Question 1:* Do students who have taken at least one online course experience less time to degree completion compared to their fully F2F counterparts, and how does it differ by race/ethnicity, gender, socioeconomic status, and major of study?
    - *Hypothesis:* I expect to find that students who have taken at least one online course experience less time to completion compared to their fully F2F counterparts. As suggested in research, students who take high quality online courses and receive virtual holistic student support services from their respective institution fare better than their fully F2F counterparts, particularly those who come from historically disadvantaged backgrounds (Aslanian et al., 2019; Bailey et al., 2018; Lucas, 2016; Shea & Bidjerano, 2014).
        - *Null Hypothesis:* Students who have taken at least one online course are not expected to experience less time to completion than their fully F2F counterparts.
- *Research Question 2:* What is the number of online courses that students can take before negatively impacting their time to completion, and how

[10] While including null hypotheses may not be standard for a dissertation, in this particular case, the null hypotheses for all three research questions will be explicitly stated due to the broad general audience who may be reading this dissertation.

does it differ by race/ethnicity, gender, socioeconomic status, and major of study?

    - *Hypothesis:* I expect the optimal online course load to be high, which is more than 50 percent of cumulative course load online as suggested by Shea and Bidjerano (2018). Shea and Bidjerano suggest that online students who come from historically disadvantaged backgrounds are expected to have a high tipping point if they take high quality online courses.
        - *Null Hypothesis:* The online course load is lower than 50 percent of cumulative course load online.

- *Research Question 3:* How has the global COVID-19 pandemic shaped online education at Montgomery College for online students and online instructors?
    - *Hypothesis:* I expect that faculty and students will state that the global COVID-19 pandemic will shift Montgomery College to focus and invest more in its online education system to include additional resources and services that will help improve student success. As suggested by researchers, higher education institutions that are willing to embrace the pandemic are those who will consider how best to incorporate technology and provide the necessary services (e.g., financial aid, mental health, tutoring, libraries) to help their students succeed (Bustamante, 2020; Gardner, 2020; Polikoff et al., 2020).

- *Null Hypothesis:* Faculty and students believe that the global COVID-19 pandemic will have negative implications on the Montgomery College online education and therefore lower student success.

*Data*

Montgomery College in Montgomery County, Maryland serves as the institution of focus. Being the largest community college in the state, the most diverse in the continental U.S., and ranked as one of the best online community colleges in the nation, Montgomery College is an ideal choice for the study. The primary datasets analyzed in this study come from the Montgomery College Office of Institutional Research and Effectiveness (OIRE). After receiving IRB approval from both the University of Maryland College Park and Montgomery College, the data were retrieved from OIRE. These data originate in Banner, which is a student information system that maintains student records, such as admissions, graduation, billings, and courses (including modality delivered). The information was provided in multiple Excel spreadsheets with the variables requested and then imported into SPSS for analysis.

The data requested included information on time to degree completion of fully F2F and online student graduates from the last five academic years, as well as these data broken down by race/ethnicity, gender, socioeconomic status (as measured by zip codes as pre-coded in Banner using the Montgomery County pre-established categories), and major of study. These datasets included information on nearly 3,000 graduates from the last five academic years combined. For variables that had missing

data, those student cases were omitted from the analysis, and only remaining cases were included and analyzed. For each academic year, fewer than 10 cases were dropped, which is well under 5 percent for each year. A total of 22 cases were dropped from the study for all of the academic years combined. Duplication of student records is not an issue because the cases are only for F2F and online students who graduated in each academic year; thus, if students did not graduate, they were not included in this data analysis.

In addition to these datasets from OIRE, electronic survey results of Montgomery College online instructors and online students from AY 2019-2020 were also analyzed. These electronic surveys were emailed to Montgomery College online instructors (n = 310) and online students (n = 8,109) who taught or took, respectively, at least one online credit course during AY 2019-2020.[11,12] The surveys were created via Survey Monkey and administered to their Montgomery College e-mail address (see Appendix A and Appendix B). I emailed the following items to Montgomery College online instructors and students: research project description, consent form, and the survey questions.[13] The respondents had two weeks to complete and submit the survey. At the end of this time period, there were 340 online students and 60 online instructors who completed the survey. It should be noted that these response rates are lower than the suggested 60 percent (Babbie, 1990), but it has been

[11] The transition to online or remote delivery as a result of the global COVID-19 pandemic will not be counted in the study, as this does not constitute as fully well-developed online instruction by Montgomery College definition.

[12] The surveys were administered to students and instructors from the last academic year only, since it is not possible to administer to all of the Montgomery graduates and instructors during the last five academic years.

[13] The introduction component of the survey will indicate that all survey responses will be confidential and that neither the respondents' academic standing (students) nor employment status (instructors) will be positively or negatively impacted by their participation or non-participation in the study.

recognized that response rates of 30 to 50 percent for online surveys are acceptable (Nulty, 2008).

The survey that was administered to online students were designed to understand their current learning situation and their experiences at Montgomery College, particularly in light of the global COVID-19 pandemic. There were also survey questions on the respondents' demographics to capture the profile of those who responded. The survey addresses the factors that may influence the difference in time to completion, if any, between the online students and the students who take fully F2F courses. The survey includes questions on factors that were previously concluded by researchers to reduce the likelihood of student success in online environments, such as technical difficulties or computer-based issues (Zavarella, 2008), lack of community or sense of belonging (Karp, 2011), poorer course design or structure (Dillon & Greene, 2003), lack of virtual student support services (Green, 2010; Zavarella, 2008), and race and gender bias by the instructor (Baker et al., 2018). This information may provide insight into hidden learner needs, which may reveal some strengths for and barriers to student success in online courses that may not necessarily exist in F2F courses. This information may also potentially shed light on the infrastructure of the online environments and whether or not it influences success in this type of course delivery.

The survey that was administered to online instructors focused primarily on their online learning environments, their approach and attitudes to teaching online, their expectations of online students, the various online activities and assessment conducted, and the professional development opportunities they utilized. There were

also survey questions on the respondents' demographics to capture the profile of those who responded. This information may reveal personal characteristics that may motivate or inhibit them in online environments, and information on their approach to teaching online versus F2F.

*Variables*

The dissertation research compares two student populations: F2F students (those who have never taken an online course) versus online students (those who have taken at least one online course). The Banner system differentiates between F2F and online courses. Therefore, it is easy to pull the course information to see the number of F2F courses versus online courses that students took during their time at Montgomery College. The primary dependent variable is the time to completion in number of years and is therefore a continuous variable. This variable is measured from when students take their first course until they officially graduate from Montgomery College.

The primary independent variables are categorical and include the following demographic variables: race/ethnicity, gender, socioeconomic status (as measured by zip code), and major of study. The variables of race/ethnicity, gender, and major of study are self-reported based on what is entered on the application form, which then gets entered into the BANNER system. Because it is difficult to crosswalk financial aid data with enrollment data, zip codes are used as proxy for socioeconomic status, which has already been pre-classified in BANNER.

Table 3 includes the coding mechanisms for the dependent and independent variables that will help address the research questions.

**Table 3. Numerical Values for Independent and Dependent Variable Outcomes**

| **Independent Variable** | **Measurement** | **Coding** |
|---|---|---|
| Online Course | Nominal/Dichotomous | 0 = Fully F2F<br>1 = At least one online course |
| *Online Course* | *Continuous* | *(Specifically for Research Question #2)* |
| Gender | Nominal/Dichotomous | 0 = Male<br>1 = Female |
| Race/Ethnicity | Nominal/Categorical | 0 = White<br>1 = Black or African American<br>2 = Asian or Pacific Islander<br>3 = American Indian or NativeAmerican<br>4 = Hispanic |
| Socioeconomic Status (SES) | Ordinal/Categorical | 0 = High Income<br>1 = Middle Income<br>2 = Low Income |
| Major of Study | Nominal/Categorical | 0 = General Studies<br>1 = Business<br>2 = Criminal Justice<br>3 = Computer Science and Technologies<br>4 = Early Childhood Education Technology |
| **Dependent Variable** | **Measurement** | **Coding** |
| Time to Completion (Number of Years to Completion/Graduation) | Interval/Continuous | |

*Methods*

The research used simple and multiple linear regression analyses, as well as quadratic regression, multiple response frequencies, and crosstabulations, which is an ideal design for a sociological examination and analysis of online education and college completion. Figure 1 lays out the data analysis schema to illustrate how each research question is addressed, and additional explanations on why these specific analyses were chosen are described below.

**Figure 1. Data Analysis Schema**

| Research Question | Hypothesis | Independent Variable | Dependent Variable | Statistical Procedure |
|---|---|---|---|---|
| 1 | 1 | Online Course (0, 1)<br><br>**Student Characteristics:**<br>Gender (0, 1)<br>Race/Ethnicity (0 thru 4)<br>Socioeconomic Status (0 thru 2)<br>Major of Study (0 thru 4) | Time to Completion (Number of Years to Graduation) | Simple Linear Regression<br><br>Multiple Linear Regression |
| 2 | 2 | Number of Online Courses Taken by Student Characteristics | Time to Completion (Number of Years to Graduation) | Quadratic Regression |
| 3 | 3 | | | Qualitative Descriptives using Multiple Response Frequencies and Crosstabulations |

To provide a foundation of what the sample looks like, descriptive statistics are presented, as they give a basic understanding of the data in a clear and concise summarized format. Such statistics are important because it allows for the opportunity to visualize what the data are showing, rather than just raw numbers. Descriptive statistics also allow for the presentation of data in a more meaningful way, which then allows for a simpler interpretation of the data.

Specifically, in this dissertation, these descriptive numbers can lead to a greater understanding of who the Montgomery College graduates are from the last five academic years (AY 2015-2016 through AY 2019-2020), as well as the survey respondents of online students and online instructors from AY 2019-2020. For instance, knowing the average time to degree completion for each of the student populations across the academic years may be useful in painting a portrait of their

progression. These descriptive statistics form the basis for the remainder of the quantitative analyses conducted in this dissertation study.

In addition to descriptive statistics, multivariate regression analysis was conducted. To address the first research question, an ordinary least squares (OLS) regression analysis was conducted to assess the relationships outlined in this question. This type of regression is beneficial for this research because it helps to test if there is a linear relationship between the dependent and independent variables. The equation is:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + \varepsilon$$

where Y is the dependent variable caused by independent variables $X_{1,}\ X_{2,\ldots}\ X_k$. The X subscript ($_{1,\ 2,\ \ldots\ k}$) denotes the number of independent variables in the equation. In this equation, the k subscript specifies the number of independent variables. The α is the constant, representing the value of Y (dependent variable) when $X_{1,}\ X_{2,\ldots}\ X_k$ (independent variables) and ε (an error term that represents the cumulative effect of all causes beyond the stated independent variables) are equal to zero. Each β, beta coefficient, represents the change in Y (dependent variable) produced by a unit increase in the X (the independent variable) when the other Xs (independent variables) are held constant (Marsh, 2005; Babbie, 2004; McClendon, 1994).

An OLS regression analysis was the best method to address the first research question because the dependent variable (i.e., time to degree completion as measured in number of years) is continuous, while the numerous independent variables (e.g., race/ethnicity, gender, socioeconomic status as measured by zip codes, and program

of study) are categorical. These variables were examined and analyzed for both the fully F2F students and the online students.

To address the second research question to determine what the optimal online course load is for a Montgomery College online student, which by default excludes the fully F2F sample from this analysis, a quadratic least squares regression analysis was the best method. To successfully carry out this type of regression, the dependent variable is now continuous as it captures the number of online courses. Out of the 20 courses taken by students to complete the 60 credits necessary to receive an Associate's degree, a quadratic least squares regression can best determine at which point in an online course load does the time to degree completion become negatively impacted (i.e., there is an increase in the number of years to degree completion). The information was also analyzed for the independent variables – race/ethnicity, gender, socioeconomic status as measured by zip codes, and program of study.

In addition to replicating the method used by Shea and Bidjerano (2018) in their study of tipping points, a quadratic regression is beneficial for this specific research question because it helps to test the non-linear relationship between the dependent and independent variables, unlike linear regressions such as multiple stepwise (Meyers et al., 2017). This method is used specifically to estimate the values of the unknown parameters whereby the data are fitted by a method of successive approximations. The result is a regression equation that is used to make predictions. The equation is:

$$y = a_i x^2 + b_i x + c_i$$

where Y is the dependent variable caused by independent variable X. In this equation, *a*, *b*, and *c* are constants, and *a* is a non-zero constant (Nielsen, 2015).

To address the third research question, I analyzed the responses from Survey Monkey using functions offered by the advanced version of the online survey tool. For this dissertation, Survey Monkey's capabilities to conduct cross-tabulations of the desired variables, as well as a tag and count of key words or key phrases of open-ended responses, were used. When specifically examining the open-ended question on the influence of COVID-19 on online education, the key words or key phrases that commonly appeared in the responses included "faculty training," "student support," "more online courses," and "course structure." There were numerous variations of these responses, and ultimately, they were grouped into appropriate categories. Responses that included these key phrases were then grouped in Survey Monkey and individually reviewed to determine commonalities for further analysis.

Ultimately, there were three major themes that cut across the survey respondents of the survey for online instructors and four major themes from the survey of online students. The three major themes from the surveys to online instructors are: 1) professional development or training opportunities in the virtual environment, 2) redesign of course structure and organization, and 3) consideration of additional online degree programs, certificates, and courses. The four major themes that came from the surveys to online students are: 1) enhanced student orientation for improved online learning, 2) redesign of course structure and organization, 3) consideration of additional online degree programs, certificates, and courses, and 4) increased embedded virtual support. The student and instructor populations of the

surveys were from AY 2019-2020. Given the time constraints of the research, it was not feasible to track down and survey previous students and instructors.

Collectively, the responses to the open-ended survey question may provide insight to Montgomery College administrators on the direction of online education as they plan for a post-pandemic institution. There could potentially be insight on the infrastructure of online education, professional development and support for online instructors, and institutional resources for online students at Montgomery College. The results may also shed light on the challenges that the institution faces as the landscape of higher education rapidly changes, particularly in the wake of possible statewide articulation agreements with virtual four-year institutions such as Southern New Hampshire University and Arizona State University, and now, the global COVID-19 viral outbreak. College administrators may be able to use the findings to assess the financial implications of online education, both from an institutional perspective as well as the student perspective. Research findings may also serve as guidance on best practices for other institutions to consider.

*Data and Methods Limitations*

The demographic information on record is based on self-reporting on the college application form, so there is potential for self-reporting bias and/or omission of information regarding their personal characteristics, such as gender and race/ethnicity. In addition, to be consistent with the national and state metrics, the benchmark of one online course (i.e., independent variable) compared with no online course is used. However, when analyzing the tipping point using the quadratic least squares regression, the independent variable becomes continuous because the

measurement is based on the number of online courses. Also, because it is difficult to crosswalk financial aid data with enrollment data, zip codes are used as proxy for socioeconomic status, similar to the way they are categorized by the Montgomery County Department of Health and Human Services when analyzing health factors and outcomes (Cruz-Cano & Liu, 2018). In the case of Montgomery College, the separation of financial aid data with all other data is primarily due to the sensitivity of the information.

A major limitation to using the OLS regression technique is that only linear relationships can be ascertained and thus causality cannot be determined. Therefore, one must be careful in making predictions based off of this technique (McClendon, 1994). However, positive or negative correlations between the independent and dependent variables can be made, though with caution. A major limitation to using the quadratic least squares technique is that there is a strong sensitivity to outliers, which can seriously affect the results on a non-linear analysis. Thus, similarly as with the OLS regression technique, one must also be cautious in making predictions using the quadratic least squares technique (Nielsen, 2015).

# Chapter 5: Results

*Purpose of the Research*

The purpose of the research is to examine whether taking at least one online course reduces the time to degree completion and if this varies by race/ethnicity, gender, socioeconomic status, and major of study; whether there is a tipping point at which taking too many online courses increases the time to completion and also if this varies by the aforementioned variables; and how COVID-19 may have influenced online education at Montgomery College. The data used for this analysis come from the Montgomery College OIRE of student graduates from the last five academic years (AY 2015-2016 through AY 2019-2020),[14] along with electronic surveys administered to online instructors and online students during AY 2019-2020. The three research questions addressed in this dissertation are:

- *Research Question 1:* Do students who have taken at least one online course experience less time to degree completion compared to their fully F2F counterparts, and how does it differ by race/ethnicity, gender, socioeconomic status, and major of study?
- *Research Question 2:* What is the number of online courses that students can take before negatively impacting their time to completion, and how

[14] Only students who graduated from the five online degree programs for which there is a F2F counterpart are included in the data analysis. Doing so enables us to assess if there is a difference in time to completion between students who take fully F2F courses versus online courses that make up the specified major. These five online degree programs are also among the largest degree programs offered at Montgomery College and therefore will capture many of the student graduates.

does it differ by race/ethnicity, gender, socioeconomic status, and major of study?

- *Research Question 3:* How has the global COVID-19 pandemic shaped online education at Montgomery College for online students and online instructors?

To address this first research question, I analyzed the data of Montgomery College graduates from the last five academic years (AY 2015-2016 through AY 2019-2020). The continuous dependent variable is the time to completion for both groups – F2F students versus online students – as measured by the number of years to graduation. This dependent variable is measured from when students take their first course until they officially graduate from Montgomery College. For each student population, the categorical independent variables analyzed were F2F versus online, race/ethnicity, gender, socioeconomic status (as measured by zip codes), and major of study. The race/ethnicity and gender variables are the same categories used by Montgomery College in its Banner system, which are self-reported and come from the application form. The socioeconomic status is replaced by zip codes, since it is difficult to crosswalk financial aid data with enrollment data because of the way Montgomery College collects its data. As self-reported independent variables, the five majors of study chosen for this dissertation are those for which there is an online degree program at Montgomery College, which implies that courses are available online for students to earn a degree. Typically, at Montgomery College, online courses are also available in the F2F delivery.

To address this research question on whether taking at least one online course reduces time to degree completion, compared to zero online course, I examined the data of Montgomery College graduates during the last five academic years. It is important to note, as mentioned before, that because the research is examining the time to degree completion between F2F and online students, the study includes only students who graduated in majors of study for which there is an online counterpart offering. Therefore, graduates of F2F certificates and other F2F only degrees are excluded. These excluded groups could potentially be subjects in an area of future research.

*Descriptive Statistics*

***Student Characteristics***

The population for this research (who took at least one online course, $n$ = 2542; F2F, $n$ = 402) consisted of Montgomery College graduates in academic years (AY) 2015-2016 (online, $n$ = 267; F2F, $n$ = 58), AY 2016-2017 (online, $n$ = 401; F2F, $n$ = 81), AY 2017-2018 (online, $n$ = 505; F2F, $n$ = 88), AY 2018-2019 (online, $n$ = 643; F2F, $n$ = 82), and AY 2019-2020 (online, $n$ = 726; F2F, $n$ = 93). Upon further inspection of the data, Native American students were excluded entirely from the analysis because of the low numbers ($n < 3$). Also excluded from the data were Hispanic students and Criminal Justice, Computer Science and Technologies, and Early Childhood Education Technology majors from some of the course modalities due to the low numbers of graduates during those academic years. Table 4 shows the results of the overall demographic statistics of Montgomery College graduates in the last five academic years.

### *Average Time to College Completion*

Table 5 shows the time to degree completion by displaying the average timeframe for each of the student populations across the academic years. This information paints a portrait of their progression. For these online student graduates – male, Black or African American, low income, high income, General Studies, and Business – the average time to college completion within the five academic years was slightly less than those who were fully F2F in those categories. Finally, in looking at the total five academic year span for online and F2F students, there appears to be no difference in the average time to completion, with both groups experiencing 4.5 years.

**Table** 4. **Descriptive Statistics of Student Graduates at Montgomery College by Online Courses, Gender, Race/Ethnicity, Socioeconomic Status, Major of Study, and Academic Year**

| | AY 2015-2016 | | | | AY 2016-2017 | | | | AY 2017-2018 | | | | AY 2018-2019 | | | | AY 2019-2020 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Online | | F2F | | Online | | F2F | | Online | | F2F | | Online | | F2F | | Online | | F2F | |
| | *N* | % | *N* | % | *N* | % | *N* | % | *N* | % | *N* | % | *N* | % | *N* | % | *N* | % | *N* | % |
| Online Courses | | | | | | | | | | | | | | | | | | | | |
| Yes | 267 | 100 | 0 | 0 | 401 | 100 | 0 | 0 | 505 | 100 | 0 | 0 | 643 | 100 | 0 | 0 | 726 | 100 | 0 | 0 |
| F2F | 0 | 0 | 58 | 100 | 0 | 0 | 81 | 100 | 0 | 0 | 88 | 100 | 0 | 0 | 82 | 100 | 0 | 0 | 93 | 100 |
| Gender | | | | | | | | | | | | | | | | | | | | |
| Male | 142 | 53 | 42 | 72 | 217 | 54 | 52 | 64 | 231 | 46 | 49 | 56 | 292 | 45 | 42 | 51 | 353 | 49 | 53 | 57 |
| Female | 125 | 47 | 16 | 28 | 184 | 46 | 29 | 36 | 274 | 54 | 39 | 44 | 351 | 55 | 40 | 49 | 373 | 51 | 40 | 43 |
| Race/Ethnicity | | | | | | | | | | | | | | | | | | | | |
| White | 82 | 31 | 23 | 40 | 135 | 33.7 | 30 | 37 | 188 | 37 | 33 | 38 | 226 | 35 | 25 | 30 | 239 | 32.9 | 45 | 48 |
| Black or African American | 81 | 30 | 5 | 9 | 147 | 36.7 | 20 | 25 | 152 | 30 | 20 | 23 | 234 | 36.4 | 28 | 34 | 266 | 37 | 27 | 29 |
| Asian or Pacific Islander | 72 | 27 | 17 | 29 | 94 | 23.4 | 18 | 22 | 132 | 26 | 26 | 30 | 150 | 23.3 | 25 | 30 | 176 | 24 | 20 | 22 |
| Native American | -- | -- | 0 | 0 | -- | -- | -- | -- | -- | -- | 0 | 0 | -- | -- | 0 | 0 | -- | -- | 0 | 0 |
| Hispanic | 31 | 11.6 | 13 | 22 | 23 | 5.7 | 12 | 15 | 32 | 6 | 9 | 10 | 31 | 5 | 4 | 5 | 44 | 6 | -- | -- |
| Socioeconomic Status | | | | | | | | | | | | | | | | | | | | |
| High Income | 9 | 3 | 5 | 9 | 19 | 5 | 5 | 6 | 23 | 5 | 6 | 7 | 24 | 4 | 4 | 5 | 41 | 6 | 7 | 8 |
| Middle Income | 99 | 37 | 17 | 29 | 155 | 39 | 35 | 43 | 205 | 41 | 41 | 47 | 257 | 40 | 36 | 44 | 273 | 38 | 45 | 48 |
| Low Income | 159 | 60 | 36 | 62 | 227 | 57 | 41 | 51 | 277 | 55 | 41 | 47 | 362 | 56 | 42 | 51 | 412 | 57 | 41 | 44 |
| Major of Study | | | | | | | | | | | | | | | | | | | | |
| General Studies | 26 | 10 | 4 | 7 | 135 | 34 | 31 | 38 | 231 | 46 | 55 | 63 | 346 | 54 | 62 | 76 | 425 | 59 | 59 | 63 |
| Business | 176 | 66 | 42 | 72 | 179 | 45 | 37 | 46 | 192 | 38 | 30 | 34 | 200 | 31 | 16 | 20 | 188 | 26 | 24 | 26 |
| Criminal Justice | 11 | 4 | 5 | 9 | 12 | 3 | 4 | 5 | 7 | 1 | -- | -- | 10 | 2 | 0 | 0 | 9 | 1 | 0 | 0 |
| Computer Science and Tech | 49 | 18 | 7 | 12 | 70 | 17 | 9 | 11 | 71 | 14 | -- | -- | 82 | 13 | 3 | 4 | 100 | 14 | 10 | 11 |
| Early Childhood Education Tech | 5 | 2 | 0 | 0 | 5 | 1 | 0 | 0 | 4 | 1 | 0 | 0 | 5 | 1 | -- | -- | 4 | 1 | 0 | 0 |

**Table 5. Average Time to College Completion (in Years) of Student Graduates at Montgomery College by Demographic Variables and Academic Year**

| | AY 2015-2016 | | AY 2016-2017 | | AY 2017-2018 | | AY 2018-2019 | | AY 2019-2020 | | 5 Year Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Online | F2F | Online | F2F | Online | F2F | Online | F2F | Online | F2F | Online | F2F |
| Gender | | | | | | | | | | | | |
| Male | 4.6 | 5.4 | 4.5 | 4.1 | 4.9 | 5.0 | 4.3 | 4.6 | 4.2 | 4.4 | 4.4 | 4.7 |
| Female | 4.9 | 4.7 | 4.7 | 4.4 | 4.9 | 4.1 | 4.0 | 4.3 | 4.4 | 4.3 | 4.5 | 4.3 |
| Race/Ethnicity | | | | | | | | | | | | |
| White | 4.3 | 5.0 | 4.3 | 2.9 | 5.0 | 4.7 | 4.1 | 4 | 3.9 | 4.2 | 4.3 | 4.2 |
| Black or African American | 4.9 | 7.6 | 4.5 | 5.0 | 5.1 | 4.9 | 4.2 | 4.5 | 4.5 | 4.5 | 4.6 | 4.8 |
| Asian or Pacific Islander | 4.1 | 3.5 | 4.7 | 3.9 | 3.9 | 3.4 | 3.4 | 3.6 | 3.7 | 4.6 | 3.9 | 3.8 |
| Native American | -- | n/a | -- | -- | -- | n/a | -- | n/a | -- | n/a | 5.2 | 7.3 |
| Hispanic | 6.6 | 6.7 | 6.2 | 6.4 | 7.3 | 6.7 | 7.6 | 12.8 | 7.5 | -- | 7.1 | 7.1 |
| Socioeconomic Status | | | | | | | | | | | | |
| High Income | 4 | 7.7 | 5.3 | 3.7 | 4.8 | 7.5 | 5.1 | 1.9 | 4.4 | 6.5 | 4.7 | 5.7 |
| Middle Income | 4.1 | 4.5 | 4.5 | 3.1 | 4.4 | 4.4 | 4.1 | 3.8 | 4.2 | 3.5 | 4.3 | 3.8 |
| Low Income | 5.2 | 5.1 | 4.6 | 5.3 | 5.2 | 4.3 | 4.1 | 5.3 | 4.3 | 4.9 | 4.6 | 5.0 |
| Major of Study | | | | | | | | | | | | |
| General Studies | 4.8 | 3.5 | 4.2 | 4.2 | 4.7 | 4.3 | 4.1 | 4.6 | 4.5 | 4.8 | 4.4 | 4.5 |
| Business | 4.4 | 5.3 | 4.7 | 4.0 | 4.9 | 5.2 | 4.3 | 3.6 | 3.9 | 3.8 | 4.4 | 4.5 |
| Criminal Justice | 5.9 | 6.3 | 7.5 | 6.3 | 5.3 | -- | 5.7 | n/a | 6.5 | n/a | 6.3 | 6.2 |
| Computer Science and Tech | 5.3 | 4.4 | 4.5 | 4.2 | 5.0 | -- | 3.6 | 3.6 | 3.6 | 3.3 | 4.2 | 3.8 |
| Early Childhood Education Tech | 6.6 | n/a | 6.1 | n/a | 11.6 | n/a | 7.9 | -- | 8.1 | n/a | 7.9 | 13.8 |
| Online Courses | | | | | | | | | | | | |
| Yes | 4.7 | | 4.6 | | 4.9 | | 4.1 | | 4.3 | | 4.5 | |
| F2F | | 5.2 | | 4.2 | | 4.6 | | 4.5 | | 4.4 | | 4.5 |

Notes: "—" denotes no data because these student groups were excluded due to very small values (n < 3). "n/a" denotes no student graduates for that category.

Table 6 shows the time to degree completion by the number of online courses taken across the academic years. Compared to fully F2F students, who averaged 4.5 years to college completion across the five academic years, students who took fewer than seven online courses experienced a lower average time to completion. Once these students took seven or more online courses, their average time to completion is higher than that of fully F2F students.

**Table 6. Average Time to College Completion (in Years) of Student Graduates at Montgomery College by Academic Year and Number of Online Courses Taken**

| Online Courses | AY2015-2016 | AY2016-2017 | AY2017-2018 | AY2018-2019 | AY2019-2020 | 5 Year Total |
|---|---|---|---|---|---|---|
| F2F | 5.2 | 4.2 | 4.6 | 4.5 | 4.4 | 4.5 |
| 1 | 4.9 | 4.3 | 4.5 | 4.3 | 4.3 | 4.4 |
| 2 | 4.2 | 4.1 | 4.7 | 3.6 | 3.5 | 3.9 |
| 3 | 4.3 | 4.4 | 4.5 | 3.8 | 4.4 | 4.3 |
| 4 | 3.7 | 4.3 | 4.6 | 4.5 | 4.3 | 4.4 |
| 5 | 5.0 | 3.7 | 5.1 | 4.2 | 4.0 | 4.3 |
| 6 | 4.8 | 5.7 | 5.0 | 3.1 | 3.7 | 4.3 |
| 7 | 5.1 | 4.3 | 4.8 | 4.4 | 5.0 | 4.7 |
| 8 | 4.3 | 6.4 | 5.4 | 5.0 | 3.7 | 4.8 |
| 9 | 5.7 | 6.4 | 5.9 | 5.2 | 5.6 | 5.6 |
| 10 | 3.6 | 4.5 | 4.9 | 3.6 | 5.3 | 4.6 |
| 11 | 12.1 | 3.7 | 5.5 | 4.8 | 5.4 | 5.2 |
| 12 | 5.6 | 5.4 | 5.9 | 3.5 | 4.6 | 4.8 |
| 13 | 7.5 | 4.0 | 5.8 | 5.9 | 4.2 | 5.3 |
| 14 | 6.6 | 8.3 | 9.8 | 4.2 | 6.5 | 6.6 |
| 15 | -- | 13 | 6.4 | 3.7 | 5.9 | 5.9 |
| 16 | 4.3 | 5.5 | 2.9 | 3.4 | 3.6 | 3.6 |
| 17 | 5.3 | 15.5 | 8.6 | 2.0 | -- | 8.0 |
| 18 | -- | 5.3 | 6.2 | 10.2 | 2.3 | 7.4 |
| 19 | 6.1 | 5.8 | 7.3 | 6.4 | 3.9 | 6.0 |
| 20 | -- | 6.8 | 7.0 | -- | 5.9 | 6.4 |

Note: -- denotes that there were no student graduates in that specific category during that academic year.

*Research Findings*

***Time to Degree Completion***

*Research Question 1:* Do students who have taken at least one online course experience less time to degree completion compared to their fully F2F counterparts, and how does it differ by race/ethnicity, gender, socioeconomic status, and major of study?

This research question seeks to determine whether students who have taken at least one online course experience less time to degree completion compared to their fully F2F counterparts. It is important to note that only students who graduated in majors of study for which there is an online counterpart offering are included in the study, so graduates of F2F certificates and other F2F only degrees are excluded. A multiple linear regression analysis was performed to assess whether taking at least one online course predicts reduced time to degree completion, and how this differed by race/ethnicity, gender, socioeconomic status, and major of study. Multiple linear regression analyses were performed separately to assess this for students who took at least one online course and those who were fully F2F.

In this analysis, the baseline reference categories (coded as 0) were fully F2F, White, male, high income and General Studies. Effect sizes for this analysis were measured by the *R*-squared ($R^2$) and squared semi-partial correlation coefficient ($sr^2$). $R^2$ is the variance proportion of a dependent variable which is explained by multiple independent variables in the regression model that range from a minimum value of 0 to a maximum value of 1. Squared semi-partial correlation coefficient is the proportion of the variance in the predicted variable that is uniquely explained by the

independent variables. As suggested by Cohen (1988), effect sizes measured by $sr^2$ are usually small (.01 to .08), medium (.09 to .24), and large (.25 or greater).[15]

The multiple linear regression model is statistically significant, ($F(8, 3305) = 42.031$, $p = .000$, $R^2 = .092$). The model accounted for only 9 percent of the variability in time to completion explained by the independent variables.[16] As shown in Table 7, the time to completion for online students is 1.154 years less than fully F2F students, though this result is not statistically significant. Moreover, statistically significant results indicate that Hispanic ($b = 2.778$, $p < .001$, $sr^2 = .008$), middle income ($b = -2.018$, $p < .01$, $sr^2 = .003$), and Computer Science and Technologies ($b = 10.716$, $p < .01$, $sr^2 = .004$) are significant in predicting time to completion. Holding constant other variables, time to completion increases for Hispanic students compared to White students by 2.778 years. In addition, time to completion for middle income students decreases by 2.018 years relative to high income students, holding constant all other variables. Finally, time to completion for

[15] A test for multicollinearity was conducted before calculating the binomial logistic regression analysis to measure the strength of the linear relationships among the variables in a set. Variance of inflation factor (*VIF*) measures the correlation and strength of the relationship among the predictor variables in a regression model and was deemed the most appropriate method to detect multicollinearity. Hair et al. (1995) and Cohen (1988) noted that the maximum acceptable level of *VIF* should be 10, so anything over 10 is a clear signal of multicollinearity.

[16] Multicollinearity test results indicated that multicollinearity was not a concern (female, *VIF* = 8.205; Asian or Pacific Islander, *VIF* = 9.138; Hispanic, *VIF* = 6.141; Business, *VIF* = 7.997; online course x Hispanic, *VIF* = 7.533; online course x Business, *VIF* = 8.723; online course x Business, *VIF* = 3.897; online course x Business, *VIF* = 3.158; and online course x Business, *VIF* = 2.638). However, for some variables, multicollinearity was a concern (fully F2F, *VIF* = 18.518; Black or African American, *VIF* = 11.500; low income, *VIF* = 30.321; middle income, *VIF* = 31.092; Business, *VIF* = 1.173; Criminal Justice, *VIF* = 13.649; Computer Science and Technologies, *VIF* = 24.206; online course x female, *VIF* = 11.562; online course x Black or African American, *VIF* = 13.924; online course x Asian, *VIF* = 10.903; online course x low income, *VIF* = 38.631; online course x middle income, *VIF* = 34.731; online course x Criminal Justice, *VIF* = 14.036; online course x Computer Science and Technologies, *VIF* = 24.222).

Computer Science and Technologies majors relative to General Studies majors increases by 10.716 years, holding constant all other variables.

Also shown in Table 7, the online course and middle income interactions ($b$ = 1.527, $p < .05$, $sr^2 = .001$) and the online course and Computer Science and Technologies majors interactions ($b$ = -7.552, $p < .05$, $sr^2 = .002$) are also significant in predicting time to completion. Holding constant other variables, time to completion for online middle income students versus fully F2F middle income students increases by 1.527 years relative to online high income students versus fully F2F high income students. Finally, time to completion for online Computer Science and Technologies majors versus fully F2F Computer Science and Technologies majors decreases by 7.552 years relative to online General Studies majors versus fully F2F General Studies majors given that all other variables are held constant. The null hypothesis is rejected.

The unique variance explained by each of the independent variables indexed by the squared semi-partial correlations was small. Results demonstrated that Hispanic (1 percent), middle income (0.3 percent), Computer Science and Technologies (0.4 percent), interactions of online course and middle income (0.1 percent) and online course and Computer Science and Technologies (0.2 percent) uniquely predicted a statistically significant proportion of variation of time to completion. The null hypothesis was rejected. Conversely, the other student characteristics were not predictors of time to completion; thus, the null hypothesis is retained.

In general, statistically significant results from the multiple regression analysis shown in Table 7 show that for Hispanic students, the average time to completion is 2.8 years longer than for White students. For middle income students, the average time to completion is 2 years less than for high income students. For Computer Science and Technologies majors, the average time to completion is 10.7 years longer than General Studies majors. For online middle income students versus fully F2F middle income students, the average time to completion increases by 1.5 years relative to online high income students versus fully F2F high income students. Finally, time to completion for online Computer Science and Technologies majors versus fully F2F Computer Science and Technologies majors decreases by 7.6 years relative to online General Studies majors versus fully F2F General Studies majors.

The most notable result is that of the Computer Science and Technologies majors. The difference in time to degree completion of this group is an outlier and can be explained by considering the nature of the students who typically major in this discipline and the nature of the industry itself. These students may be those who work full time and attend school part time and thus an online degree program best suits their schedules. Also, given the complexity of the computer science industry, the degree requirements may also be as complex and very rigorous, creating some hurdles along the way for students to complete in a timely fashion.

Some research concludes that online students fare worse than their fully F2F counterparts (Leeds et al., 2013; Hart, 2012; Xu & Jaggers, 2011). Some of the factors for this differential outcome cited in additional research include technical difficulties or computer-based issues (Zavarella, 2008), lack of community or sense

of belonging (Karp, 2011), poorer course design or structure (Dillon & Greene, 2003), and lack of virtual student support services (Green, 2010; Zavarella, 2008). This may explain why online middle income students fare worse in terms of time to completion their fully F2F middle income students. However, the multiple linear regression analysis shows that particularly for online Black or African American students, online Hispanic students, and online Asian female students,[17] they have a slightly reduced time to completion than their fully F2F counterparts, suggesting that these groups who have been historically marginalized or disadvantaged are possibly receiving additional support or services in their online courses than those in F2F settings.

[17] The findings for these online student groups are not statistically significant but are being shared for the broader general audience.

**Table 7. Multiple Linear Regression Analysis Results**

| | *b* | S.E. | *βeta* | *t* | *p* | $sr^2$ | *95 CI* for *b* | |
|---|---|---|---|---|---|---|---|---|
| Online Courses (*base* = Fully F2F) | -1.154 | .725 | -.122 | -1.593 | .111 | .001 | -2.575 | .266 |
| Female (*base* = Male) | -.481 | .331 | -.074 | -1.452 | .147 | .001 | -1.130 | .169 |
| Black or African American | .468 | .416 | .068 | 1.125 | .260 | .000 | -.348 | 1.284 |
| Asian or Pacific Islander | -.340 | .405 | -.045 | -.841 | .401 | .000 | -1.134 | .453 |
| Hispanic (*base* = White) | 2.778*** | .569 | .215 | 4.879 | .000 | .010 | 1.661 | 3.894 |
| Low Income | -1.000 | .649 | -.153 | -1.540 | .124 | .001 | -2.272 | .273 |
| Middle Income (*base* = High Income) | -2.018** | .651 | -.304 | -3.098 | .002 | .003 | -3.295 | -.741 |
| Business | -.153 | .339 | -.023 | -.450 | .653 | .000 | -.817 | .512 |
| Criminal Justice | -.579 | .621 | -.061 | -.932 | .352 | .000 | -1.797 | .639 |
| Computer Science and Tech (*base* = General Studies) | 10.716*** | 3.163 | .297 | 3.388 | .001 | .004 | 4.514 | 16.919 |
| Online Course x Female | .380 | .396 | .058 | .960 | .337 | .000 | -.396 | 1.156 |
| Online Course x Black | -.176 | .471 | -.025 | -.374 | .708 | .000 | -1.100 | .748 |
| Online Course x Asian | .042 | .467 | .005 | .090 | .928 | .000 | -.874 | .958 |
| Online Course x Hispanic | -.281 | .698 | -.020 | -.403 | .687 | .000 | -1.650 | 1.087 |
| Online Course x LO | .638 | .719 | .098 | .888 | .375 | .000 | -.771 | 2.048 |
| Online Course x MID | 1.527* | .721 | .222 | 2.117 | .034 | .001 | .113 | 2.942 |
| Online Course x Business | .086 | .367 | .012 | .234 | .815 | .000 | -.633 | .805 |
| Online Course x Criminal Justice | .469 | .652 | .048 | .720 | .472 | .000 | -.809 | 1.747 |
| Online Course x Computer Science and Tech | -7.552* | 3.232 | -.205 | -2.337 | .020 | .002 | -13.889 | -1.215 |
| Online Course x Female x Black | .002 | .303 | .000 | .007 | .994 | .000 | -.591 | .595 |
| Online Course x Female x Asian | -.085 | .331 | -.008 | -.257 | .797 | .000 | -.734 | .564 |
| Online Course x Female x Hispanic | .603 | .543 | .032 | 1.111 | .267 | .000 | -.461 | 1.667 |

Note: Dependent Variable: time to completion (number of years to graduation). $R^2$ = .074.
* p < 0.05 ** p < 0.01 *** p < 0.001

### *Online Course Load for Students*

*Research Question 2:* What is the number of online courses that students can take before negatively impacting their time to completion, and how does it differ by race/ethnicity, gender, socioeconomic status, and major of study?

This research question seeks to determine the number of online courses that students can take before negatively impacting their time to completion based on select student characteristics (race/ethnicity, gender, socioeconomic status, and major of study). Since the time to degree completion is the dependent variable, only students who majored in degree programs for which there is a comparable online offering were included in the research. I performed a series of polynomial linear regression analyses to quantify this relationship, similar to the analysis performed in the Shea & Bidjerano (2018) research on the tipping point of online students at 30 SUNY community colleges.

*Male Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for male students. All two models are statistically significant: the linear component, ($F(1, 1471) = 5.038$, $p < .05$, $R^2 = .003$); and the combined linear and quadratic components, ($F(2, 1470) = 6.938$, $p < 0.01$, $R^2 = .009$). As Table 8 shows, the quadratic effects indicate that the number of online courses

taken is significant in predicting time to completion for male students (*βeta* = .204, $p < 0.01$).

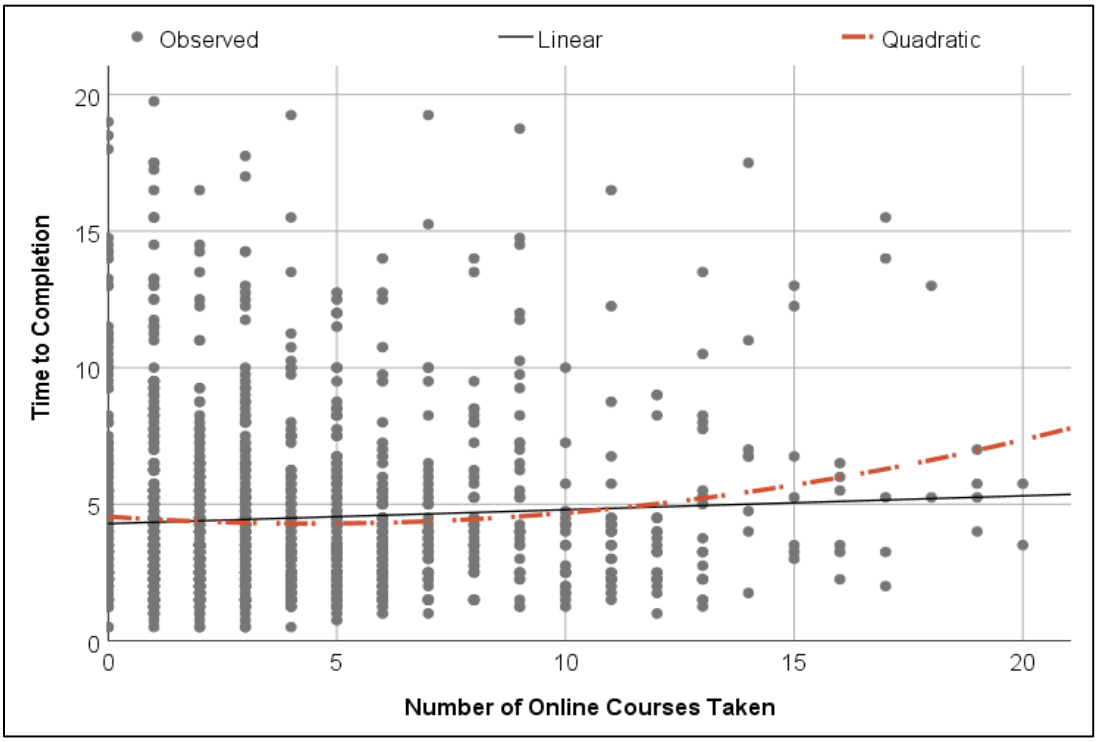
**Table 8. Quadratic Regression Analysis Results for Online Male Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | -.113 | .060 | -.130 | -1.895 | .058 | .003 |
| Quadratic | .013 | .004 | .204** | 2.968 | .003 | .009 |
| Constant | 4.544 | .143 | | 31.694 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

Figure 2 shows a scatterplot of the course load for male online students. The scatterplot of estimated standard error of measurement as a function of average time to college completion suggests a curvilinear relationship, which is confirmed by the results of the analysis. As can be seen in Figure 2, the divergent of the linear and quadratic function begins at 13 online courses taken for male students before the average time to completion increases for this population. The null hypothesis is rejected.

**Figure 2. Course Load and Time to Completion for Online Male Students**




*Female Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for female students. All two models are statistically significant: the linear component, ($F(1, 1469) = 5.222$, $p < .001$, $R^2$ =.018); and the combined linear and quadratic components, ($F(2, 1468) = 14.073$ $p < 0.001$, $R^2 = .019$). As Table 9 shows, the quadratic effects show that the number of online courses taken is not significant in predicting time to completion for female students ($\beta eta = .065$, $p = 0.349$). The null hypothesis is retained.[18]

[18] There are no scatterplots for nonsignificant quadratic results in this section.

**Table 9. Quadratic Regression Analysis Results for Online Female Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | .063 | .059 | .074 | 1.070 | .285 | .018 |
| Quadratic | .004 | .004 | .065 | .936 | .349 | .019 |
| Constant | 4.067 | .164 | | 24.761 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

*White Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for White students. All two models are statistically significant: the linear component, ($F(1, 1024) = 16.239$, $p < .001$, $R^2 = .016$); and the combined linear and quadratic components, ($F(2, 1023) = 9.221$ $p < 0.001$, $R^2 = .018$). As Table 10 shows, the quadratic effects show that the number of online courses taken is not significant in predicting time to completion for White students (*βeta* = .118, $p = 0.140$). The null hypothesis is retained.

**Table 10. Quadratic Regression Analysis Results for Online White Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | .014 | .072 | .016 | .195 | .845 | .016 |
| Quadratic | .007 | .005 | .118 | 1.478 | .140 | .018 |
| Constant | 4.003 | .178 | | 22.455 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

*Black or African American Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for Black or African American students. All two models are statistically significant: the linear component, ($F(1, 978) = 5.038$, $p < .01$, $R^2 = .007$); and the combined linear and quadratic components, ($F(2, 977) = 6.665$, $p < 0.01$, $R^2 = .013$). As Table 11 shows, the quadratic effects indicate that the number of online courses taken is significant in predicting time to completion for Black or African American students ($\beta eta = .223$, $p < 0.05$). The null hypothesis is rejected.

**Table 11. Quadratic Regression Analysis Results for Online Black or African American Students**

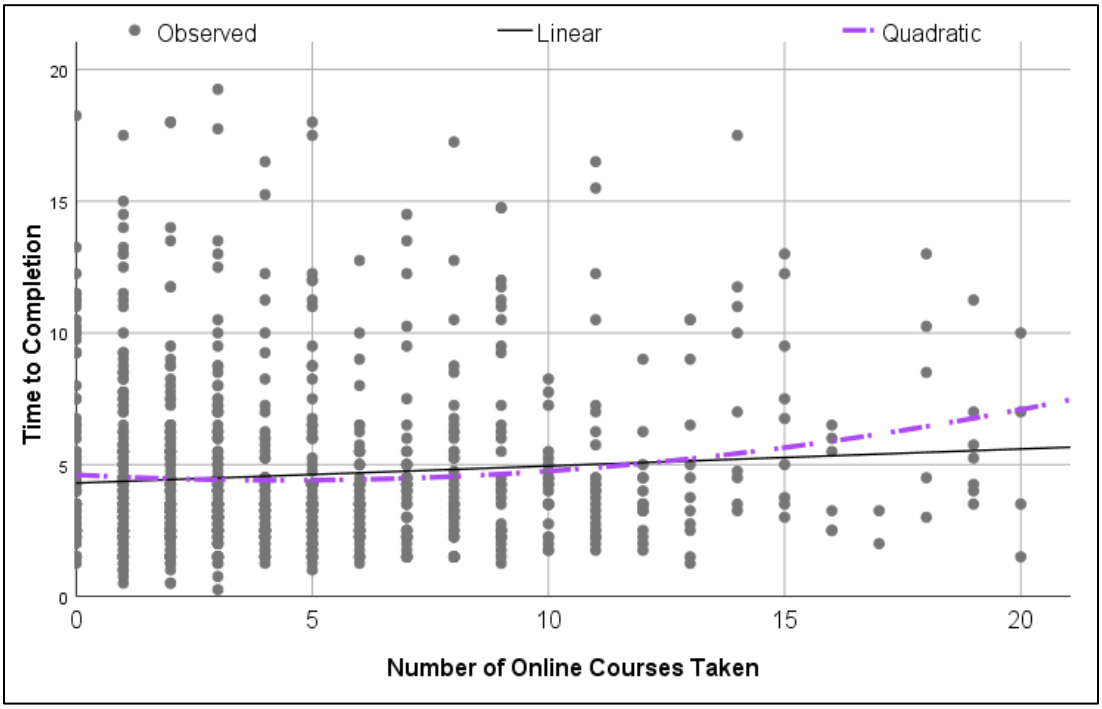
| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | -.096 | .068 | -.124 | -1.403 | .161 | .007 |
| Quadratic | .011 | .004 | .223* | 2.517 | .012 | .013 |
| Constant | 4.612 | .193 | | 23.863 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

Figure 3 shows a scatterplot of the course load for Black or African American online students. The scatterplot of estimated standard error of measurement as a function of average time to college completion suggests a curvilinear relationship, which is confirmed by the results of the analysis. In looking at the quadratic trend, it

is apparent that at almost 14 online courses taken, the average time to college completion for Black or African American students increases.

**Figure 3. Course Load and Time to Completion for Online Black or African American Students**




*Asian Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for Asian students. All two models are not statistically significant: the linear component, ($F(1, 728) = 3.042$, $p = .082$); and the combined linear and quadratic components, ($F(2, 727) = 2.474$ $p = 0.085$). As Table 12 shows, the quadratic effects indicate that the number of online courses taken is not

significant in predicting time to completion for Asian students (*βeta* = .136, *p* = 0.168). The null hypothesis is retained.

**Table 12. Quadratic Regression Analysis Results for Online Asian Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | -.049 | .078 | -.062 | -.624 | .533 | .004 |
| Quadratic | .008 | .006 | .136 | 1.379 | .168 | .007 |
| Constant | 3.836 | 0.187 | | 20.477 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

*Hispanic Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for Hispanic students. All two models are not statistically significant: the linear component, ($F(1, 198) = 2.593$, $p = .109$); and the combined linear and quadratic components, ($F(2, 197) = 2.838$ $p = 0.061$). As Table 13 shows, the quadratic effects indicate that the number of online courses taken is not significant in predicting time to completion for Hispanic students (*βeta* = -.332, *p* = 0.082). The null hypothesis is retained.

**Table 13. Quadratic Regression Analysis Results for Online Hispanic Students**

| | *b* | S.E. | *βeta* | *T* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | .401 | .180 | .422 | 2.223 | .027 | .013 |
| Quadratic | -.021 | .012 | -.332 | -1.748 | .082 | .028 |
| Constant | 6.258 | .456 | | 13.732 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

*High Income Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for high income students. All two models are not statistically significant: the linear component, ($F(1, 141) = 1.739$, $p = .189$); and the combined linear and quadratic components, ($F(2, 140) = 2.236$ $p = 0.111$). As Table 14 shows, the quadratic effects indicate that the number of online courses is not significant in predicting time to completion for high income students ($\beta eta = .373$, $p = 0.102$). The null hypothesis is retained.

**Table 14. Quadratic Regression Analysis Results for Online High Income Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | -.197 | .189 | -.236 | -1.044 | .298 | .012 |
| Quadratic | .019 | .012 | .373 | 1.647 | .102 | .031 |
| Constant | 5.042 | .505 | | 9.988 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

*Middle Income Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for middle income students. All two models are statistically significant: the linear component, ($F(1, 1161) = 23.177$, $p < .001$); and the combined linear and quadratic components, $F(2, 1160) = 11.764$, $p < .001$). As Table 15 shows, the quadratic effects indicate that the number of online courses taken is not significant in predicting time to completion for middle income students (*βeta* = .046, $p = .546$). The null hypothesis is retained.

**Table 2. Quadratic Regression Analysis Results for Online Middle Income Students**

| | *b* | S.E. | *βeta* | *t* | *P* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | .082 | .064 | .097 | 1.275 | .203 | .020 |
| Quadratic | .003 | .004 | .046 | .603 | .546 | .020 |
| Constant | 3.819 | .161 | | 23.678 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

*Low Income Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for low income students. All two models are statistically significant: the linear component, ($F(1, 1636) = 7.070$, $p < .01$, $R^2 = .004$); and the combined linear and quadratic components, ($F(2, 1635) = 7.231$, $p < 0.01$, $R^2 = .009$). As Table 16 shows, the quadratic effects indicate that the number of online courses taken is significant in predicting time to completion for low income students ($\beta eta = .180$, $p < 0.01$). The null hypothesis is rejected.

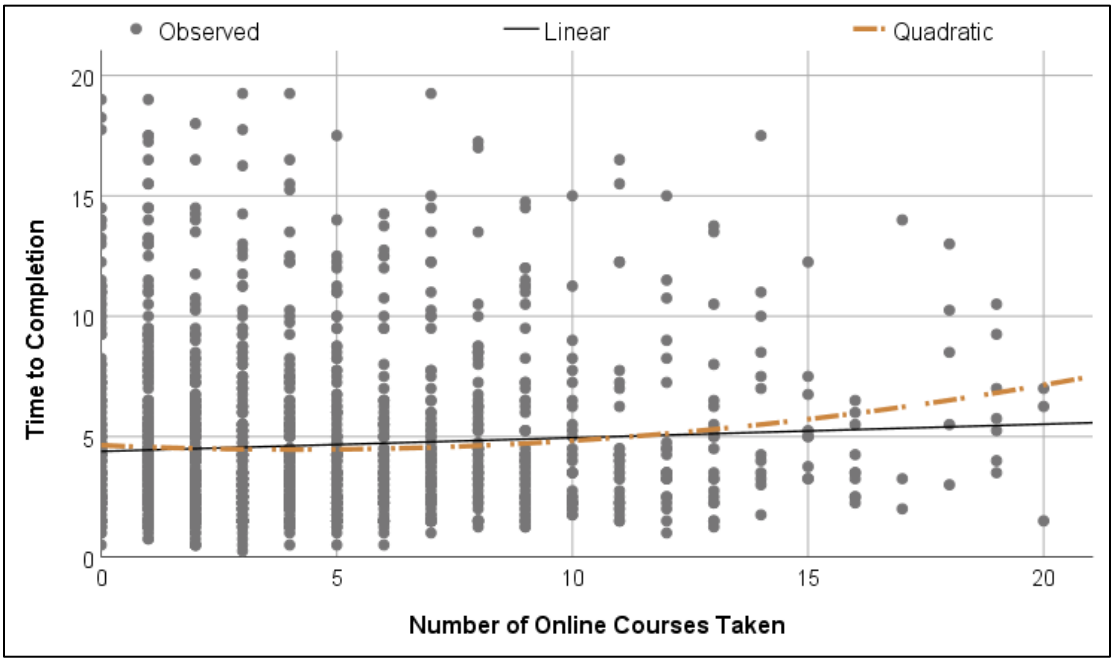
**Table 16. Quadratic Regression Analysis Results for Online Low Income Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | -.087 | .057 | -.101 | -1.528 | .127 | .004 |
| Quadratic | .011 | .004 | .180** | 2.714 | .007 | .009 |
| Constant | 4.640 | 0.151 | | 30.738 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

Figure 4 shows a scatterplot of the course load for low income online students. The scatterplot of estimated standard error of measurement as a function of average time to college completion suggests a curvilinear relationship, which is confirmed by the results of the analysis. The divergent of the linear and quadratic function begins at 13 online courses taken, after which point the average time to college completion for low income students increases.

**Figure 4. Course Load and Time to Completion for Online Low Income Students**




*General Studies Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for General Studies students. All two models are statistically significant: the linear component, ($F(1, 1372) = 7.658$, $p < .01$); and the combined linear and quadratic components, ($F(2, 1371) = 3.831$, $p < .05$). As Table 17 shows, the quadratic effects indicate that the number of online courses taken is not significant in predicting time to completion for General Studies students ($\beta eta = .007$, $p = .926$). The null hypothesis is retained.

**Table 3. Quadratic Regression Analysis Results for Online General Studies Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | .061 | .063 | .068 | .972 | .331 | .006 |
| Quadratic | .000 | .005 | .007 | .093 | .926 | . 006 |
| Constant | 4.177 | .158 | | 26.476 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

*Business Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for Business students. All two models are statistically significant: the linear component, ($F(1, 1082) = 12.676$, $p < .001$, $R^2 = .012$); and the combined linear and quadratic components, ($F(2, 1081) = 9.483$, $p < .001$, $R^2 = .017$). As Table 18 shows, the quadratic effects indicate that the number of online courses taken is significant in predicting time to completion for Business students ($\beta eta = .201$, $p < 0.05$). The null hypothesis is rejected.

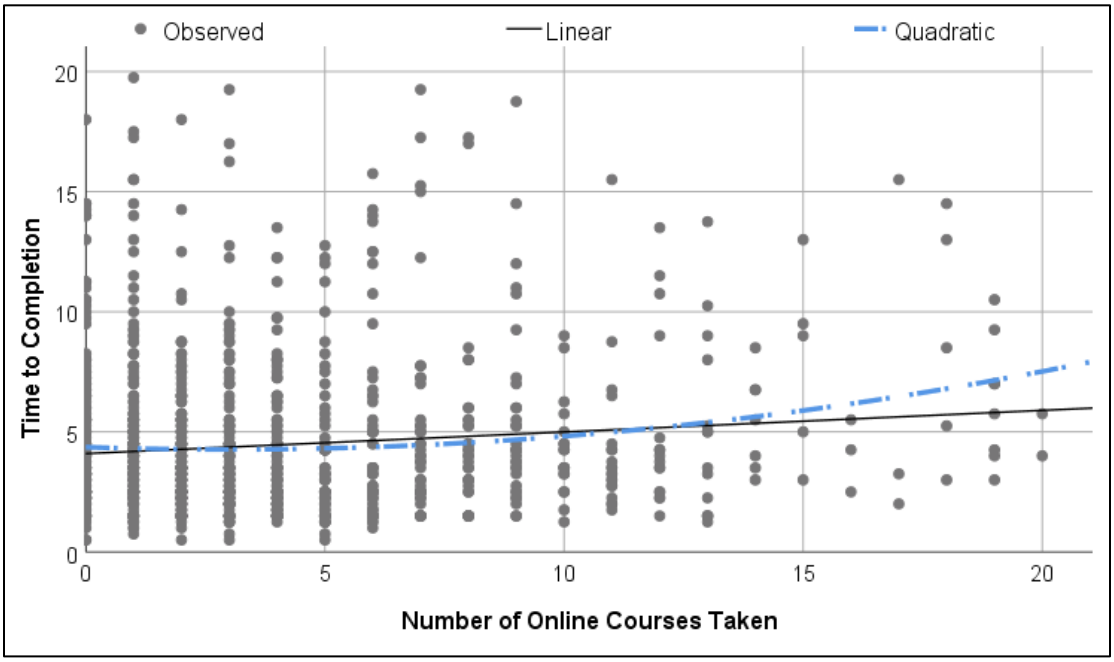
**Table 4. Quadratic Regression Analysis Results for Online Business Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | -.066 | .067 | -.079 | -.982 | .326 | .012 |
| Quadratic | .011 | .004 | .201* | 2.4986 | .013 | .017 |
| Constant | 4.362 | .175 | | 24.925 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

Figure 5 shows a scatterplot of the course load for online Business students. The scatterplot of estimated standard error of measurement as a function of average time to college completion suggests a curvilinear relationship, which is confirmed by the results of the analysis. The divergent of the linear and quadratic function begins at almost 14 online courses taken, at which point the average time to college completion for Business students increases.

**Figure 5. Course Load and Time to Completion for Online Business Students**




*Criminal Justice Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for Criminal Justice students. All two models are not statistically significant: the linear component, ($F(1, 57) = .811$, $p = .372$); and the combined linear and quadratic components, ($F(2, 56) = .667$ $p = 0.667$). As Table 19 shows, the quadratic effects indicate that the number of online courses taken is not significant in predicting time to completion for Criminal Justice students ($\beta eta = .051$, $p = 0.892$). The null hypothesis is retained.

**Table 19. Quadratic Regression Analysis Results for Online Criminal Justice Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | .047 | .248 | .071 | .189 | .851 | .014 |
| Quadratic | .002 | .014 | .051 | .136 | .892 | .014 |
| Constant | 5.980 | .701 | | 8.533 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

*Computer Science and Technologies Students*

A two-stage hierarchical polynomial linear regression analysis (entering the linear and quadratic successively) is used to predict the estimated value of the standard error of measurement as a function of time to college completion by the number of online courses taken for Computer Science and Technologies students. All two models are statistically significant: the linear component, ($F(1, 401) = 16.023$, $p < .001$, $R^2 = .038$); and the combined linear and quadratic components, ($F(2, 400) = 11.531$, $p < 0.001$, $R^2 = .055$). As Table 20 shows, the quadratic effects indicate that the number of online courses taken is significant in predicting time to completion for Computer Science and Technologies students ($\beta eta = .366$, $p < 0.01$). The null hypothesis is rejected.

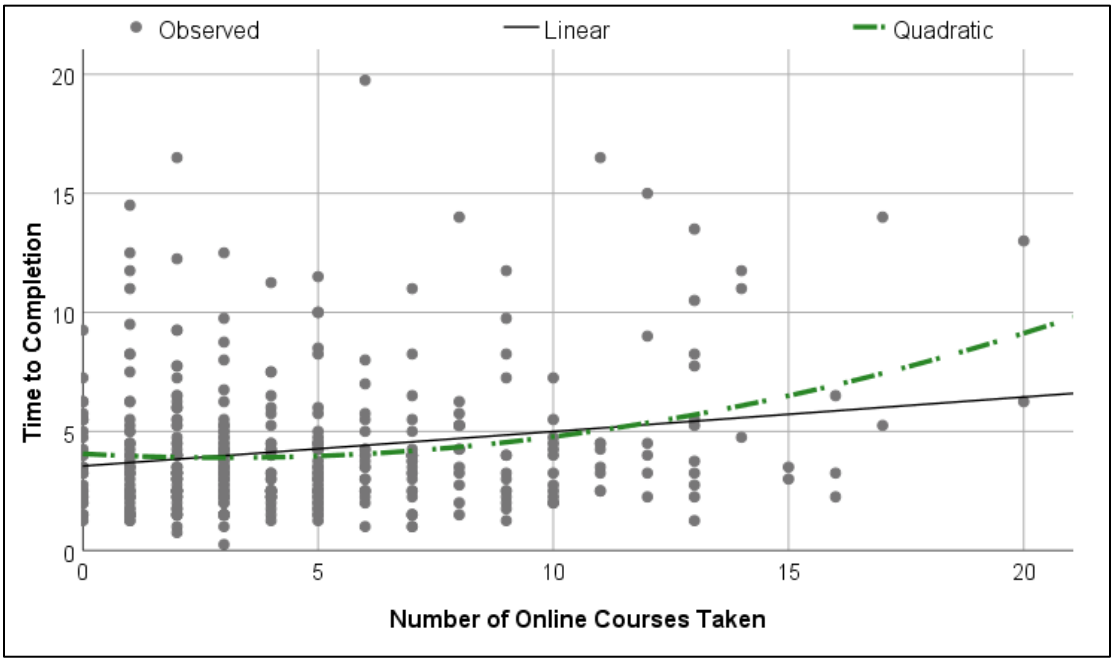
**Table 5. Quadratic Regression Analysis Results for Online Computer Science and Technologies Students**

| | *b* | S.E. | *βeta* | *t* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Number of Online Courses Taken | | | | | | |
| Linear | -.109 | .104 | -.148 | -1.051 | .294 | .038 |
| Quadratic | .018 | .007 | .366** | 2.609 | .009 | .055 |
| Constant | 4.059 | .291 | | 13.927 | .000 | |

*Note:* Dependent Variable: time to completion (number of years to graduation).
* p < 0.05 ** p < 0.01 *** p < 0.001

Figure 6 shows a scatterplot of the course load for online Computer Science and Technologies students. The scatterplot of estimated standard error of measurement as a function of average time to college completion suggests a curvilinear relationship, which is confirmed by the results of the analysis. The divergent of the linear and quadratic function begins at about 13 online courses taken, after which the average time to college completion for Computer Science and Technologies students increases.

**Figure 6. Course Load and Time to Completion for Online Computer Science and Technologies Students**




In general, statistically significant results suggest that online males, online low income students, and online Computer Science and Technologies majors experience a tipping point of 65 percent. This means that these groups can take up to 13 online courses before experiencing an increase in time to completion. Also, online Black and African American students and online Business majors can take up to 14 online courses before experiencing a rise in time to degree completion.

The higher online course load at Montgomery College, particularly for these student populations, can be explained first by the three online learning theories – transactional distance theory (Moore, 1997), connectivism learning theory (Siemens, 2005), and the Obsidian distributed learning theory (Victor, 2016). These online learning theories posit that online education is most successful if the micro-level

components of the courses, coupled with the macro-level structure of the online environment itself, work in conjunction to support student success. In addition to a strong online education structure, it can also be suggested that additional virtual support or services, such as thorough and careful advising, are being provided to these student populations, particularly those who come from marginalized or disadvantaged backgrounds.

### *How the Global COVID-19 Pandemic Shaped Online Education at Montgomery College*

#### *Academic Year 2019-2020 Online Student Characteristics*

The population ($N$ = 340) that were surveyed consisted of online students from academic year 2019-2020 at Montgomery College. The majority of these students were female (76 percent), Black or African American (28 percent), not first generation (58 percent), and enrolled full-time (56 percent). Nearly two-thirds of the respondents reported their major of study as Other), followed by General Studies (12 percent). Finally, most of the students reported taking more than three online courses (49 percent). This specific response category was added to the survey to better understand the online course load of these students during the most recent academic year 2019-2020. Table 21 presents these online students' demographic characteristics.

**Table 21. Online Student Characteristics at Montgomery College by Gender, Race/Ethnicity, Enrollment Status, First-Generation Status, Major of Study, and Number of Online Courses Taken for Academic Year 2019-2020**

| Description | *N* | % |
|---|---|---|
| Population | 340 | 100.0 |
| Gender | | |
| Male | 81 | 23.8 |
| Female | 257 | 75.6 |
| Other | 2 | 0.6 |
| Race/Ethnicity | | |
| White | 91 | 26.8 |
| Black or African American | 95 | 27.9 |
| Asian or Pacific Islander | 46 | 13.5 |
| American Indian or Native American | 2 | 0.6 |
| Hispanic | 79 | 23.2 |
| Other | 27 | 7.9 |
| Enrollment Status | | |
| Full-Time | 191 | 56.2 |
| Part-Time | 146 | 42.9 |
| Missing Data | 3 | 0.9 |
| First-Generation | | |
| Yes | 141 | 41.5 |
| No | 198 | 58.2 |
| Missing Data | 1 | 0.3 |
| Major of Study | | |
| General Studies | 42 | 12.4 |
| Business | 18 | 5.3 |
| Criminal Justice | 10 | 2.9 |
| Computer Science and Technologies | 25 | 7.4 |
| Early Childhood Education Technology | 19 | 5.6 |
| Other | 218 | 64.1 |
| Missing Data | 8 | 2.4 |
| Number of Online Courses Taken | | |
| 1 online course | 52 | 15.3 |
| 2 online courses | 60 | 17.6 |
| 3 online courses | 58 | 17.1 |
| More than 3 online courses | 168 | 49.4 |
| Missing Data | 2 | 0.6 |

*Academic Year 2019-2020 Online Faculty Characteristics*

The population ($N$ = 60) that were surveyed consisted of faculty who taught an online course from academic year 2019-2020 at Montgomery College. The majority of faculty were female (67 percent), White (65 percent) who are employed full-time (75 percent), and in the Social Sciences (47 percent). Slightly more than one-third of the online faculty said they had more than 15 years of employment at Montgomery College (38 percent). Finally, most of the faculty reported teaching more than three online courses (85 percent). Similarly as with the survey administered to online students, this specific response category of "more than three online courses" was added to the survey to better understand the online teaching course load of the faculty during the most recent academic year 2019-2020. Table 22 presents the online faculty's demographic characteristics.

**Table 22. Online Faculty Characteristics at Montgomery College by Gender, Race/Ethnicity, Employment Status, Academic Discipline, Length of Employment, and Number of Online Courses Taught for Academic Year 2019-2020**

| Description | *N* | % |
|---|---|---|
| Population | 60 | 100.0 |
| Gender | | |
| Male | 18 | 30.0 |
| Female | 40 | 66.7 |
| Other | 1 | 1.7 |
| Missing Data | 1 | 1.7 |
| Race/Ethnicity | | |
| White | 39 | 65.0 |
| Black or African American | 8 | 13.3 |
| Asian or Pacific Islander | 2 | 3.3 |
| Hispanic | 3 | 5.0 |
| Other | 8 | 13.3 |
| Employment Status | | |
| Full-Time | 45 | 75.0 |
| Part-Time | 15 | 25.0 |
| Academic Discipline | | |
| Social Sciences | 28 | 46.7 |
| Humanities | 15 | 25.0 |
| STEM | 12 | 20.0 |
| Missing Data | 5 | 8.3 |
| Length of Employment | | |
| 0-5 years | 6 | 10.0 |
| 6-10 years | 15 | 25.0 |
| 11-15 | 14 | 23.3 |
| 15+ years | 22 | 36.7 |
| Missing Data | 3 | 5.0 |
| Number of Online Courses Taught | | |
| 1 online course | 2 | 3.3 |
| 2 online courses | 4 | 6.7 |
| 3 online courses | 3 | 5.0 |
| More than 3 online courses | 51 | 85.0 |

*Survey Results*

*Research Question 3:* How has the global COVID-19 pandemic shaped online education at Montgomery College for online students and online instructors?

This research question seeks to determine how the global COVID-19 pandemic has shaped online education at Montgomery College by students and faculty. To answer this qualitative question, I analyzed descriptive statistics using multiple response frequencies (of which four themes emerged) and crosstabulation of those themes by student and faculty characteristics. There were only 229 students out of 340 who answered this question on the survey.

*Online Students*

The four themes that emanated from the multiple response frequencies for online students were:

1. Student Orientation has been enhanced for online learning
2. Course design and organization have improved
3. Additional online degree programs, certificates, and/or courses are available
4. Embedded virtual support for students have increased or improved

Out of the four themes, nearly half of the online student respondents (49 percent) said that because of COVID-19 they believe the course design and organization have improved at Montgomery College. Also, 34 percent believe embedded virtual support for students have increased or improved, 28 percent believe additional online degree programs, certificates, and/or courses were available, and 21

percent believe student orientation has been enhanced for online learning. Table 23 presents the multiple response frequencies findings for online students.

**Table 23. Multiple Response Frequencies on COVID-19 Impact on Online Education for Students**

| | Responses ($n$ = 229) | |
|---|---|---|
| | *N* | % |
| Student orientation has been enhanced for online learning | 48 | 21 |
| Course design and organization have improved | 112 | 49 |
| Additional online degree programs, certificates, and/or courses are available | 64 | 28 |
| Embedded virtual support for students have increased or improved | 78 | 34 |

A crosstabulation was performed to provide insight on the perceptions of these four themes based on the respondents' student characteristics. As shown in Table 24, across student characteristics, first-generation students (100 percent), female students (62 percent), students who took more than three courses online (57 percent), Hispanic students (51 percent), General Studies majors (50 percent), and part-time students (46 percent) believed student orientation was enhanced for online learning. When looking at course design and organization, first-generation students (98 percent), students who took more than three courses online (98 percent), part-time students (89 percent), female students, (80 percent), Black or African American students (40 percent), and General Studies majors (40 percent) believed there were improvements.

Also shown in Table 24, students who took more than three courses online (96 percent), part-time students (94 percent), first-generation students (86 percent),

female students (78 percent), General Studies majors (63 percent), and White students (31 percent) believed additional online degree programs, certificates, and/or courses were available. Finally, first-generation students (90 percent), female students (73 percent), students who took more than three courses online (68 percent), part-time students (64 percent), Black or African American students (61 percent), and General Studies majors (61 percent) believed embedded virtual support for students have either increased or improved.

**Table 24. Percentage of the Four Types of COVID-19 Impacts on Online Education by Student Characteristics**

| | Student Orientation has been Enhanced for Online Learning (n = 48) | Course Design and Organization have Improved (n = 112) | Additional Online Degree Programs, Certificates, and/or Courses are Available (n = 64) | Embedded Virtual Support for Students have Increased or Improved (n = 78) |
|---|---|---|---|---|
| Number of Online Courses Taken | | | | |
| 1 Online Course | -- | -- | -- | -- |
| 2 Online Courses | 6 | -- | -- | 9 |
| 3 Online Courses | 33 | 2 | -- | 23 |
| More than 3 Online Courses | 57 | 98 | 96 | 68 |
| Race/Ethnicity | | | | |
| Whites | 20 | 9 | 31 | 14 |
| Blacks or African American | 23 | 40 | 23 | 61 |
| Asians or Pacific Islanders | -- | 2 | 8 | -- |
| American Indians or Native American | -- | 2 | -- | -- |
| Hispanic | 51 | 36 | 30 | 25 |
| Other | -- | 11 | 5 | -- |
| Gender | | | | |
| Female | 62 | 80 | 78 | 73 |
| Course Load Status | | | | |
| Part Time Student | 46 | 89 | 94 | 64 |
| College Status | | | | |
| First-Generation | 100 | 98 | 86 | 90 |
| Major of Study | | | | |
| General Studies | 50 | 40 | 63 | 61 |
| Business | 25 | 11 | 7 | 6 |
| Criminal Justice | -- | 30 | 12 | 13 |
| Early Childhood Education Tech | -- | 9 | 10 | 17 |
| Computer Science and Tech | 25 | 10 | 8 | 3 |

Note: -- denotes that there are no data because these student groups were excluded due to very small values (n < 3).

*Online Faculty*

The three themes that emanated from the multiple response frequencies for online faculty were:

1. Faculty professional development/training has been enhanced for online teaching
2. Course design and organization have improved
3. Additional online degree programs, certificates, and/or courses are available

The vast majority of the online faculty respondents (88 percent) believe that as a result of COVID-19, the course design and organization have improved at Montgomery College. Also, 79 percent of online faculty state that professional development/training has been enhanced for online teaching, and 62 percent state that additional online degree programs, certificates, and/or courses were available. Table 25 presents the multiple response frequencies findings for online faculty.

**Table 25. Multiple Response Frequencies on COVID-19 Impact on Online Education for Faculty**

| | Responses ($n$ = 56) | |
|---|---|---|
| | *N* | % |
| Faculty professional development/training has been enhanced for online teaching | 44 | 79 |
| Course design and organization have improved | 49 | 88 |
| Additional online degree programs, certificates, and/or courses are available | 35 | 62 |

A crosstabulation was performed to provide insight on the views on the four themes based on the respondents' faculty characteristics. As shown in Table 26, across faculty characteristics, faculty who taught more than three courses online (93 percent), female faculty (68 percent), those in the Social Science disciplines (66 percent), with 10 to 15 years of employment (60 percent), faculty who are Black or African American (50 percent), and part-time faculty (45 percent) believed faculty professional development/training has been enhanced for online teaching. When looking at course design and organization, faculty who taught more than three courses online (82 percent), with 10 to 15 years of employment (80 percent), in the Social Sciences disciplines (76 percent), female faculty (47 percent), part-time faculty (47 percent), and faculty who are Black or African American (41 percent) believed there were improvements.

Also shown in Table 26, female faculty (71 percent), Social Sciences faculty (63 percent), faculty with 10 to 15 years of employment (60 percent), faculty who taught three or more online courses (57 percent), faculty who are White (41 percent), and part-time faculty (29 percent) believed additional online degree programs, certificates, and/or courses were available.

**Table 26. Percentage of the Three Types of COVID-19 Impacts on Online Education by Faculty Characteristics**

| | Faculty Professional Development/Training has been Enhanced for Online Teaching (n = 44) | Course Design and Organization have Improved (n = 49) | Additional Online Degree Programs, Certificates, and/or Courses are Available (n = 35) |
|---|---|---|---|
| Number of Online Courses Taught | | | |
| 1 Online Course | -- | -- | 9 |
| 2 Online Courses | -- | -- | 11 |
| 3 Online Courses | 7 | 16 | 23 |
| More than 3 Online Courses | 93 | 82 | 57 |
| Race/Ethnicity | | | |
| White | 5 | 31 | 41 |
| Black or African American | 50 | 41 | -- |
| Asian or Pacific Islanders | 5 | -- | 17 |
| American Indians or Native American | -- | -- | -- |
| Hispanic | 40 | 28 | 30 |
| Other | -- | -- | 9 |
| Gender | | | |
| Female | 68 | 47 | 71 |
| Employment Status | | | |
| Part Time Instructor | 45 | 47 | 29 |
| Length of Employment | | | |
| 0-5 Years | 5 | -- | 6 |
| 6-10 Years | 7 | -- | 14 |
| 10-15 years | 60 | 80 | 60 |
| More than 15 years | 28 | 16 | 20 |
| Academic Discipline | | | |
| Social Sciences | 66 | 76 | 63 |
| Humanities | 11 | 20 | 22 |
| STEM | 23 | -- | 15 |

Note: -- denotes no data because these student groups were excluded due to very small values (n < 3).

# Chapter 6: Conclusion

*Discussion*

In this dissertation, I examined Montgomery College students from the last five academic years (AY 2015-2016 through AY 2019-2020) and sought to address three research questions: whether taking at least one online course reduces the time to degree completion and if this varies by race/ethnicity, gender, socioeconomic status, and major of study; at what point in the online course load is taking too many online courses increasing the time to completion and also if this varies by the aforementioned variables; and how COVID-19 may have influenced online education at Montgomery College.

While not statistically significant, the study found that the time to completion for online students is 1.154 years less than fully F2F students. Also, on average, there is no significant difference in the average time to completion across the total five academic years for online and fully F2F students. A multiple linear regression analysis shows that both groups had an average of 4.5 years to completion across the five academic year span. For certain online student populations – males, Blacks or African Americans, high income students, low income students, General Studies majors, and Business majors – experienced an average time to completion that is lower than that of their fully F2F counterparts.

In addition, statistically significant results suggest that Hispanic students' time to completion was 2.8 years longer than for White students. Middle income students had a time to completion that is 2 years less than high income students. Computer

Science and Technologies majors experienced a time to completion that is 10.7 years longer than their General Studies counterparts. In addition, online middle income students experienced 1.5 years longer than their online high income counterparts. However, online Computer Science and Technologies graduates had a reduced time to completion of 7.6 years less than their online General Studies counterparts.

This dissertation also shows that online students at Montgomery College can take up to six online courses before they begin to experience time to completion higher than that of fully F2F students. In addition, a two-stage hierarchical polynomial linear regression analysis shows the following statistically significant results. For some groups of online student graduates – males, low income, and Computer Science and Technology majors – these groups could take up to 13 online courses (out of the 20 courses needed to accrue the 60 credits needed to graduate with an Associate's degree) before it had a negative impact on their time to degree completion. In addition, the following online student graduates – Blacks or African Americans and Business majors – could take up to 14 online courses before experiencing a decline in time to completion.

Lastly, I surveyed online instructors and online students from the last academic year to understand their perception of how the global COVID-19 pandemic has shaped the Montgomery College online education system. Descriptive statistics using multiple response frequencies and crosstabulations of dominant responses or themes were analyzed to address how the pandemic may have influenced online education.

Results show that students believed that orientation has been enhanced for improved learning, course design and organization taught by the faculty have improved, availability of additional online credentials has increased, and embedded virtual support has improved. Faculty believe that professional development/training for online teaching has been enhanced, their course design and organization have improved, and availability of online credentials has increased.

Some researchers argue that online students fare worse than their fully F2F counterparts (Leeds et al., 2013; Hart, 2012; Xu & Jaggers, 2011). Other researchers add that these poorer outcomes are due to technical difficulties or computer-based issues (Zavarella, 2008), lack of community or sense of belonging (Karp, 2011), poorer course design or structure (Dillon & Greene, 2003), and lack of virtual student support services (Green, 2010; Zavarella, 2008). However, this study shows that some groups of Montgomery College graduates who took at least one online course fared better than their fully F2F counterparts, particularly those groups who have been historically marginalized or disadvantaged – males, African Americans, and low income. These findings complicate the findings in the research conducted on race bias and poor student outcomes (Baker et al., 2018).

The online course load for Montgomery College students is relatively high, unlike the study conducted on the 30 SUNY community colleges in which their tipping point was 40 percent (Shea & Bidjerano, 2018). The higher online course load can be explained by the three online learning theories – transactional distance theory (Moore, 1997), connectivism learning theory (Siemens, 2005), and the Obsidian distributed learning theory (Victor, 2016). These online learning theories posit that

online education is most successful if the micro-level components of the courses, coupled with the macro-level structure of the online environment itself, work in tandem to support student success. All of these attributes can be found in the six public leading higher education institutions that have strong online education systems (Bailey et al., 2018).

This dissertation also indicates that Montgomery College has engaged in innovative and transformational efforts in their teaching practices and learning environments. The institution is being nimble with its online education system in response to the global COVID-19 pandemic, suggesting that it is utilizing technology and other mechanisms to improve or enhance its online course delivery (Lucas, 2016), attempting to close the digital divide (Rafalow, 2020), and increasing the necessary support services in the virtual environments that are critical for student success (Cottom, 2017).

By examining solely on Montgomery College – a leading community college in the state of Maryland on a number of different initiatives – greater knowledge about online education can help predict future trends and unveil hidden issues that can be applied to practice within Montgomery College, throughout the state of Maryland, and potentially nationwide. Using quantitative data provided by Montgomery College, the research can add context to the prevailing thought that online students fare significantly worse than exclusively F2F students. The data can also provide greater insight into possible disparities in success outcomes across various student demographic populations. In addition to the quantitative data, the

survey data can increase institutional understanding of the impact of the COVID-19 pandemic.

*Significance of the Research*

The national tragedy is that low college completion rates persist in the U.S. education system. This nationwide trend can contribute to numerous social problems, particularly among low income students, first generation students, African Americans, Hispanics, and women, all of whom have historically experienced low college completion rates. In response to this phenomenon, U.S. government leaders in recent years continue to emphasize the importance of increased educational attainment for their citizens and residents. Their common goal is to raise the percentage of college graduates. Not only are higher graduation rates important for the social and economic status of a community, but they also play a tremendous role in the fiscal health of a higher education institution. Completion rates are common metrics for institutional ranking and government funding. In some cases, completion rates are used as a factor in whether or not students enroll in those institutions. For institutions with strong online education systems, completion rates can help to improve their social status by highlighting student success in this domain. While higher education institutions across the U.S. recognize its importance, just under half increased their budgets for online education (NCES, 2019).

In the U.S., while overall total enrollment has declined, online enrollment has increased dramatically. The Integrated Postsecondary Education Data System (IPEDS) shows that in the Fall 2017 semester, there were 3.2 million undergraduate students enrolled in at least one online course at a degree-granting higher education

institution, and 2.2 million undergraduate students taking only online courses, bringing the total to 5.4 million (NCES, 2019). Students taking at least one online course comprise nearly 30 percent of all higher education enrollments, and larger higher education institutions have the greatest share of online enrollments (Seaman & Seaman, 2017). Online enrollments in the nation are primarily undergraduate enrollments, and public higher education institutions host two-thirds of all online enrollments. The majority of students who take online courses do so within their home state and take a combination of online and F2F courses at their institution. Only 21 percent of online students chose fully online degree programs because that was their only means of obtaining a degree in their field of interest, while almost half cite that their existing commitments do not allow for attendance in F2F courses (NCES, 2019).

In the state of Maryland, with the passing of the College and Career Readiness and College Completion Act (CCRCCA) in 2013, the state legislation expects that by 2025, at least 55 percent of Maryland's residents age 25 to 64 will hold an Associate's degree or higher. To achieve this goal, higher education institutions throughout the state, and specifically Montgomery College in Montgomery County, Maryland, have increased access to and improved services in online education. More than 121,000 students enrolled in Maryland higher education institutions took at least one online course (Seaman & Seaman, 2017b). The number of online students increased by almost 25 percent in the last several years (Seaman & Seaman, 2017b). The most common online degrees in the state are Business Administration and Management, followed by Nursing and Computer and Information Systems Security.

Because of the convenience and flexibility, the demand for online courses in the state of Maryland has dramatically increased. Online education provides students with an opportunity to create a better balance with home-work-school responsibilities. Online education can also improve students' financial status because its flexibility enables students to continue working while pursuing their studies without having to take time off from work, thus, no income is immediately lost. Online education can ultimately reduce time to completion because students may worry less about scheduling conflicts that may delay graduation. Some research suggests that online students are at greater risk of academic failure (Baker et al., 2018; Shea & Bidjerano, 2018; Bettinger & Loeb, 2017; Karp, 2011; Green, 2010; Zavarella, 2008; Dillon & Greene, 2003), while other studies point to greater success (Bailey et al., 2018; Shea & Bidjerano, 2018; Shea & Bidjerano, 2014).

*Implications*

Conclusions from this study can serve a number of different purposes. Firstly, the information can be utilized to enhance the teaching practices and learning environments in the virtual setting at Montgomery College. Although it is predicted that eventually the global COVID-19 viral outbreak will subside, it has been concluded that the nature of higher education has been permanently transformed, so much so that higher education institutions across the U.S. are not likely to revert back to the traditional brick-and-mortar methods (Polikoff et al., 2020; Smalley, 2020). This also means that students will have to adjust to the different delivery or modality of academic and student support services that these institutions may offer, including but not limited to mental health services, tutoring services, counseling and advising

services, and the courses themselves (Brown, 2020; McMurtrie, 2020). This also means that institutions will have to heavily invest in inclusive and equitable online learning experiences, including enhancing the online teaching training programs and creating spaces to help instructors with curriculum re-development (Darby, 2020). Thus, it is important for Montgomery College to continue putting its fingers on the pulse and maintain relevance for post-COVID-19 resilience.

Another way in which the research findings can help Montgomery College – and possibly other higher education institutions – is to guide in its creation of a virtual campus. In considering the infrastructure, services, and resources of this virtual campus, the research findings on the tipping point of an online-to-F2F course load can help counselors and program advisors appropriately advise students on the optimal combination of modalities to take to help reduce time to degree completion. They can also assist students to complete more quickly to be aligned with evolving federal and state performance metrics. Higher institutions across the U.S., particularly those whose online education system is not considered high quality, can also begin or continue discussions on their own tipping point. These discussions may then open up avenues for further discussion on how they can improve their online education and the possibility of offering fully online degree programs. Also in their efforts in a more comprehensive advising on the tipping point, institutions can consider a clearer guided pathway to degree completion so that students can be on a more appropriate track with their courses and the modalities in which they are offered.

Lastly, the conclusions of the research can be used is to examine best practices at Montgomery College. Given the College's national reputation in online education,

other higher education institutions in the state of Maryland and throughout the U.S. may be able to learn some best practices that Montgomery College has done. While not fully generalizable, what Montgomery College has done effectively can be adopted and adapted by numerous higher education institutions across the nation as they see fit. Because of its renowned online education, as suggested by state and national rankings, the College can be added to the growing list of other higher education institutions who are effective in the virtual environment, including the six public leading universities and community colleges described in the dissertation (Bailey et al., 2018). Its best practice model, including what it is currently doing in the wake of the global COVID-19 pandemic, can help other institutions develop or enhance its own online education. An important takeaway from the research findings is how students from various demographic populations fare in online environments compared to F2F environments. Wherever there are disparities in student outcomes, institutions should re-focus their energy to examining the data and making informed decisions on how to close the achievement gaps.

*Limitations*

Some limitations exist in this research that deserve consideration. The first limitation is that in this dissertation, the socioeconomic status of the students at Montgomery College was gathered by using their zip codes as a proxy measurement as typically categorized by the Montgomery County Department of Health and Human Services. Because of the way the data are gathered at the College, it is a challenge to crosswalk financial aid status with enrollment data. Thus, the zip codes, as categorized by the U.S. Census Bureau, were used instead. However, it should be

noted that one should be cautious about this proxy measurement, as zip codes may not be the most reliable indicator of socioeconomic status of a population. If possible and available to use from the institution, the better measurements are actual incomes and/or Pell grant eligibility status.

Another limitation in the study is that only the independent variables salient in previous research were analyzed. These include race/ethnicity, gender, socioeconomic status (using zip codes as proxy measurements), and program of study. Once again, because of the way the information is collected at Montgomery College, it was not possible to crosswalk other – and perhaps equally relevant – demographic student variables with enrollment data. Additional independent variables that may be useful for future research and analysis, if possible and available from the institution, would be employment status, parental status, marital status, and first-generation status, among many others. Analyzing these variables may help better understand which groups are benefitting from and experiencing challenges in online education.

*Future Research*

The dissertation started long before the global COVID-19 pandemic began. While much of the examination of online education is on the design, leadership, infrastructure, and resources that existed pre-COVID-19, the viral outbreak has opened doors of opportunities for future researchers to assess how the pandemic is going to re-direct higher education over the next several years. There are numerous trends already happening, such as declining total college enrollment, increasing online college enrollment, shifting demographic student populations, low college

completion rates, and an economic recession. Many higher education institutions have been moving in the direction of re-imagining the student experience by incorporating virtual student support services and re-designing their online teaching training programs. This institutional re-direction has exposed many of the inequities that have long existed. Thus, there is great urgency to examine and analyze how these barriers to access may continue impacting students. There are four recommendations for future research, particularly as the nation continues to be in the midst of the global COVID-19 pandemic.

One area for future research is the examination of best practices in online course design. As platforms for student learning and engaging continue to take place in the virtual environment, it is important to evaluate the various components of online courses. To help better understand why some students are successful and why some students continue to experience challenges, future researchers should look into the way online courses are designed to see how it may impact course grades and completion rates. Future researchers may want to conduct a deep dive into the elements of the online environment (e.g., discussion boards, assignments, examinations, and announcements) to assess whether or not they align with national best practices or QM standards. In tandem, examining the online teaching training programs at these institutions is also a good step, since after all, instructors often implement in their courses what they are trained (or not trained) to do.

An additional recommendation for future research is to analyze other student demographic variables that have not been considered before by this study or previous studies. Future researchers may want to delve into other student factors, such as

employment status, parental status, marital status, first-generation status, grade point average, Pell grant eligibility status, personality traits (e.g., level of motivation, level of engagement), and other relevant variables that may predict student success outcomes. As the nation continues to experience the impact of the global COVID-19 pandemic and a shifting student demographic population, it is even more critical to gain a comprehensive understanding of which factors serve as barriers to success and which serve as predictors of success.

Another area for future research is to further delve into the reasons behind the variation in an online course load versus F2F course load at Montgomery College – or any other higher education institution, for that matter. Qualitative studies can be conducted to investigate why students at a given institution may experience a particular tipping point. For institutions with higher online course loads, such as Montgomery College, or institutions with lower online course loads, such as the 30 SUNY community colleges described in this dissertation, it may be beneficial to know why this is the case in order to better grapple how to resolve issues students may have along the way. This understanding can also help institutions know whether the challenges they experience is related to a greater need for virtual student support services, the online courses themselves, or something related to personal circumstances that evolve over time (i.e., greater responsibilities at home or work that interfere with school).

Lastly, another recommendation for future research is to conduct a longitudinal study, following students until graduation, particularly now that more and more institutions are offering online courses due to COVID-19. Doing so sooner

rather than later allows future researchers to see how online education may have changed and impacted students throughout the course of the global pandemic, in addition to other changes discussed in this dissertation, including, but not limited to, changing student demographic populations. Pulling from the results of this dissertation, a longitudinal study that examines the impact of additional independent variables, such as parental status and employment status over time, can shed some light on how online education may either benefit or harm these students. A longitudinal study also helps to better understand other factors that either support or hinder success over time, such as changes in online teaching training programs, changes in virtual student support services, changes in emerging technology, and changes in institutional support in online education. Such information can better inform higher education institutional leaders, instructors, and staff to make decisions that will help online students be more successful, no matter the obstacle.

## Appendix A

### Survey Questions to Online Students at Montgomery College

**Student Demographic Characteristics:**

1. What is your gender?
    a. Female
    b. Male
    c. Other
2. What is your race or ethnicity?
    a. White
    b. Black of African American
    c. Asian
    d. American Indian or Native American
    e. Hispanic
    f. Other (please specify)
3. What is your major (or program of study)?

    _____
4. Are you a first-generation student (i.e., you are the first member in your immediate family to attend college)?
    a. Yes
    b. No
5. What semester and year did you begin your studies at Montgomery College?

    _____

**Student Background:**

1. How many courses are you taking this semester at Montgomery College?

    _____
2. How many online courses are you taking this semester at Montgomery College? (Do not include face-to-face courses that were converted into emergency remote teaching due to the COVID-19 school closure)?

    _____

3. How many total online courses have you taken during your time at Montgomery College? (Do not include face-to-face courses that were converted into emergency remote teaching due to the COVID-19 school closure)? _____

**Online Learning Experiences:**

1. Which of the following technologies or devices do you have access to when you are off campus? (Select all that apply.)
    a. Desktop
    b. Tablet
    c. Internet
    d. Smart phone
    e. None of them
2. How would you describe your level of comfort using technology for your online course?
    a. Very comfortable
    b. Somewhat comfortable
    c. Neutral
    d. Somewhat uncomfortable
    e. Not at all comfortable
3. To what extent did the following factors influence your decision to enroll in this online course?
    a. Required for my major
        i. Strong influence
        ii. Some influence
        iii. No influence
    b. Fits with my schedule
        i. Strong influence
        ii. Some influence
        iii. No influence
    c. Enables me to reduce the time it takes to get to graduation faster

i. Strong influence
ii. Some influence
iii. No influence

d. Personal interest
    i. Strong influence
    ii. Some influence
    iii. No influence
e. Instructor reputation
    i. Strong influence
    ii. Some influence
    iii. No influence
f. Recommended by a friend/classmate
    i. Strong influence
    ii. Some influence
    iii. No influence
g. Encouraged by an advisor or faculty member
    i. Strong influence
    ii. Some influence
    iii. No influence
h. Online delivery format
    i. Strong influence
    ii. Some influence
    iii. No influence

4. Have you experienced any of the following issues in any online course at Montgomery College? (Select all that apply.)
    a. Technical difficulties or computer-based issues
    b. Lack of community or sense of belonging
    c. Lack of respect by instructor
    d. Lack of respect by classmates
    e. Poor course design or lack of structure

f. Lack of online student support services (e.g., advising, library resources)
g. Sense of racial/ethnic bias by the instructor
h. Sense of gender bias by the instructor

5. Have you experienced any of the following issues in any face-to-face course at Montgomery College? (Select all that apply.)
    a. Lack of community or sense of belonging
    b. Lack of respect by instructor
    c. Lack of respect by classmates
    d. Poor course design or lack of structure
    e. Lack of student support services on campus (e.g., advising, library resources)
    f. Sense of racial/ethnic bias by the instructor
    g. Sense of gender bias by the instructor
6. Are you also taking face-to-face courses this semester? (These face-to-face courses may have been transitioned into emergency remote teaching due to the COVID-19 school closure.)
    a. Yes – Proceed to Question 7
    b. No
7. Rate your experience in this online course compared with face-to-face courses you are taking this semester.
    a. Quality of teaching
        i. Much higher
        ii. Slightly higher
        iii. About the same
        iv. Slightly lower
        v. Much lower
    b. Quality of instructional materials
        i. Much higher
        ii. Slightly higher
        iii. About the same

iv. Slightly lower
v. Much lower

c. Level of student engagement or participation
    i. Much higher
    ii. Slightly higher
    iii. About the same
    iv. Slightly lower
    v. Much lower

d. Overall quality of learning experience
    i. Much higher
    ii. Slightly higher
    iii. About the same
    iv. Slightly lower
    v. Much lower

8. What are the advantages or strengths of learning in an online setting compared to a face-to-face setting? _____
9. What are the challenges of learning in an online setting compared to a face-to-face setting? _____
10. What resources or services does Montgomery College offer that you have used as an online student? _____
11. What additional resources or services could Montgomery College offer to help online students be more successful? _____

**Conclusion:**

1. On a scale of 1 to 5, how likely are you to enroll in another online course at Montgomery College?
    a. 1 – not at all likely
    b. 2 – somewhat unlikely
    c. 3 – neutral
    d. 4 – somewhat likely
    e. 5 – very likely

2. On a scale of 0 to 5, how likely are you to recommend an online course to a friend?
    a. 1 – not at all likely
    b. 2 – somewhat unlikely
    c. 3 – neutral
    d. 4 – somewhat likely
    e. 5 – very likely
3. What recommendations do you have for improving the success of online students at Montgomery College? _____
4. How do you think the COVID-19 pandemic has shaped online education at Montgomery College? _____

## Appendix B

### Survey Questions to Online Instructors at Montgomery College

**Instructor Demographic Characteristics:**

1. What is your gender?
    a. Female
    b. Male
    c. Other
2. What is your race or ethnicity?
    a. White
    b. Black of African American
    c. Asian
    d. American Indian or Native American
    e. Hispanic
3. In which discipline do you teach online courses?

    _____
4. What is your employment status at Montgomery College
    a. Part time faculty
    b. Full time faculty
5. How long have you been teaching at Montgomery College?

    _____

**Instructor Background:**

1. How many courses are you teaching this semester at Montgomery College?

    _____
2. How many online courses are you teaching this semester at Montgomery College? (Do not include face-to-face courses that were converted into emergency remote teaching due to the COVID-19 school closure)?

    _____
3. How many total online courses have you taught during your time at Montgomery College? (Do not include face-to-face courses that were

converted into emergency remote teaching due to the COVID-19 school closure)? _____

**Online Teaching Experiences:**

1. Which of the following technologies or devices do you have access to when you are off campus? (Select all that apply.)
    a. Desktop
    b. Tablet
    c. Internet
    d. Smart phone
    e. None of them
2. How would you describe your level of comfort using technology teaching your online course?
    a. Very comfortable
    b. Somewhat comfortable
    c. Neutral
    d. Somewhat uncomfortable
    e. Not at all comfortable
3. To what extent did the following factors influence your decision to teach online at Montgomery College?
    a. Flexible teaching schedule
        i. Strong influence
        ii. Some influence
        iii. No influence
    b. Desire for a different teaching experience
        i. Strong influence
        ii. Some influence
        iii. No influence
    c. Part of original job description
        i. Strong influence
        ii. Some influence

iii. No influence

d. Personal interest
    i. Strong influence
    ii. Some influence
    iii. No influence
e. Online education reputation at Montgomery College
    i. Strong influence
    ii. Some influence
    iii. No influence
f. Encouraged by a Montgomery College employee
    i. Strong influence
    ii. Some influence
    iii. No influence

4. Have you experienced any of the following issues while teaching any online course at Montgomery College? (Select all that apply.)
    a. Technical difficulties or computer-based issues
    b. Lack of community or sense of belonging within Montgomery College
    c. Lack of respect by colleagues
    d. Lack of professional development opportunities for online teaching
    e. Sense of racial/ethnic bias by the students
    f. Sense of gender bias by the students
5. Have you experienced any of the following issues in any face-to-face course at Montgomery College? (Select all that apply.)
    a. Lack of community or sense of belonging within Montgomery College
    b. Lack of respect by colleagues
    c. Poor course design or lack of structure
    d. Lack of professional development opportunities for face-to-face teaching
    e. Sense of racial/ethnic bias by the students
    f. Sense of gender bias by the students

6. Are you also teaching face-to-face courses this semester? (These face-to-face courses may have been transitioned into emergency remote teaching due to the COVID-19 school closure.)
    a. Yes – Proceed to Question 7
    b. No
7. Rate your experience in this online course compared with face-to-face courses you are teaching this semester.
    a. Quality of online environment
        i. Much higher
        ii. Slightly higher
        iii. About the same
        iv. Slightly lower
        v. Much lower
    b. Quality of instructional materials
        i. Much higher
        ii. Slightly higher
        iii. About the same
        iv. Slightly lower
        v. Much lower
    c. Level of student engagement or participation
        i. Much higher
        ii. Slightly higher
        iii. About the same
        iv. Slightly lower
        v. Much lower
    d. Overall quality of teaching experience
        i. Much higher
        ii. Slightly higher
        iii. About the same
        iv. Slightly lower
        v. Much lower

8. What are the advantages or strengths of learning in an online setting compared to a face-to-face setting? _____
9. What are the challenges of learning in an online setting compared to a face-to-face setting? _____
10. What resources or services does Montgomery College offer that you have used as an online instructor? _____
11. What additional resources or services could Montgomery College offer to help online instructors be more successful? _____

**Conclusion:**

1. On a scale of 1 to 5, how likely are you to teach another online course at Montgomery College?
    a. 1 – not at all likely
    b. 2 – somewhat unlikely
    c. 3 – neutral
    d. 4 – somewhat likely
    e. 5 – very likely
2. On a scale of 0 to 5, how likely are you to recommend an online course to a friend?
    a. 1 – not at all likely
    b. 2 – somewhat unlikely
    c. 3 – neutral
    d. 4 – somewhat likely
    e. 5 – very likely
3. What recommendations do you have for improving the success of online instructors at Montgomery College? _____
4. What recommendations do you have for improving the success of online students at Montgomery College? _____
5. How do you think the COVID-19 pandemic has shaped online education at Montgomery College? _____

**References**


Acker, S. (1987). Feminist theory and the study of gender and education. *International Review of Education 33*, 419-435.

Allen, I. E., & Seaman, J. (2008). Staying the course: Online education in the United States. *The Online Learning Consortium.* Retrieved from https://onlinelearningsurvey.com/reports/staying-the-course.pdf

Allen, I. E., & Seaman, J. (2011). Going the distance: Online education in the United States. *The Online Learning Consortium.* Retrieved from https://www.onlinelearningsurvey.com/reports/goingthedistance.pdf

Allen, I. E., Seaman, J., Poulin, R., & Straut, T. T. (2016). Online report card: Tracking online education in the United States. *The Online Learning Consortium.* Retrieved from https://onlinelearningsurvey.com/reports/onlinereportcard.pdf

Alon, S. (2009). The evolution of class inequality in higher education: Competition, exclusion, and adaptation. *American Sociological Review 74*: 731-755.

American Association of Community Colleges. (2019). *Fast facts 2019.* Washington, D.C.: American Association of Community Colleges.

Aslanian, C. B., Clinefelter, D. L., & Magda, A. J. (2019). *Online college students 2019: Comprehensive data on demands and preferences.* Louisville, KY: Wiley, LLC.

Aucejo, E., French, J., Araya, P. U., & Zafar, B. (2020). *COVID-19 is widening inequality in higher education.* Washington, D.C.: Center for Economic and

Policy Research.

Babbie, E. (2004). *The practice of social research.* Belmont, CA: Wadsworth Publishing Company.

Babbie, E. (1990). *Survey research methods.* Belmont, CA: Wadsworth Publishing Company.

Bailey, A., Vaduganathan, N., Henry, T., Laverdiere, R., & Pugliese, L. (2018). *Making digital learning work: Success strategies from six leading universities and community colleges.* Boston, MA: The Boston Consulting Group.

Bailey, T. R., Jaggars, S. S., & Jenkins, D. (2015). *Redesigning America's community colleges.* Cambridge, MA: Harvard University Press.

Ballantine, J. H., & Spade, J. Z. (2008). *Schools and society: A sociological approach to education.* Los Angeles, CA: Pine Forge Press.

Baker, R., Dee, T., Evans, B., & John, J. (2018). Bias in online classes: Evidence from a field experiment. *Stanford Center for Education Policy and Analysis.* Retrieved from https://cepa.stanford.edu/content/bias-online-classes-evidence-field-experiment

Bell, B. S., & Federman, J. E. (2013). E-learning in postsecondary education. *The Future of Children, 23*(1), 165-185.

Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research, 79*(3), 1243-1289.

Berrett, D. (2020). *Fall's enrollment decline now has a final tally: Here's what's behind it.* Washington, D.C.: The Chronicle of Higher Education.

Bettinger, E., & Loeb, S. (2017). Promises and pitfalls of online education. *Evidence Speaks Reports, 2*(15). Washington, D.C.: Brookings Institution.

Block, J. (2010). Distance education and the digital divide: An academic perspective. *Online Journal of Distance Learning Administration, 13*(1). Retrieved from https://www.westga.edu/~distance/ojdla/spring131/block131.html

Boysen, G. A., Vogel, D. L., Cope, M. A., & Hubbard, A. (2009). Incidents of bias in college classrooms: instructor and student perceptions. *Journal of Diversity in Higher Education, 2*(4), 219-231.

Bradford, G. R. (2011). A relationship study of student satisfaction with learning online and cognitive load: Initial results. *The Internet and Higher Education, 14*(4), 217-226.

Brown, S. (2020). *How colleges can ease students' fear and anxiety in quarantine.* Washington, D.C.: The Chronicle of Higher Education.

Buchmann, C., DiPrete, T. A., & McDaniel, A. (2008). Gender inequalities in education. *Annual Review of Sociology, 34*(1), 319-337.

Bughin, J., Manyika, J, & Woetzel, J. (2019). *The future of work in America: People and places, today and tomorrow.* Washington, D.C.: McKinsey Global Institute.

Bustamante, J. (2020). *Online education statistics.* Washington, D.C.: Education Data.

Bustamante, J. (2019). *College dropout rates.* Washington, D.C.: Education Data.

Carlson, J. A., Mignano, A., Norman, G., McKenzie, T. L., Kerr, J., Arredondo, E. M., Madanat, H., Cain, K. L., Elder, J. P., Saelens, B. E., & Sallis, J. F. (2014). Socioeconomic disparities in elementary school practices and children's physical activity during school. *American Journal of Health Promotion, 28*(30): 47-53.

Carnevale, A. P., Smith, N., & Strohl, J. (2013). *Recovery: Job growth and education requirements through 2020.* Washington, D.C.: Georgetown Public Policy Institute.

Carter, P. L., & Welner, K. G. (2013). *Closing the opportunity gap: What America must do to give every child an even chance.* New York: Oxford University Press.

Cellini, S. R. (2020). *The alarming rise in for-profit college enrollment.* Washington, D.C.: Brookings Institution.

Cimpian, J. (2018). *How our education system undermines gender equity, and why culture change – not policy – may be the solution.* Washington, D.C.: Brookings Institution.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Collison, G., Elbaum, B., Haavind, S., & Tinker, R. (2000). *Facilitating online learning: Effective strategies for moderators.* Madison, WI: Atwood Publishing.

Cottom, T. M. (2017). *Lower ed: The troubling rise of for-profit colleges in the new*

*economy*. New York: The New Press.

Croft, N., Dalton, A., & Grant, M. (2015). Overcoming isolation in distance learning: Building a learning community through time and space. *Journal for Education in the Built Environment 5*(1), 27-64.

Cruz-Cano, M. M. R., & Liu, C. (2018). *The zip coding ranking project: An analysis of health factors and health outcomes by zip code in Montgomery County, Maryland.* Montgomery County, MD: Department of Health and Human Services.

Darby, F. (2020). Teaching and learning. *The Post-Pandemic College.* Washington, D.C.: The Chronicle of Higher Education.

Darling-Hammon, L. (1998). *Unequal opportunity: Race and education.* Washington, D.C.: Brookings Institution.

Deming, D., Goldin, C. & Katz, L. (2013). For-profit colleges. *The Future of Children 23*(1): 137-163.

De Welde, K., & Stepnick, A. (2015). *Disrupting the culture of silence: Confronting gender inequality and making change in higher education.* Sterling, VA: Stylus Publishing.

Dillon, C., & Greene, B. (2003). Learner differences in distance learning: Finding differences that matter. In M. G. Moore & W. G. Anderson (Eds.) *Handbook of Distance Education.* Pp. 235-243. Mahwah, NJ: Lawrence Erlbaum Associates.

Duke, B., Harper, G., & Johnston, M. (2013). Connectivism as a digital age learning theory. *The International HETL Review.* Special Issue 2013, 4-13.

Durkheim, E. (1893). *The division of labour in society.* Paris, France: Presses Universitaires de France.

Flores, A. (2007). Examining disparities in mathematics education: Achievement gap or opportunity gap? *The High School Journal 91*(1), 29-42.

Freedman, J. (2013). Why American colleges are becoming a force for inequality. *The Atlantic.* Retrieved from https://www.theatlantic.com/business/archive/2013/05/why-american-colleges-are-becoming-a-force-for-inequality/275923/

Gaddis, S. M. (2015). Discrimination in the credential society: An audit study of race and college selectivity in the labor market. *Social Forces 93*(4), 1451-1479.

Garcia, E., & Weiss, E. (2015). Early education gaps by social class and race start U.S. children out on unequal footing: A summary of the major findings. *Inequalities at the Starting Gate.* Washington, D.C.: Economic Policy Institute.

Gardner, L. (2020). *What higher ed has learned from COVID-19 so far.* Washington, D.C.: The Chronicle of Higher Education.

Gegenfurtner, A., Quesada Pallares, C., & Knogler, M. (2014). Digital simulation-based training: A meta-analysis. *British Journal of Educational Technology 45*(6), 1097-1114.

Goldrick-Rab, S. (2016). *Paying the price: College costs, financial aid, and the betrayal of the American dream.* Chicago, IL: The University of Chicago Press.

Grawe, N. D. (2021). *The agile college: How institutions successfully navigate*

*demographic changes.* Baltimore, MD: Johns Hopkins University Press.

Grawe, N. D. (2018). *Demographics and the demand for higher education.* Baltimore, MD: Johns Hopkins University Press.

Green, K. (2010). Managing online education. *The Campus Computing Project.* Retrieved from https://www.campuscomputing.net/sites/www.campuscomputing.net/files/ManagingOnlineEd2010-ExecSummaryGraphics.pdf

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate Data Analysis* (3rd ed.). Macmillan.

Hannah-Jones, N. (2014). Segregation now… Boston, MA: The Atlantic.

Hart, C. (2012). Factors associated with student persistence in an online program of study: A review of the literature. *Journal of Interactive Online Learning, 11*(1), 19-42.

Jack, A. A. (2019). *The privileged poor: How elite colleges are failing disadvantaged students.* Cambridge, MA: Harvard University Press.

Jackson, M., & Holzman, B. (2020). A century of educational inequality in the United States. *National Academy of Sciences 117*(32), 19108-19115.

June, A. W., & Elias, J. (2019). *Where the men are.* Washington, D.C.: The Chronicle of Higher Education.

Karp, M. M. (2011). *Toward a new understanding of non-academic student support: Four mechanisms encouraging positive student outcomes in the community college.* New York, NY: Columbia University, Teachers College, Community College Research Center.

Keup., J. (2018). “First-year seminars.” In K. E. Linder & C. M. Hayes (Eds.). *High-Impact Practices in Online Education: Research and Best Practices.* Pp. 11-25. Sterling, VA: Stylus Publishing.

Khalil, M. K., & Elkhider, I. A. (2016). Applying learning theories and instructional design models for effective instruction. *Advances in Physiology Education 40,* 147-156.

Knowles, M. S. (1962). *A history of the adult education movement in the United States.* Malabar, FL: Robert E. Krieger Publishing.

Kozol, J. (1991). *Savage inequalities.* New York: Crown Publishing.

Kuh, George D. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter.* Washington, D.C.: Association of American Colleges & Universities.

Leeds, E., Campbell, S., Baker, H., Ali, R., Brawley, D., & Crisp, J. (2013). The impact of student retention strategies: An empirical study. *International Journal of Management in Education, 7*(1-2), 22-43.

Lei, S. A., & Gupta, R. K. (2010). College distance education courses: Evaluating benefits and costs from institutional, faculty, and students’ perspectives. *Education 130*(4), 616-631.

Lesane, C. B. (2020). Enrollment. *The Post-Pandemic College.* Washington, D.C.: The Chronicle of Higher Education.

Linder, K. E., & Hayes, C. M. (2018). *High-impact practices in online education: Research and best practices.* Sterling, VA: Stylus Publishing.

Lorber, J. (2010). *Gender inequality: Feminist theories and politics.* New York:

Oxford University Press.

Lucas, H.C. (2016). *Technology and the disruption of higher education.* Hackensack, NJ: World Scientific Publishing.

Marsh, K. (2005). *Black urban non-family households: Their socioeconomic position and spatial buffering.* University of Southern California.

Maryland Higher Education Commission. (2020). *MHEC 2020 data book.* Annapolis, MD: Maryland Higher Education Commission.

McClendon, M. J. (1994). *Multiple regression causal analysis.* Belmont, CA: Wadsworth Publishing Company.

McMurtrie, B. (2020). *The new rules of engagement.* Washington, D.C.: The Chronicle of Higher Education.

McNair, T. B., Bensimon, E. M., & Malcolm-Piqueux, L. (2020). *From equity talk to equity walk: Expanding practitioner knowledge for racial justice in higher education.* Hoboken, NJ: Jossey-Bass Publisher.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence based practices in online learning: A meta-analysis and review of online learning studies.* Washington, D.C.: U.S. Department of Education.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2017). *Applied multivariate research: Design and interpretation* (3rd ed). Thousand Oaks, CA: Sage.

Montgomery College (2020). *Online learning and distance education.* https://www.montgomerycollege.edu/academics/online-learning/index.html

Montgomery College. (2018). *2018 Middle States Self-Study Report.* Rockville, MD: Montgomery College.

Moore, M. (1997). Theory of transactional distance. In D. Keegan (Ed.) *Theoretical Principles of Distance Education.* Pp. 22-38. New York: Routledge.

Naidoo, R. (2010). Repositioning higher education as a global commodity: Opportunities and challenges for future sociology of education work. *British Journal of Sociology of Education 24*(2), 249-259.

National Center for Education Statistics. (2019). *Enrollment and employees in postsecondary institutions, fall 2017; and financial statistics and academic libraries, fiscal year 2017.* Retrieved from https://nces.ed.gov/pubs2019/2019021REV.pdf.

National Student Clearinghouse Research Center. (2019). *Current term enrollment estimates: Fall 2019.* Retrieved from https://nscresearchcenter.org/current-term-enrollment-estimates-2019/.

Nielsen, L. E. J. (2015). *Understanding Quadratic Functions and Solving Quadratic Functions.* University of Washington.

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: What can be done? *Assessment & Evaluation in Higher Education 33*(3), 301-314.

O'Banion, T. (1997). *A learning college for the 21st century.* Westport, CT: Oryx Press.

Office of ELITE. (2019). *Montgomery College believes Quality Matters in online instruction.* Rockville, MD: Montgomery College.

Pager, D. (2003). The mark of a criminal record. *American Journal of Sociology 108*(5), 937-975.

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S. (2018). Online education: Worldwide status, challenges, trends, and implications. *Journal of Global Information Technology Management 21*(4), 233-241.

Polikoff, M., Silver, D., & Korn, S. (2020). *What's the likely impact of COVID-19 on higher education?* Washington, D.C.: Inside Higher Ed.

Rafalow, M. H. (2020). *Digital divisions: How schools create inequality in the tech area.* Chicago: University of Chicago Press.

Seaman, J. E., & Seaman, J. (2017a). *Distance education state almanac.* Retrieved from https://files.eric.ed.gov/fulltext/ED580356.pdf

Seaman, J. E., & Seaman, J. (2017b). *Distance education state almanac: Maryland.* Retrieved from https://files.eric.ed.gov/fulltext/ED580389.pdf

Seaman, J. E., Allen, I. E., & Seaman, J. (2018). *Grade increase: Tracking distance education in the United States.* Retrieved from http://onlinelearningsurvey.com/reports/gradeincrease.pdf

Sewell, T. R. (2016). Student outcomes in traditional, hybrid, and online courses in community college career and technical education programs. (Unpublished doctoral dissertation). Johnson City, TN: East Tennessee State University.

Shea, P., & Bidjerano, T. (2014). Does online learning impede degree completion? A national study of community college students. *Computers & Education*, 75, 103-111.

Shea, P., & Bidjerano, T. (2018). Online course enrollment in community college and degree completion: The tipping point. *International Review of Research in*

*Open and Distributed Learning 19*(2), 282-293.

Siemens, G. (2005). Connectivism: A theory for the digital age. *International Journal of Instructional Technology and Distance Learning 2*(1).

Smalley, A. (2020). *Higher education responses to Coronavirus (COVID-19).* Washington, D.C.: National Conference of State Legislatures.

Spring, J. (2006). *American education.* New York, NY: McGraw-Hill.

Stevenson, B. (2020). The initial impact of COVID-19 on labor market outcomes across groups and the potential for permanent scarring. *The Hamilton Project.* Washington, D.C.: Brookings Institution.

Stout, K. A. (2020). Community colleges. *The Post-Pandemic College.* Washington, D.C.: The Chronicle of Higher Education.

Straut, T. T., & Boeke, M. (2020). *NC-SARA 2019 data report: Enrollment & out-of-state learning placements.* Boulder, CO: National Council for State Authorization Reciprocity Agreements.

Sullivan, A. (2001). Cultural capital and educational attainment. *Sociology 35*(4), 893-912.

United Nations. (2020). *Education during COVID-19 and beyond.* New York: United Nations.

U.S. Census Bureau. (2019). QuickFacts about Montgomery County, Maryland. *American Community Survey*. Washington, D.C.: U.S. Census Bureau.

U.S. Census Bureau. (2015). Percentage of Population with Associates Degree or Higher. *American Community Survey.* Washington, D.C.: U.S. Census Bureau.

U.S. Department of Education, National Center for Education Statistics. (2018). Distance education. *Digest of Education Statistics.* Washington, D.C.: U.S. Department of Education.

Victor, S., & Hart, S. (2016). *Distributed learning: A flexible learning and development model.* Washington, D.C.: E-Learn.

Von Bergen, C. W., Bressler, M. S., & Whitlock, D. W. (2020). Separate but equal on college campuses: A case of 'déjà vu' all over again. *Research in Higher Education Journal, 38*, 2-30.

Whistle, W. (2019). *Ripple effect: The cost of the college dropout rate.* Washington, D.C.: Third Way.

Xu, D., & Jaggars, S. S. (2011). The effectiveness of distance education across Virginia's community colleges: Evidence from introductory college-level math and English courses. *Educational Evaluation and Policy Analysis, 33*(3), 360-377.

Young, M., & Muller, J. (2010). Three educational scenarios for the future: Lessons from the sociology of knowledge. *European Journal of Education 45*(1), 11-27.

Zavarella, C. A. (2008). Computer-based instruction and remedial mathematics: A study of student retention at a Florida community college. (Unpublished doctoral dissertation). Tampa, FL: University of South Florida.

Zhao, H., Sullivan, K. P. H., & Mellenius, I. (2014). Participation, interaction and social presence: An exploratory study of collaboration in online peer review groups. *British Journal of Educational Technology 45*(5), 807-819.