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Impact of Online Education on Student Success Outcomes and Institutional Effectiveness: Study of Florida State University System

A Dissertation

Presented to the Faculty of the

Department of Public Policy and Administration

West Chester University

West Chester, Pennsylvania

In Partial Fulfillment of the Requirements for

the Degree of

Doctor of Public Administration

By

Maria Graham

May 2021

Dedication

I would like to dedicate my dissertation to my family, who supported me on this journey and every journey in my life.

To my wonderful husband, Dan, who took care of the household and made sure I was fed when I isolated myself with my laptop for days on end. You are my strength and sanity in this sometimes insane world.

To my son, Aiden, who is my pride and joy. You taught me patience and resilience, even when I felt like I will never finish my education.

To my loving parents, Alan and Elena, who provided me with all the tools in life to succeed. Your love and support mean more to me than you can imagine.

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Abstract

Online education has been around for several decades, but only recently has there been a boom in its integration into the public higher education sector on a larger scale. It proved instrumental to student education continuity and progression toward graduation during the COVID-19 health crisis and campus closures. Technological advances produce higher quality online courses that keep students engaged and allow for greater flexibility and accessibility, evident by its dramatic enrollment increase that outpaced the total enrollment at postsecondary institutions. Nine public universities in the State University System of Florida are analyzed to determine if greater enrollment in undergraduate online courses improves students' success outcomes and institutional effectiveness. A standard measure of these outcomes is graduation, retention, and time-to-degree rates. They are frequently used by policymakers, academic leaders, and students to evaluate institutional performance and effectiveness at meeting students' academic needs. Florida also ties its higher education funding model to these outcome measures to allocate funds integral to the institutional operation. A one-way ANOVA and panel data analysis is performed to evaluate the relationship between student enrollment in online courses and its impact on graduation, retention, and time to degree rates. The results show evidence that larger enrollment in at least some online courses positively affects graduation and retention while reducing the time to degree. These findings support that online education has more to offer than flexibility and accessibility and can improve student success outcomes and institutional effectiveness.

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Chapter 1

Introduction

Overview

In modern society, higher education is no longer optional for the students who desire more direct access to a higher earning potential and a better quality of life. University graduates are shown to earn double what people with only high school diplomas earn, and almost six times more than a high-school dropout (DesJardins et al., 2002). Bachelor's degree recipients are statistically less likely to experience prolonged unemployment and face poverty (Letkiewicz et al., 2014). Larger numbers of college graduates have a significant impact on society as a whole. A better-educated workforce fosters economic stability, reduces poverty and unemployment, decreases the need for welfare programs and government assistance, and increases tax revenue (Tentso et al., 2017). Making higher education more accessible and college degrees more attainable for a larger population should take precedence with academic leaders and legislators alike.

Technological advancements impact almost every single sector and improve organizational performance, efficiency, and effectiveness. Public higher education institutions were falling behind to effectively integrate technology into their teaching model, unable to utilize its full potential. The value of online education was fully realized when schools and universities worldwide were forced to close their doors to mitigate the spread of the COVID-19 pandemic. Students were forced to abandon their dorms and campuses in the middle of the Spring semester. Educators and government leaders had to act quickly to minimize academic disruption to ensure educational continuity for millions of students nationwide by tapping into new technologies and digital platforms that allowed for traditional curricula to be transformed

into virtual alternatives. In the face of a crisis, online education proved to be the only feasible solution, allowing students to continue working toward their degrees without an extensive interruption in their studies.

The global pandemic and its austere impacts must serve as a critical lesson to educators who still do not see the full worth of online education. When disaster strikes, online education will be a large part of emergency response solutions and a critical component of mitigation efforts (Sener, 2010). As academic institutions began re-opening their doors and welcoming returning students to campus, many educators are re-evaluating their coursework to decide which classes can remain online permanently. Academic leaders are faced with a choice of whether to integrate online education into their long-term business plan. Online education proved to be essential during critical times, but it can provide a much more significant and sustainable impact on students and universities.

Online education has been a subject of numerous studies for decades, and its effects on the higher education field continue to be a focal point for policymakers, educators, and students. Advocates and opponents engage in heated arguments about whether online coursework can be as effective as in-person instructions (Bowen et al., 2012). Proponents frequently cite greater accessibility and flexibility of online courses to allow more students to obtain undergraduate degrees in less time. Past studies demonstrate that students at 4-year degree-granting universities enrolled in some online courses were less likely to drop out of college (Wavle & Ozogul, 2019), had higher degree completion rates, and earned their degrees faster than their on-campus counterparts (Shea & Bidjerano, 2016). Opponents, however, doubt that online education can provide the same quality of learning and improve student outcomes as face-to-face instruction (Bettinger & Loeb, 2017).

As the debate continues, undergraduate student enrollment in online courses is rising, outpacing total college enrollment (Bailey et al., 2018). The increase in online course enrollment is seen in college-age students and non-traditional students (Hamann, 2020). Both populations of students cite flexibility and the ability to work at their own pace as the primary reason for enrolling in online coursework (Wallis, 2020). Older students, students with full-time jobs and family responsibilities, and disabled individuals who cannot participate in traditional learning models can now access higher education to obtain valuable degrees, giving them a competitive edge in the job market. The flexibility of online coursework shown to improve progress toward degree completion in specific at-risk populations, such as first-generation, low-income, and older students, allowing greater accessibility and ability to combine work and family obligations with higher education (Pontes & Pontes, 2012; Pacciano, Seaman, & Allen, 2010). The increased accessibility and flexibility of online education are undeniable, but can it also improve overall student success outcomes?

A standard measure of student success consists of several outcomes: graduation, retention rate, time-to-degree, student debt, post-graduation employment, and others. Timely graduation and rate of retention are also essential indicators of how well an academic institution is performing. The Higher Education Opportunity Act of 1965 (HEOA) requires all postsecondary education institutions that participate in the Title IV federal student financial aid programs to report their retention, graduation, and time-to-degree rates annually to the U.S. Department of Education and the Congress (National Postsecondary Education Cooperative, 2009). The statistics are made publicly available to assist students and their families in selecting a proper institution to pursue their undergraduate degrees. Higher education institutions with low-performance indicators can lose out on revenue from new recruits who may not want to spend their time and money at a college that is not meeting its students' needs.

Some states also tie their funding model to institutional effectiveness and use the performance indicators to allocate state funding. Universities with high-performance indicators receive additional funding, and those who do not demonstrate effectiveness may lose out on funding critical to their operations. Academic institutions that are a part of the performance-based funding model strive to improve their graduation, retention, and time-to-degree rates. The premise behind this funding model is to link student outcomes to institutional effectiveness, as the success of institutions and the success of their students are inseparable (Voigt and Hundrieser, 2008). Although there are numerous indicators of student success and institutional effectiveness, graduation, retention, and time-to-degree rates have a strong presence across both measures.

Previous studies indicate that online education can increase accessibility to higher education and meet students' changing needs more effectively (Christensen et al., 2011). The demand for more robust online course offerings is undeniable; overall enrollment in online courses at public postsecondary institutions increase 128.8% within five years, from 2015 to 2020 (Open Education Database, 2021). Many undergraduate face-to-face courses are offered during peak hours, have limited capacity, or have a long waitlist, which can hinder students' progression towards their degree. Online courses provide a larger enrollment capacity and can be accessed anytime, allowing students to advance through their coursework and toward timely graduation. With the growing number of students taking an increasing proportion of their undergraduate coursework online, the question persists whether online education can improve student success outcomes and institutional effectiveness by increasing graduation and retention rates while reducing the time to degree. This research will attempt to answer this very question.

Research Outline

This study investigates online education's impact on graduation, retention, and time-to-degree rates at nine public four-year degree-granting universities in Florida. These rates represent student success and institutional effectiveness measures frequently used by policymakers, institutional leaders, and students to evaluate how well a university meets students' academic needs. Each of the measures is a dependent variable that warrants its own research question. Does online education improve graduation rates? Does it contribute to higher retention? Can a larger enrollment in online courses reduce the time to degree? Conducting a separate analysis on the impact of online education on each of the dependent variables can improve the understanding of its influence on overall student success and institutional effectiveness.

Three statistical analyses using a panel-data method are performed to determine the significance between the independent and dependent variables. The time-to-degree variable is split into three dependent variables, time-to-degree in four, five, and six years, to determine if enrollment in online courses reduces that measure. Although enrollment rates are not used as student success outcomes, they will be briefly discussed as an institutional effectiveness indicator. The independent variable directly affects student success measures to determine if the enrollment in online courses changes the outcomes. Although many other factors can influence graduation, retention, and time-to-degree rates, isolating one independent variable can reduce the ambiguity and focus on its direct relationship with the dependent variables.

Dependent Variables:

1. Graduation rate
2. Retention Rates
3. Time-to-degree

    a. in four years
    b. in five years
    c. in six years
4. Enrollment
    a. total enrollment
    b. first-time, full-time undergraduate enrollment

Independent Variable: Percent of students enrolled in all or at least some online courses.

Florida was chosen as a subject for this study due to its many accolades for public higher education and consistently high national rankings. The state's education system was ranked number one by the U.S. News and World Report for the consecutive three years on merits of graduation rates, time-to-degree, cost of tuition, and total student loan debt at graduation (Ceballos, 2019). Its public degree-granting universities are also ranked amongst the country's best for their online bachelor's degree programs with indicators such as faculty credentials and engagement, training, and services and technologies (Kumar, 2021). Florida's legislators actively invest in public higher education and support online education initiatives.

This study's subject is an undergraduate population of nine State University System of Florida (SUSF) institutions. Although a part of one system, each university has distinct characteristics, such as enrollment size, budget, rankings, preeminent research university designation, and student population. The data is collected from the Integrated Postsecondary Education Data System (IPEDS) for six consecutive years, from 2013 to 2018. IPEDS did not begin recording data related to online course enrollment until 2013, and most of the data for the 2019-2020 academic year is not yet available.

The study is composed of four consequent chapters:

Chapter 2 examines relevant studies on online education and its impact on the overall higher education landscape related to accessibility, quality, and affordability. Although affordability is not the focus of this study, it is important to offer both sides' perspectives that support and opposes online education as more cost-effective than the traditional higher education model. It further discusses the studies on student success and institutional performance effectiveness outcomes, emphasizing the significance of each on a larger social and economic level. Past research linking online education to possible improvements in graduation, retention, and time-to-degree rates is considered; however, there is a considerable gap in the literature examining its effects in a public university undergraduate population on a system-wide scale.

Recommendations for effective integration of online education into academic institutions' long-term business model are outlined and supported by studies of universities that have successfully done so. The chapter concludes with an overview of Florida's policies and initiatives that promote online education expansion at the public postsecondary degree-granting institutions. Since Florida's public university system is the subject of this study, it's essential to contextualize legislative policies' influence on its many accomplishments.

Chapter 3 introduces the study's concepts and methodologies. The outlined concepts reiterate this study's premise and its importance in determining if online education can improve student success outcomes. The chapter details the data collection process, defines the term "online education," and provides a comprehensive explanation of each dependent and independent variable. The basis and reasons behind selecting specific quantitative analysis models to produce the study results are justified. The comprehensive study design is outlined and explained.

Chapter 4 presents the results of the analysis and discusses the findings. The chapter provides an overview of each university in this study to comprehend their academic and structural differences. The analysis of each variable is conducted and evaluated to support or reject the hypothesis and answer the research question. Lastly, a case analysis of the University of Florida Online (UF Online) is offered as an exemplary model for the successful implementation of online education and its impact on Florida's public higher education environment.

Chapter 5 concludes the study by reexamining the results and producing a concrete explanation of their significance. Implications of some of the findings are explored. A brief overview of the study is offered, and the limitations of the research are discussed. Areas for future studies are proposed to provide a deeper insight into online education's impacts on accessibility and affordability and provide suggestions for lasting improvements to the public higher education sector to address the many challenges it is facing.

Study Design

A quantitative mixed-method of analysis is used to evaluate the collected data for statistical significance between the dependent and independent variables. A one-way ANOVA followed by a panel-data analysis is performed to produce the results and examine online education's effects on meeting students' success and institutional effectiveness outcomes. All statistical analyses are performed in SPSS version 24 software. The collected data is transferred into SPSS, and categorical variables, *Universities,* and *Academic Year* are numerically coded. Before performing statistical analysis, descriptive statistics compare each dependent and independent variable across all nine universities. The difference in means allows visualizing how each university is different and why these differences must be

controlled. The descriptive summary of means includes graduation, retention, time-to-degree in four, five, and six years, total enrollment, full-time first-time enrollment, percent of students enrolled in all or some online classes, and percent of students who are only enrolled in face-to-face classes. Visual statistics in the form of tables and graphs provide a quick reference for the differences of the mean for each university. The mean is expressed as a six-year average of each variable.

The next step in the statistical analysis is applying a one-way ANOVA to each dependent variable and the categorical fixed-factor variable *University*. The dependent variables are expresses as continuous and fixed-factor variables as categorical nominal. A multiple comparisons table is produced to note the universities with no statistical difference in means for each dependent variable. The next step is applying the panel-data model to directly examine the impact of the percentage of students enrolled in online courses on each dependent variable. This model was chosen because it provides more variability and efficiency than a time-series or a cross-section model. It also minimizes the biases that arise from grouping a categorical variable into a single time series. A fixed-effect dummy variable method is used to control for the effects of variable *Universities.* One-way ANOVA found that most universities have a significant difference in means for each dependent variable, and these differences must be accounted for. The least squared dummy variable method controls for the heterogeneities across individual groups that can affect the results. The fixed-effects dummy variable regression model is as follows:

$$Y_{it} = B_1 X_{it} + a_{fx} + u_{it}$$

Test for the normal distribution is performed, and any possible autocorrelation is controlled for. The data analysis is treated as a system, evaluating all universities' variables over the six years.

The limited number of observations does not allow for a comprehensive analysis of statistical significance between each university's dependent and independent variables separately.

The study includes a case analysis of UF Online, a fully online degree-granting university under SUSF. Since UF Online opened its virtual doors in 2014, the data available is very limited. Currently, there is no accessible data for graduation or time-to-degree rates. However, the total undergraduate enrollment and retention rates are analyzed and present a clear picture of UF's tremendous growth in just a few years. Since its creation, UF Online saw a 300% undergraduate enrollment growth. Its impressive funding model is discussed to demonstrate that effective implementation of online education can control costs and improve public higher education affordability.

Significance of Findings

This study's findings can serve as a valuable tool for advocating for investment in online education as a viable long-term solution in addressing such concerns as student success outcomes and institutional effectiveness at public universities. The study can address institutional and state-level policy implications and serve as a point for Florida legislators to make evidence-based policy choices. The findings demonstrate that an increase in students taking at least some of their courses online improves graduation and retention rates, as well as reducing the time-to-degree at Florida's public degree-granting universities. Florida legislators and institutional leaders should continue to grow the online course catalog amongst its universities. The state's administration's continuous investment toward online education will positively influence student success and institutional effectiveness outcomes. Any defunding or reduction in appropriations from online education initiatives can have adverse effects on students and universities.

Florida's current performance-based funding model was implemented relatively recently. It is still unknown how it will impact funding reallocation and its effects on the lower- and under-performing universities. This model may siphon the funding from universities that need it the most and constrict their growth toward improving performance outcomes. Future studies of the SUSF performance-based funding model can provide recommendations if better interventions are needed than those dictated by the current policy. Specific strategies should be identified to reallocate state funding into online education to continue improving student success outcomes and institutional effectiveness.

Chapter 2

Literature Review

Introduction

Online education is no longer considered a novelty but an accepted part of higher education. Its continuous growth amongst public higher education institutions in the U.S. shows no sign of slowing down. The latest data from the National Center for Education Statistics (NCES) shows that in 2018 more than 6.9 million students, or 35.3% of students nationwide, were enrolled in online courses at a degree-granting postsecondary institution (Wallis, 2020). Students opt to take some or even all of their undergraduate coursework online because of the flexibility it offers. Universities can accommodate more students in high-demand classes reducing their wait time and progressing them toward graduation. In 2020, 78% of students enrolled in traditional and online courses felt that the latter were as good or better learning experience as face-to-face courses (Magda et al., 2020). Online education provides more than convenience to students; it can also help address recurring issues in public postsecondary education institutions.

Higher education is confronted with many modern challenges resulting from greater demand for college graduates in the workforce, risings costs in the face of declining federal and state funding, and the need to improve student success outcomes. Budgetary constraints and current funding patterns limit public universities' ability to accommodate growing student enrollment and reduce access to higher education by becoming more selective and more expensive (Sener, 2010). These challenges call for more effective policies and practices that promote academic goals and provide legislators and the public with empirical evidence of student success (Levitz & Noel, 2008; Kuh, 2005). Studies have indicated that online education

can effectively meet accessibility needs and increase student success outcomes, with a potential for cost savings.

The COVID-19 pandemic brought a wave of unforeseen and unprecedented changes across the globe and challenged the higher education sector like never before. The nationwide closures of universities across the country prompted policymakers and academic leaders to convert their curricula to an online platform. It seems like overnight online education took the forefront and became essential to ensuring students can continue their education and progress toward their degrees. As campuses entered re-opening initiatives, many universities are now evaluating the changes in their course offerings to see which can be effectively taught online long term (Wallis, 2020). The pandemic exposed the cracks in outdated teaching models and proved that online education could provide responsive solutions that a traditional academic structure cannot.

Exploring ways that policymakers and academic leaders can work together to promote high-quality online education through integrating it into the current institutional business model may unlock the needed solutions to making education more accessible to a larger student population while increasing their chances at a timely degree. Chapter 2 examines past studies on the impacts of online education on public postsecondary degree-granting institutions. The chapter opens with a look at current online education trends such as its growth, quality, and accessibility and outlines recommendation for its effective integration as a long-term strategy. Affordability is discussed by presenting favoring and opposing arguments on the issue. The following section outlines Florida's initiatives and policies for online education and their impact on the state's public higher education landscape. The last section addresses the research question directly by discussing studies on student success outcomes and

institution effectiveness indicators, such as graduation, retention, and time-to-degree rates. Concluding remarks provide a brief overview of the literature review and introduce subsequent Chapter 3.

Current Trends in Online Education

Online education is increasingly becoming more prevalent in colleges and universities across the country, urging academic leaders and policymakers to implement new initiatives in response to the growing demand (Kim & Bonk, 2006). More and more students opt to take at least some of their coursework online, taking advantage of their flexibility. A recent study (Miller et al., 2017) reports that nearly all public higher education institutions sampled offered online education, with many leaders stating that it is more common to see a student enrolled in at least one online class than a student in an entirely traditional setting. One of the examined institutions saw tremendous growth in their online programs in only five years, and institutions with limited physical space benefitted the most from increased online course offerings. Higher education should harness the power of technological innovations and incorporate them into their business model to keep up with the changing demands of their students.

Online education provides greater accessibility for students who cannot participate in a traditional on-campus learning setting (Miller et al., 2017). Students can access their courses anytime from anywhere in the world without sacrificing job or family responsibilities. Online education reaches a broader demographic of students, especially working adults, persons with disabilities, and rural populations, who otherwise would be excluded from the opportunity to obtain a college degree. A Best Colleges Online Education Trend Report (2019) indicates that nearly 59% of people surveyed had children and or are employed cited convenience and flexibility at the top of the list of reasons for choosing online education. The increased

accessibility that online education provides has great benefits on the societal level by allowing a larger population of Americans to obtain quality higher education and compete in the labor market (Hiltz & Turoff, 2005). More traditional students are increasingly enrolling in online courses, as well.

Academic leaders are noticing the growing demand for online education among undergraduate students. A national increase of 572,000 students taking online courses occurred just between 2010 and 2011 (Allen & Seaman, 2013). Parker et al. (2011) report that more than 77% of colleges and universities offer online courses, with 89% of them being public four-year universities and 58% of which provide degree-granting programs entirely online. Over the past decade, enrollment in online education grew faster than the overall higher education enrollment that is declining at an annual rate of 1.2%, while the number of traditional students taking all of their coursework on campus is declining at a rate of 2.5% (Bailey et al., 2018). Bailey et al. (2018) note that the number of students taking some or all their classes online has grown at an annual rate of 5% during the same period. All these factors should serve as indicators that online education is here to stay and cannot be overlooked for its long-term value.

Some academic leaders and even students continue to hold the presumption that online education is inferior to the traditional on-campus learning model. Recent studies prove these assumptions to be false. Allen and Seaman (2013) found that most chief academic officers rate the learning outcomes for online education to be as good or even better than traditional instruction. When the authors performed their online education study in 2003, they found that 57% of academic leaders rated online education as the same or better; however, that number increased to 77% by 2012. They also found that the small minority of leaders who still consider online education inferior came from universities that did not offer an online instruction model.

Bailey et al. (2018) reached the same conclusion in their study that the faculty who rated online education as inferior have not taught an online class. Faculty who experienced developing and teaching an online course tend to have an increased appreciation for online teaching, and their level of concern diminishes (Sener, 2010).

Bowen et al. (2012) also aimed to determine if online education can produce similar or better learning outcomes and improve access. A randomized trial was performed at six public universities with a large and diverse population and an equal mix of commuting and residential students. The trial consisted of the same introductory statistics course taught by the same faculty in both traditional face-to-face format and online. Students were randomly assigned either to an online or a conventional introductory statistics class for an entire semester. They took a statistics literacy assessment test at the beginning and end of the semester and, as well as the final exam. Traditional students performed slightly worse on three outcomes, with pass rates around three percent lower than the online students. The researchers found no significant difference in learning outcomes between the two methods of instruction. Quality online courses have shown to provide the same instruction level as those offered in a traditional face-to-face setting. It is not to say that all online education is equal or better than in-person instruction; however, high-quality online education implementation can produce no less than equal results (Bailey et al., 2018). None of the studies reviewed contested that online education cannot match traditional face-to-face education models' learning objectives.

Betts et al. (2009) further urge institutional leaders to recognize online education as a viable and sustainable long-term model. They describe the current students as technologically savvy consumers who value flexibility and cost reduction associated with living on campus, stating that online education can reach far more students to increase the institution's alumni base. The authors warn that institutions that are not proactively investing in innovations to

offer programming options to the broader student market may find themselves under critical financial pressure sooner than they might expect. Universities that strategically invest in online education are able to achieve greater accessibility for a larger student population and improve their institutional performance outcomes (Bailey et al., 2018). Institutions must make online education a part of their culture and embrace evidence-based decision-making.

Online education proved to be the "lifeline" to education continuity during the COVID-19 pandemic-related academic campus closures nationwide. A study by Sener (2010) recognizes online education as an emergency response solution to a natural or man-made disaster. The author recalled the twin disasters of 2005, Hurricane Katrina and Rita, and their educational delivery disruption. An initiative called the "Sloan Semester" helped mitigate the effects by offering free online courses to students affected by the disasters. Many colleges and universities in the impacted areas were unprepared to deal with the consequences and could not successfully maintain academic continuity. Sener (2010) encourages institutions to develop a proactive response to potential future disasters by creating courses in multiple delivery modalities, online and on-campus, as part of a long-term business plan. He notes that online education will be a critical part of the education sector's mitigation efforts when the next disaster strikes. A decade later, Sener's predictions are realized, and online education has proved to be a viable solution in response to a natural disaster. Academic leaders must take these experiences at face value and incorporate online education into their mainstream models.

In their study, Christensen et al. (2011) provide a model of an effective online curriculum integration by rethinking institutional goals and processes while anticipating challenges. Institutional leaders must recognize that online education can transform curriculum by allowing it to be taught in a variety of contexts, locations, and times. Institutions that cling

to the outdated academic teaching model that is no longer sustainable cannot meet their students' growing demand (Christensen et al., 2011). Authors note that it is unlikely that public universities will see an influx of endowments, state funding, and enrollment rates; therefore, they must view the current higher education environment rationally. Online education has the potential to contribute to a new low-cost business model, which is critical to making higher education fundamentally affordable for students and society. Other studies have pointed to online education potentially producing cost savings in higher education.

The Cost of Online Education Report (Florida Board of Governors [FLBOG], 2016) cites strategies for incorporating online education into public universities to improve its affordability. The report suggests that online education must be shared across the same state system institutions to provide a broader coursework portfolio for all students without incurring duplicate costs. Additionally, sharing many services such as the online course catalog, the application process, career education planning, and other student services can lead to additional cost savings. Developing system-wide institutional dashboards allow for a more effective way to manage online education initiatives and providing current information. A critical component of successful online education implementation is for the universities to utilize technology differently instead of attempting to replicate the bricks-and-mortar teaching model in a digital space (Casement, 2013). Universities should examine their tuition setting model for online education and avoid charging the students more for online courses, especially when they are being taken in conjunction with the on-campus classes. Institutional leaders must remove old pricing practices that are ineffectively adapted to new delivery models (Pualson, 2008).

The study by Bailey et al. (2018) used the University of Central Florida (UCF) as a great example of such cost-saving. UCF increased its fully online programs, enrolled an

additional 11,000 full-time students without investing in their campus's physical size, and saved an estimated $150 million in projected construction costs. Additionally, UCF saved approximately $13 per student in expenses for facilities operations and maintenance. Online education's ability to increase enrollment without increasing physical space allows institutional costs to be spread across a broader student base with potential savings anywhere from 36% to 57% (Bowen et al., 2012). A high-quality online curriculum implementation will require an upfront strategic investment for technology and faculty development, but greater financial sustainability can be achieved over time with the amortization of start-up costs (Bailey et al., 2018).

While many studies discuss online education as a bridge to affordable education, many reject this notion. A comprehensive research study by Poulin and Straut (2017) found that most universities charge their online students the same or more than they do for the traditional on-campus students. Institutions frequently charged additional fees, such as a technology fee, to enroll in online courses. Respondents from 200 universities, who oversaw distance education, cited higher production costs as the most significant contributing factor to why online education costs more. The production costs included such components as faculty development, instructional design, and student assessment. All responded that online education costs more to produce than in-person courses. Additional costs that were mentioned are licensing of software and technical support. The study concludes that the primary institutional reason for investment in online education is to improve accessibility but not lower costs, which cannot be achieved without rethinking existing structures. A study by Hemelt and Stange (2020) analyzed over 3,000 departments at more than 200 four-year degree-granting institutions from 2015 to 2017 on their prevalence of online courses and their instructional costs. The authors did not provide

any indication that online education can achieve significant cost savings for institutions and students. Their study notes that the evidence between online courses and costs is limited.

Currently, there is no consensus amongst higher education researchers and academic leaders that online education can produce cost savings. Several research studies support the notion that online education can improve affordability, as well as studies that reject it. Because online education is commonly associated with affordability, it is important to include the argument in this literature review. However, due to currently conflicting information, this relationship will not be tested in this study but must be explored further in future research.

Online Education Policy Agenda

More and more Americans view education as their primary road to succeeding in life. The Public Agenda poll (McPherson & Shulenburger, 2008) found that between 2000 and 2007, the percentage of people believing that higher education is necessary has almost doubled. Higher education has well-documented benefits for individuals who attain a college degree and on society as a whole. College graduates have better job opportunities, higher incomes, and better quality of life than those who do not attend college or do not complete their degrees. Higher education levels reduce chances of unemployment, decrease poverty and government assistance, increase tax revenue, and have other positive effects on society (Tentso, McNeil, and Tongkumchum, 2017). The public's growing demand for more accessible and affordable higher education must serve as a catalyst for legislators, decision-makers, and educators to come together to address these demands. Christensen et al. (2011) urge academic leaders to work closely with policymakers to foster new higher education models by removing constraints impeding innovative solutions. Agreeing on common goals for higher education,

such as improving student success outcomes while embracing innovation to achieve that goal, should take precedence in agenda-setting.

Many public universities are starting to re-examine their current business models in hopes of finding solutions to counteract numerous adverse economic and social effects, such as the decreases in state appropriations, affordability, and public support. A growing number of academic leaders view online education as a critical component of their long-term strategy. Elaine Allen and Jeff Seamen have been tracking online education for almost two decades and provide strong support that the academic community must increase online education investment. Their 2013 report shows that in 2002 less than one-half of all higher education institutions viewed online education as essential to their long-term strategy, compared to the 2013 report, where that number grew to 70%. Only 11.2% of institutional leaders do not view it as critical. The authors also provide support to previous claims that enrollment in online education is outpacing the overall higher education enrollment.

The growing support for online education can also be seen in the increase of universities offering fully online programs, which jumped from 48.9% in 2002 to 70.6% in 2012 (Allen & Seaman, 2013). Technology is seen as a promising way of improving access and contributing to overall institutional effectiveness while breaking free from the higher education system's traditional rigidities. It has the potential to achieve equivalent or better educational outcomes while saving significant resources that can be allocated more effectively (Bowen et al., 2012). The State of Florida policymakers work closely with the state's public university system leaders to reduce roadblocks that can interfere with innovative growth that contributes to institutional effectiveness and student success.

As of 2016, Florida's higher education system has been ranked as number one by the U.S. News and World Report for three consecutive years. The metrics used for the rankings include graduation rates, time-to-degree, cost of tuition, and total student loan debt at graduation (Ceballos, 2019). Its public degree-granting universities are also ranked amongst the best in the country for their online bachelor's degree programs, with indicators such as faculty credentials and engagement, training, and services and technologies (Kumar, 2021). The State University System of Florida (SUSF) Board of Governors oversees the development of online education and its quality of instruction by analyzing the current trends and facilitating its universities in expanding online education capacity. Overall public postsecondary enrollment in online courses increased by 128.8% within five years, signifying a high level of demand (Open Education Database, 2021). Florida's public higher education continues to be considered one of the most affordable in the nation (SUSF Annual Report for Online Education, 2018).

Two of the SUSF universities, the University of Florida (UF) and the University of Central Florida (UCF), are continually nationally ranked among the top in online bachelor's degree programs (Martin, 2021). The University of Central Florida (UCF) is one of the country's largest public institutions, with 64,000 undergraduate and graduate students. It is ranked amongst the top 100 public universities in the country and the top ten for most innovative online education (U.S. News & World Report, 2019). UCF was also named first amongst public universities nationally for the number of annual baccalaureates degrees awarded (Kruckemyer, 2019). UF is recognized nationally as a leader in academic excellence in traditional and online education and is currently ranked number three in online bachelor's degree programs (University of Florida, 2021). UF's extensive online course offering allows

more significant accessibility to higher education for non-traditional students. Over 80% of its online students are employed or over the age of 25 (Kumar, 2021).

The success of UCF and UF's online undergraduate degree programs, as well as their rapidly increasing enrollment growth, prompted Florida's policymakers to invest in a fully online degree-granting institution. In 2013, an unanimously passed bill by the Florida House approved the creation of UF Online (Jordan, 2013). UF Online launched in 2014 by offering its students a selection of 24 baccalaureate degree programs. Its successful implementation and the state's continuous investment in its growth and development have earned UF Online a number four ranking amongst the best online bachelor's degree programs and number one for college affordability (U.S. News & World Report, 2020).

Florida's legislators actively support the higher education agenda, recognizing its prominence in ensuring the state's sustainable economic development and growth in high-paying jobs. A 2018 policy enhancement and funding investment package was passed to increase accessibility and affordability of public higher education, providing a historic education funding of over $124 million for public universities and historically black colleges (The Florida Senate, 2018). SUSF universities saw a 0.8 percentage point increase in graduation rates from 2017 to 2018, and a jump of 27.7 percentage points since 2003, with an all-time high graduation rate of 80.6% for students with disabilities, who mostly attend their classes online (Florida Department of Education [FLDOE], 2020). The positive institutional outcomes highlight the importance of a collaborative relationship between academic leaders and policymakers and their support for increased higher education investments.

More recent bills passed in 2019 require closer monitoring to determine their effects on the state's higher education system. One notable bill allows the Florida Board of Governors to

tie funding directly to each university's performance (Ceballos, 2019). The premise behind the performance funding model is to reward high-performing universities that achieve national excellence. Although the bill provides additional funding for excelling universities to continue improving their programs and student outcomes, it can leave already struggling lower-performing universities in the system that need more support behind. Now more than ever, SUSF universities must improve their effectiveness outcomes to secure additional funding.

Student Success Outcomes and Institutional Effectiveness

Numerous predictors and indicators measure students' success, with the most commonly used are graduation, retention, and time-to-degree rates. The retention rate is a measure of full-time first-time freshman students progressing to sophomore year. The graduation rate is the percentage of entering class completing undergraduate education within six years, or within 150% of a regular time to obtain an undergraduate degree (National Center for Education Statistics [NCES], 2020). The time-to-degree outcome is measured by the percentage of undergraduate students in a cohort who obtain their bachelor's degree in four, five, or six years. Together, these three measures representing student success are closely tied to institutional performance effectiveness (Voigt & Hundrieser, 2008; Levitz & Noel, 2008).

The Higher Education Opportunity Act of 1965 (HEOA) mandates that all postsecondary education institutions participating in Title IV federal student financial aid programs report the retention, graduation, and time-to-degree rates annually to the U.S. Department of Education and make the statistics publicly available (National Postsecondary Education Cooperative, 2009). Some states, including Florida, tie institution effectiveness indicators to state funding. Florida's Board of Governors evaluates all public postsecondary degree-granting institutions under the State University System on ten metrics to determine the

amount of additional state funding, as well as the recurring state-based funding that each university receives (Florida Board of Governors, 2019). The graduation, retention, and time-to-degree rates are amongst the ten metrics. Meeting these performance outcomes can mean much-needed additional funding for underperforming institutions. These outcome indicators are crucial to academic institutions, policymakers, and students whose success is potentially impacted by how well the universities can meet their needs. Voigt and Hundrieser (2008) cite that the success of institutions and the success of their students are inseparable.

Retention rates are essential measures for both students and universities. Inability to keep students progressing toward their degree hurts institutions financially, as it is more costly to recruit new students than to keep the current enrollees (McGinity, 1989). Institutions with low retention rates can also lose state funding as their performance indicators dip. Additionally, they can miss out on new student recruitment who may be apprehensive to invest time and money in a university that is ineffective at meeting students' academic needs (Voigt & Hundrieser, 2008). Previous research supports that universities that consistently demonstrate high retention rates perform effectively and engage in sound educational practices (Pascarella & Terenzimi, 2005). Improvement in retention rates must be an ongoing campus-wide responsibility to maximize institutional effectiveness (Voigt & Hundrieser, 2008).

One possible solution to increasing undergraduate retention rates in bachelor's degree-granting universities is to offer more online courses. A study by James et al. (2016) on retention rates in community colleges found that students who took at least some of their courses online had slightly better retention rates than students who were enrolled solely in traditional on-campus courses. The results demonstrated that retention rates were not affected by gender or Pell-grant status. A comparable conclusion was attained by another study (Bailey

et al., 2018) that found that freshmen who took some of their courses online were 9 to 10 percentage points higher to return next year than students who took all of their courses on-campus. This study will evaluate the retention rates in four-year bachelor's degree-granting universities to determine if similar patterns exist.

Graduation rates play a key role in students' financial well-being and impact the U.S. economy. Students who do not finish their education and drop out of their undergraduate programs cost the county billions of dollars a year (Letkiewicz et al., 2014; Kelderman, 2010). Students who graduate college earn double the students who only graduated high school, and 6-times more than high-school dropouts (DesJardins et al., 2002). Graduates ages 25 to 34 with a bachelor's degree had a median earning of 63%, or $19,500, higher than those with a high school diploma in 2018 (Trends in College Pricing, 2019). It is clear that having a college degree improves the quality of life by allowing graduates to be in a higher earning bracket.

Graduation rates are also used to assess academic institutions' quality and their ability to affect student success rates (Tentsho, McNeil, & Tongkumchum, 2017). A study by Walve and Ozogul (2019) found that students who took online classes early on in their academic careers achieved higher rates of degree completion. Xu and Jaggars (2011) supported these findings, showing that students who took at least some online courses were able to obtain their degrees and did it faster than students who took no online courses. On the other hand, students who took all of their courses on-campus in-person were less likely to complete their degrees (Shea & Bidjerano, 2017). Undergraduate students in four-year degree-granting universities who took at least some courses online were also less likely to drop out (Walve & Ozogul, 2019; Ortagus, 2018). A meta-analysis of online education conducted by Bailey et al. (2018)

found that graduation rates were 17 percentage points higher for students who took some of their courses online versus students who only took face-to-face courses.

Time-to-degree is another student success outcome that has significant financial implications for undergraduate students and universities. The 2019 Trends in College Pricing Report found that 16% of traditional students complete their degrees in more than ten years. Students who take longer to complete their undergraduate programs tend to accumulate more debt in order to afford the escalating costs of higher education. In 2010, almost two-thirds of undergraduate degree recipients were forced to take out student loans or accrue another form of debt, which significantly impacted their financial flexibility and economic stability (Reed et al.,2011). The growing debt forces many students to obtain part-time or full-time employment to reduce the financial strain, which in turn prolongs their degree completion and causes them to accrue more debt in the process (Letkiewicz et al., 2014), creating a vicious circle. Studies show that even part-time employment can delay graduation by one-half of a semester (Lam, 1999).

Prolonged degree completion is also associated with a higher college dropout rate (Robb et al., 2011). Nearly 60% of students who drop out do not return to complete their degree programs within five years (DesJardins, Ahlburg, & McCall, 2002). Students who prolong their graduation have a significant impact on the institution by limiting their resources, reducing their enrollment (Tentsho, McNeil, & Tongkumchum, 2017), complicate planning, and negatively impact state budgets (Weldon, 2013). The Center for College Affordability and Reliability estimates that $7.5 billion can be saved each year in public revenue if all students graduated on time (Vedder et al., 2013). It is crucial for students to graduate on time to reduce financial strains, decrease the chances of dropping out, and enter the job market faster.

Taxpayers spend nearly $5,900 per student enrolled in public university (Weldon, 2013), making it a national policy prerogative to graduate students on time.

Numerous factors can increase undergraduate student's time to degree. Although not all can be resolved by legislature, policymakers must make strides to remove apparent barriers to timely graduation. Two such barriers are the high cost of education pushing the students to seek part-time or full-time employment and decreased funding, resulting in reduced course offerings (Weldon, 2013). Online education can provide help to solve at least the latter barrier. Offering courses online can allow a larger student enrollment and reduce registration waiting time. Many traditional students find their ability to take a full course load is often hindered by classes being offered simultaneously or during the "peak" hours. Online education provides students with options to complete their degrees on time and take advantage of the labor market sooner. The flexibility of online learning allows students with extracurricular responsibilities to accelerate their education (Lapovsky, 2014.).

Online education is frequently associated with improving enrollment rates without investing in additional physical space on campus. Overall enrollment in online courses increased dramatically in recent years, outpacing the overall undergraduate enrollment rate (Protopsaltis & Baum, 2019). A study of online education trends (Protopsaltis & Baum, 2019) found that between 2012 and 2016, online enrollment increased by 16% while total enrollment declined by 4%. Bailey et al. (2018) also confirmed the decline of total enrollment in postsecondary degree-granting universities but saw an increase in enrollment in specific populations. Universities that offered a robust online course catalog saw an increase in enrollment of Pell Grant recipients, students over 25 years of age, racial minorities, and women, which translated into greater accessibility to higher education.

A meta-analysis by Bailey et al. (2018) found that public degree-granting universities that heavily invested in producing quality online courses subsequently achieved better student success outcomes, such as graduation and retention. They were also able to increase their total enrollment by offering a robust catalog of online courses. Another crucial outcome was an increase in accessibility to higher education, especially for more vulnerable student populations like Pell Grant recipients, minorities, older students, and women.

Conclusion

Over the past decade, online education has experienced increased integration into public higher education institutions with hopes of providing solutions to many long-standing challenges. Online coursework allows to increase student capacity without spending resources on building more physical space for classrooms and lecture halls, and allows for greater accessibility to non-traditional students. University graduates are shown to have more opportunities for better-paying jobs, increased standard of living, and lower chances to experience unemployment and poverty. In turn, more educated people benefit the greater society by increasing tax revenues and needing fewer resources like government assistance. Online education allows a larger population, who may not be able to attend on-campus programs due to employment and family responsibilities, to obtain college degrees and improve their financial well-being. Its flexibility helps students complete their degrees faster and take advantage of the job market sooner. Timely degree completion is shown to save money for students and academic institutions by reducing learning expenses, the necessity to borrow more student loans, and the expenditure of institutional resources.

Policymakers and academic leaders begin to recognize that online education is here to stay. They must develop long-term strategies to integrate it into the academic business model

by invest in quality online courses. The valuable lessons learned from nationwide university campus closures in responses to the COVID-19 pandemic proved that the online learning model could be the only viable solution to academic continuity in disaster mitigation efforts. Although some academic leaders continue to question online education quality, presuming that it is inferior to the traditional face-to-face learning models, numerous studies dispelled that notion. Universities that offer quality online courses achieved equal and, in some cases, even higher learning outcomes when compared to the traditional model.

Extensive literature is written on the impacts of online education on the higher education sector. Previous studies have evaluated its quality, ability to produce comparable learning outcomes, accessibility, and affordability. Although few studies exist on online education's ability to increase graduation and retention rates, none could produce concrete evidence on a larger scale. This study will delve deeper into examining the effects of online education on student success and institutional effectiveness outcomes such as graduation, enrollment, and time-to-degree rates on a system-wide scale. Florida's nine public degree-granting institutions are the subject of this study. Chapter 3 presents the concepts and research design, and Chapter 4 covers data analysis and discusses results.

Chapter 3

Concepts and Methodology

Introduction

Universities across the country use graduation, retention, and time to degree rates as standard metrics of students' success. Graduation and time to degree are an especially important policy issue that directly impacts students' long-term financial well-being. University graduates are shown to earn twice as much as high-school graduates (DesJardins, Ahlburg, & McCall, 2002). Studies show consistent evidence that education is directly tied to workforce participation and significantly reduces unemployment chances (Letkiewicz et al., 2014). A timely degree completion also plays a significant financial role as more extended graduation tends to cost students more tuition and fees. The longer students remain in college, the more they are likely to increase their student loan debt. Students who graduate on time can enter the workforce sooner and increase their lifetime earning potential. Retention rates are closely tied to the degree completion and serve as indicators of student's succession through the program. Low retention rates will negatively impact institutional effectiveness by pointing to potential ineptness at providing academic support. Institutional financial health will also be affected due to loss of tuition from dropped-out students and can lead to a hike and tuition and fees to offset the losses. This study will explore if graduation, retention, and time-to-degree rates improve when students take at least some of their undergraduate coursework online.

Chapter 2 outlined previous studies supporting online education's role in increasing students' performance outcomes and institutional effectiveness metrics. Its underlying message is to bring online education into the focal point and urge Florida legislators to provide additional funding to SUS universities, especially its lower-perform institutions, to increase

online curricula' quality and quantity. Chapter 3 will present the methodology of this study, describe variables, and lay the statistical analysis groundwork. The concluding paragraph provides an overview and introduces subsequent Chapter 4.

Concepts

During the twenty-first century, political and economic development, specifically related to the decline in public subsidies, have had a detrimental effect on higher education's current ability to serve the public good (Stein, 2019; Giroux, 2011; Goldrick-Rab, 2016; Newfield, 2016). Policymakers nationwide are urging public institutions to increase university enrollment and degree completion rates but face the opposite trends of decreased enrollments and slower times to degree completion (Mulhern et al., 2015). The impact of higher education's rising costs and decreasing accessibility hurt the economy and society, contributing to higher unemployment rates, growing social disparities, and ballooning national student debt (Oliff et al., 2013). In 2016, Florida legislators implemented initiatives to increase online course enrollment in the State University System public universities to address such concerns. Legislators and SUSF's Board of Governors set ambitious goals of delivering 40% of undergraduate credit hours online by 2025 (Bakeman, 2017). The initiative's premise is that online education can increase institutional performance effectiveness by providing more access to quality instruction and improving student success outcomes.

Online education is commonly defined as the utilization of internet or web-based technologies to deliver educational content without reliance on additional sources such as CD-rooms, satellites, and television (Miller, Topper, & Richardson, 2017; Lee, 2017; Moore et al., 2011). Such tools are used in an e-Learning model and cannot be attributed to online education. Although both terms are considered "distance learning," they cannot be used interchangeably

due to their unique content delivery platforms. Online education can further be classified as online-only or a hybrid, with the latter pertaining to a mix of online and face-to-face course components. SUSF considers the hybrid courses to have 50 to 79% of their online technology format (The Florida State University, 2012). Many universities struggle with delineating the number of classes that must be taken online versus a hybrid model to be classified as online education (Alammary, Sheard, & Carbone, 2014). This research data was collected from the Integrated Postsecondary Education Data System (IPEDS), which will be discussed in this Chapter's Measurement section. It must be noted that IPEDS excludes data for hybrid courses and accounts only for fully online coursework. The online courses must meet the following requirements: the instructor and students must be in different locations, be connected by at least one technology tool, and provide regular substantive interaction, to be included in the IPEDS data (NCES, n.d.). This study focuses only on the online education that is solely delivered over the internet and excludes the hybrid courses to avoid replicating data.

Measurements

This study aims to determine whether an increase in the percent of students who take at least some of their courses online affects the graduation, retention, and time to degree rates. The studied population is the State University System of Florida (SUSF), comprising of 12 public four-year universities. Nine of the twelve universities are included in the study based on their academic structure and online education. The three excluded universities currently do not offer any online coursework or primary grant specialized degrees. Their dissimilarities in structure and lack of online education offerings rejected them from this study.

A detailed overview of each included and excluded university is provided in Chapter 4. The studied universities are: University of Florida (UF), Florida State University (FSU),

University of South Florida (USF), University of North Florida (UNF), Florida Atlantic University (FAU), Florida Gulf Coast University (FGCU), Florida International University (FIU), University of Central Florida (UCF), and University of West Florida (UWF). The following universities have an established online education teaching model and have been actively expanding on their online course catalog. Florida SUS was selected due to its growing investment in online education and its reputation as an education-focused state. Florida is currently ranked first in the country for higher education for the third consecutive year (State University System of Florida, 2020). The ranking is bestowed by the U.S. News & World Report by weighing the ranking metrics such as graduation rates, tuition costs, and the amount of student debt. It lists five of the SUSF universities among the top 100 public universities in the country. The State's aggressive venture in online education makes it a strong subject for this study. If investment in online education can expand student success and institutional performance outcomes, SUSF's business model can be implemented on the national level to replicate similar results.

To provide additional support for online education as a bridge between student success and institutional effectiveness, a case analysis of University of Florida Online (UF Online) is provided. UF Online is a fully online institution that offers undergraduate, graduate, and doctorate degrees. It was launched in 2014 to increase the accessibility and affordability of higher education. The case analysis data was collected from IPEDS and UF Online Comprehensive Business Plan (2019). No data is available for graduation and time to degree rates due to its recent launch; however, it can still provide valuable insight into online education in terms of enrollment and costs. UF Online has the lowest tuition rate and optional fees package. Because UF Online is part of UF Main and SUSF, it must be included in this study but will be discussed separately.

Although financial structures of SUSF institutions are not discussed in this study, it is important to note that Florida employs a performance-based funding allocation model. The performance funding model includes ten metrics by which universities are evaluated. Three of the ten metrics are a part of this study: graduation, retention, and time to degree. This model determines how much new funding will be reallocated from each university's recurring state base appropriation (Florida Board of Governors, 2021). Universities that receive high metrics receive additional funding. The SUSF institutions, especially lower-performing universities, can receive more state funding by increasing graduation, retention, and time-to-degree rates. Such improvements can be possible by investing in online course offerings' quality and quantity and increasing their student enrollment.

Data Collection

The archival, or secondary, data collection method is employed in the study. The data is collected from the Integrated Postsecondary Education Data System (IPEDS), monitored by the U.S. Department of Education's National Center for Educational Statists (NCES). Its primary data is collected through annual interrelated surveys from all colleges, universities, and vocational institutions that participate in Title IV federal student financial aid programs (NCES, n.d.). The purpose of IPEDS is to collect statistics and analyze trends related to U.S. education, such as enrollment rates, admissions, student financial aid, completions, and other outcome measures organized in a single comprehensive system.

IPEDS is a commonly utilized database by researchers in postsecondary education and is used by NCES to report annually to Congress. The data from IPEDS is regularly requested by federal and state agencies, legislators, education associations, postsecondary institutions, media, and the public (NCES, 2019). IPEDS online database contains records of SUSF

universities starting in 2001; however, it did not begin reporting on the number of students enrolled in online courses until 2013 for most universities. This statistic is the only online learning information reported by IPEDS, and it lacks severely in capturing other information regarding online education's growth and development. Although the collected data undergoes a rigorous quality check by a designated task force, it is worth noting that its validity can potentially be compromised if institutions provide data containing inherent inaccuracies.

The nine studied universities' data is accessed for each year, from 2013 to 2018, and for each variable. Microsoft Excel is used to compile and organize the data. There was no missing information that must be accounted for. Information for the UF Online case analysis was mainly retrieved from the UF Online Comprehensive Business Plan 2019-2024 document. IPEDS is used to obtain the enrollment and retention rates from 2014 to 2018. No other information such as graduation and time-to-degree rates are currently available from either of the sources.

Variables

Three dependent variables (DV) and one independent variable (IV) are selected to analyze how enrollment in online courses can contribute to higher performance outcomes for both the students and universities. The dependent variables are graduation rate, retention rate, and time to degree in four, five, and six years. The independent variable is the percent of students who are enrolled in all or some undergraduate online courses. Total enrollment rates and first-time, full-time undergraduate enrollment rates serve as additional dependent variables; however, they will not be analyzed in length. Although enrollment rate is another critical indicator of institutional effectiveness and is vital to its financial health, it will not

focus on this study. Numerous factors can influence enrollment rates that cannot be accounted for here.

The first dependent variable, graduation rate, is measured as the overall 6-year graduation rate for first-time, full-time, undergraduate degree-seeking students at a 4-year degree-granting university or completing a program within 150% of normal time (NCES, n.d.). Graduation rates are both crucial indicators of student success outcomes and institutional effectiveness. The retention rates are closely related to enrollment rates and are just as critical for institutional well-being. If retention rates are low, the university will not fully capture the revenues from tuitions, which can further negatively impact its appropriations from the State. A low retention rate can indicate an institution's ineptness at meeting students' needs. Retention rates are measured for the full-time first-time undergraduate students. The time to degree variable demonstrates how quickly the students can finish their undergraduate education and enter the labor market.

Attainment of academic degrees positively impacts students on the economic and societal levels, allowing for an increased lifetime earning potential, lower unemployment rates, and increase tax revenues for essential government programs (SUSF Board of Governors, 2013). The time-to-degree variable is divided into three variables: time-to-degree in four years, time-to-degree in five years, and time-to-degree in six years. The desired result is for a higher percentage of students graduating in four years and a lower percentage of students graduating in six years. The analysis explores if the percent of students enrolled in online courses can positively impact the 4-year completion rate and negatively impact the 6-year completion rate. A faster graduation rate is a preferred outcome for both student success and institutional effectiveness.

Enrollment rates are measured by total undergraduate enrollment and by the first-time, full-time undergraduate enrollment. They vary significantly among SUSF universities depending on the size and structure of the institution. UCF is the largest university with an annual undergraduate enrollment of almost 60,000 students. UWF is the smallest university admitting less than 10,000 undergraduates annually. The significant variation in enrollment rates amongst the studied universities can produce erroneous results and will only be discussed briefly.

The independent variable is measured by percent of students who take all or some of their courses online. The fully online and partially online students were combined to capture online education's full effects on the performance metrics. Students who seek a more traditional university culture with on-campus peers and faculty engagement and social events may choose to abstain from taking all their courses online. However, many enjoy the flexibility of online education and opt for taking at least some of their coursework online. The study will evaluate if the predictor, enrollment in online courses, significantly impact graduation, retention, and time-to-degree outcomes.

Study Design and Analysis

The study's research question asks if enrolling more students in online courses can improve student success outcomes and institutional effectiveness. This question is explored by applying quantitative methods of analysis to determine if statistical significance exists between the percent of students enrolled in online courses and graduation, retention, and time-to-degree rates. The hypothesis question is as follows:

H_0 = there is no statistical significance between the percent of undergraduate students enrolled in online courses and graduation, retention, and time-to-degree rates.

H_{alt} = there is a statistical significance between the percent of undergraduate students enrolled in online courses and at least one outcome.

Rejecting the null hypothesis signifies that the predictor positively influences at least one outcome.

The collected data is assembled in Microsoft Exel chronologically, in a long format. Each university represents a categorical nominal variable and is numerically coded as follows: UF=1, FSU=2, UNF=3, FAU=4, USF=5, FGCU=6, FIU=7, UCF=8, and UWF=9. The dependent and independent variables are entered as percentage rates and labeled as scaled variables. Total enrollment and first-time, full-time undergraduate enrollment are listed as the number of students and marked as scaled variables. The complete data sheet is transferred to SPSS version 24 statistical software. SPSS allows analyzing data by performing various statistical tests to support or reject the hypotheses. A one-way ANOVA and panel data analysis is performed to examine the data and produce results.

A one-way ANOVA is performed in SPSS to analyze the statistical means across the categorical variable, *University*, for each dependent variable. The descriptive statistics are acquired to produce the means and standard deviation. A Levene's test for homogeneity of variances is performed to test the null hypothesis that the variance is equal across groups. After obtaining the F value and the p significance value, a Bonferroni post hoc test is conducted to determine which groups are different from one another. The means plot is included in the analysis to provide visual statistics for all dependent variables. The results of ANOVA are also

organized into descriptive statistics to account for mean differences across all universities. The conduction of a one-way ANOVA for each dependent variable is imperative before performing a pane data analysis to obtain information on the amount of heterogeneity in the population (Wooldridge, 2011).

The panel data analysis is a preferred qualitative method to determine the significance of the outcomes. Panel data analysis contains observations of different entities across time (Wooldridge, 2011). This method allows to analyze the repeated observations of the same nine SUSF institutions over a six-year time period. Panel data provides benefits of a series-data analysis with observations collected at a regular frequency and cross-sectional data analysis with observations across various individuals. There are several advantages to panel data analysis that series-data or cross-sectional data analysis alone cannot provide (Wooldridge, 2011). Panel data can produce more information, variability, and more efficiency. It also allows for heterogeneity across groups with individual-specific effects and minimizes estimation biases that result from combining groups into a single time series (Aptech, 2021). Because all examined universities have different characteristics, such as size, budget, on-campus culture, a fixed-effects panel data using dummy variables will account for variation.

The panel data is set up in a long format, with observations for each variable from all groups and time periods listed in a column. Because there is no missing data and contains the same number of observations across groups, it is balanced. The model included a unique time-invariant identifier for each unit, *University*, a time-varying outcome, a dependent variable, and an indicator for time, *Year*. The fixed-effects model is selected for the panel-data analysis as it accounts for unobservable components of individual-specific effects (Aptech, 2021), in this case, the universities. A least-squares dummy variable estimation is applied to incorporate these effects using dummy variables. The variable *Universities* is recoded into eight dummy

variables and controlled for in the regression analysis. Because the time indicator is only six years, the panel model controls for period effects (McManus, 2011). The inclusion of dummy variables in a fixed-effect model removes omitted variable bias that can contaminate research results and produce changes within the group over time (Glen, 2021). Visual statistics in the form of tables and graphs provide for each variable to demonstrate the relationship between dependent and independent variables.

Conclusion

Chapter 3 outlines the concepts, methodology, data sampling, and design and analysis for this study. Nine public four-year degree-granting universities in Florida's State University System are selected as subjects. In this study, universities all offer online coursework to their undergraduates, while the three excluded institutions offer none. Florida has been ranked as number one nationally for higher education and is aggressively investing in online education. State legislators recognize that online education can provide more accessibility and affordability. Studies have shown that online education can also improve student success by increasing retention rates and graduating them on time. Additionally, it can also enhance institutional effectiveness and performance indicators, some of which are tied to funding.

A one-way ANOVA and fixed-effects panel data are selected for statistical analysis to produce descriptive statistics, explain the variance in means across the universities, and determine if there is a statistical significance between the percent of students enrolled in online courses and graduation, retention, and time-to-degree rates. Chapter 4 will present and discuss the findings of the statistical analysis. It will conclude with a case analysis of UF Online to support the research question and encourage further online education investment.

Chapter 4

Results and Analysis

Introduction

Online education proved to be a vital model of instructional delivery during the nationwide physical closures of universities due to the COVID-19 pandemic. Although online course offerings were becoming more popular in many higher education institutions before the pandemic, there was a sense of comprehension from academic leaders and policymakers in their role in contributing to higher student success outcomes and improved institutional performance. This paper aims to support the research question of whether an increase of students enrolled in online courses contributes to higher graduation, retention, and time to degree rates. The studied population is the State University System of Florida (SUSF) and its nine public degree-granting universities. The data is gathered from six consequent academic years, from 2013 to 2018. The study also provides a case analysis of an entirely online undergraduate university, a subsidiary of the University of Florida, to support the findings.

Chapter 4 compares and presents findings from quantitative analysis, discussing their significance in detail. The chapter begins with a brief overview of the nine universities under the State University System of Florida to provide relevant information about their structure and historical performance measures. Descriptive statistics are provided post overview of each university to help develop a more in-depth understanding of how the means compare and differentiate across all universities in the population. The following sections present and discuss the results of a one-way ANOVA and fixed-effects panel data tests for each dependent variable: graduation rates, retention rates, time-to-degree in four, five, and six years. A one-way ANOVA model is used to measure if there is a statistical difference of means across

sampled universities. Next, the panel data analysis is performed to determine the significance between the dependent and independent variables. Panel data allows conducting regression analysis over the same universities over time.

The total enrollment rates and first-time, full-time undergraduate enrollment rates are briefly discussed as an outcome indicator for institutional effectiveness. Finally, a case analysis of the University of Florida Online (UF Online) is presented as an exemplary investment model in online education to increase enrollment and retention while scaling down the costs and increasing affordability. The concluding portion of Chapter 4 summarizes the key findings and introduces Chapter 5, where the study's limitations are discussed.

Florida State University System Overview

Florida State University System (SUS) comprises 12 public universities; however, only nine are a part of this study. The remaining three, Florida Agricultural and Mechanical University (FAMU), Florida Polytechnic University (Florida Poly), and New College of Florida (NCF) were omitted from the study due to their academic structure and curriculum. FAMU is a historically black college and offers no undergraduate online courses. Florida Poly is the newest SUS university and does not offer any online undergraduate courses, as well. Its sole focus is on STEM education. NCF is an honors college for liberal arts with a very small annual admission of about 880 students. It offers no online education. The remaining nine universities sampled in this study are described below.

University of Florida (UF)

The University of Florida, a pubic land-grant research university, was founded in 1853 in Gainesville and is ranked as number 30 on the Best Colleges and National

Universities list in 2021 (U.S. News, 2021). It is one of three preeminent universities in Florida SUS and the third-largest by student population. The average for undergraduate enrollment is 35,405, with an acceptance rate of 37%. The vast majority of students attend the university full time (about 83%) and are under the age of 25 years (98%). Only a quarter of undergraduate students receive Federal Pell Grand financial aid assistance. UF offers over 100 undergraduate and 200 graduate degree programs, with many undergraduate courses being offered online. In 2020, the instate tuition was $6381, and out-of-state tuition is $28,659. The popularity of online courses contributed to creating the UF satellite college, UF Online, in 2014 that offers fully online baccalaureate degrees. UF Online will be discussed further in this Chapter.

Table 1

UF Descriptive Summary of Means

	Mean	Std. deviation
Graduation rate	88.0	1.10
Retention rate	96.3	0.62
Time-to-degree 4 years rate	67.2	0.69
Time-to-degree 5 years rate	17.8	0.78
Time-to-degree 6 years rate	2.8	0.34
Total Enrollment	30,451	94.10
Full-time first-time undergrad enrollment	6604	222.5
Percent of Online Students rate	63.0	2.94
Percent of Face-to-face Students rate	37.0	2.96

Florida State University (FSU)

FSU is located in Tallahassee, Florida's capital, and is considered one of the state's largest public universities. It was established in 1851 and is ranked as the 19th best public university in the United States by U.S. News and World Report (2021). It has an acceptance

rate of 49%, and 85% of students are full-time. The undergraduate enrollment is about 30,000 students. Students aged under 25 years old make up 95% of the undergraduate population, with 27% being Pell Grant recipients. It is one of the preeminent research universities in the state, with many nationally ranked programs. The in-state and out-of-state tuitions are $6,517 and $19,084 respectively. It has less than 1000 undergraduate online courses, and most undergraduate students take courses on campus. As the oldest university in Florida, FSU offers its students a rich campus life, student clubs and organizations, Greek life, sporting events, and a large on-campus housing. Promotion of on-campus living and embracing student community can be a contributing factor to low online undergraduate course enrollment.

Table 2

FSU Descriptive Summary of Means

	Mean	Std. deviation
Graduation rate	80.7	1.86
Retention rate	92.8	0.75
Time-to-degree 4 years rate	63.3	3.12
Time-to-degree 5 years rate	15.2	1.24
Time-to-degree 6 years rate	2.1	0.33
Total Enrollment	28,951	159.9
Full-time first-time undergrad enrollment	6060	167.7
Percent of Online Students rate	38.9	9.01
Percent of Face-to-face Students rate	63.5	8.64

University of North Florida (UNF)

UNF is a newer and one of the smaller schools among Florida public universities established in 1965 in Jacksonville. Its undergraduate enrollment is about 14,000 students, with about 67% being full-time. UNF mostly invested in ungraduated education, with only about 2000 students enrolled in graduate programs. Total student enrollment in 2020 was 16,525, with 92% of students under the age of 25. The in-state tuition is $6394 and out-of-state tuition

is $20,798. About 31% of students are Pell Grant recipients. The acceptance rate is 72%, with approximately 96% on in-state students. UNF has very low graduation rates, with only 55% graduating with 150% of normal completion time. Only about 25% of bachelor's degree recipients earned it within four years. UNF only offers one fully online bachelor's degree program and does not have a robust undergraduate online courses catalog. UNF has a "commuter school" reputation, with many students transferring to more prestigious universities for the junior and senior years (Brooks, 2012).

Table 3

UNF Descriptive Summary of Means

	Mean	Std. deviation
Graduation rate	56.0	3.900
Retention rate	81.3	1.21
Time-to-degree 4 years rate	29.2	3.62
Time-to-degree 5 years rate	20.8	1.21
Time-to-degree 6 years rate	6.29	0.69
Total Enrollment	14,147	288.2
Full-time first-time undergrad enrollment	1872	322.8
Percent of Online Students rate	38.2	10.1
Percent of Face-to-face Students rate	61.8	10.1

Florida Atlantic University (FAU)

FAU is a public, non-profit research university offering 170 undergraduate and graduate degree programs and doctorate-level degrees, associate degrees, and certificates. It was established in 1961 in Boca Raton and had an undergraduate enrollment rate of approximately 24,000 students and a total enrollment of over 30,000 students. The acceptance rate is over 60%, the retention rate is about 80%, and the on-time graduation rate is less than 50%. The average time to degree completed in 4 years is less than 25%. Like UNF, FAU is considered a "commuter school," with most students residing off-campus. FAU has the smallest in-state and out-of-state tuition cost out of all nine SUSF universities, with $4,790

yearly in-state and $17,234 out-of-state tuition. A quarter of its undergraduates consist of age 25 years and older students, and about half are Pell Grant recipients. Over the past several years, FAU has been actively rebranding itself as a more traditional university by increasing student housing, student organizations, and increasing undergraduate and graduate programs. It has also begun making investments in online education and diversifying the undergraduate online course catalog. Currently, it offers 16 fully and partially online undergraduate program degrees.

Table 4

FAU Descriptive Summary of Means

	Mean	Std. deviation
Graduation rate	48.2	1.670
Retention rate	79.2	2.32
Time-to-degree 4 years rate	22.0	4.00
Time-to-degree 5 years rate	19.5	1.26
Time-to-degree 6 years rate	7.87	1.77
Total Enrollment	24,063	490.4
Full-time first-time undergrad enrollment	3080	207.5
Percent of Online Students rate	34.18	11.23
Percent of Face-to-face Students rate	65.8	11.23

University of South Florida (USF)

USF is a public preeminent research university located in Tampa and the fourth-largest university in Florida. It was established in 1956 and had an average annual enrollment of over 30,000 students, with 24,500 undergraduates. The acceptance rate is 48%, the retention rate is 90%, and the graduation rate is approximately 70%. On average, Pell Grant recipients make up about 31% of the undergraduate student body. It has 14 colleges and offers more than 180 undergraduate, graduate, and doctoral-level degree programs. The in-state and out-of-state annual tuitions are $6410 and $17324, respectively. USF has a vibrant campus life, offering its

students to join many organizations, sports, and Greek life. USF had a steady increase in undergraduate online course offerings, and their popularity increased even among the on-campus students. Currently, it offers seven fully online bachelor's degree programs.

Table 5

USF Descriptive Summary of Means

	Mean	Std. deviation
Graduation rate	70.2	3.37
Retention rate	89.5	1.05
Time-to-degree 4 years rate	48.4	8.15
Time-to-degree 5 years rate	17.2	3.85
Time-to-degree 6 years rate	4.7	0.94
Total Enrollment	30,621	418.26
Full-time first-time undergrad enrollment	4050	205.9
Percent of Online Students rate	54.6	6.24
Percent of Face-to-face Students rate	45.4	6.24

Florida Gulf Coast University (FGCU)

FGCU, located in Fort Myers, was established in 1991 and is one of Florida's SUS youngest members. The acceptance rate is about 67%, with a total annual enrollment of around 13,000 and undergraduate enrollment of around 11,000 students. Pell Grant recipients make up on average 32% of the full-time first-time undergraduate student body. The tuition for 2020 was $6,118 in-state and $25,162 out-of-state. In 2018, a new President assumed the position, who assembled a task force to address low graduation rates and other performance-based indicators. In 2017, FGCU was ranked among SUSF's three worst-performing schools and lost $8 million in performance-based funding from the state (Bland, 2018). FGCU began increasing its undergraduate online course catalog and offering three fully online undergraduate programs, among many changes that accompanied leadership change. However, considering how recent

the change of leadership and implementation of initiatives occurred, there is no sufficient data to determine their impact on graduation, retention, and time to degree rates.

Table 6

FGCU Descriptive Summary of Means

	Mean	Std. deviation
Graduation rate	47.3	2.5
Retention rate	78.5	0.55
Time-to-degree 4 years rate	21.8	1.13
Time-to-degree 5 years rate	19.5	1.57
Time-to-degree 6 years rate	5.7	0.84
Total Enrollment	13436	350.6
Full-time first-time undergrad enrollment	2668	97.5
Percent of Online Students rate	47.08	5.19
Percent of Face-to-face Students rate	53.43	6.17

Florida International University (FIU)

FIU is the largest university in South Florida and the second-largest in the state. It was established in 1965 in Miami and had a total annual enrollment of 40,000 students, 28,000 undergraduates. FIU is affiliated with the Hispanic Association of Colleges and Universities and serves a predominantly Hispanic community, who make up almost 70% of the total student body. The acceptance rate is 58%, and half of the first-time, full-time undergraduate students are the Pell Grant recipients. FIU has been investing in online education since 1998, currently offering 36 fully online bachelor's programs and numerous online undergrad courses. More than half of students prefer to take their coursework online at least part-time, and 20% take it entirely online. The popularity of online education is partially due to almost 30% of undergraduate students over the age of 25 who appreciate its flexibility.

Additionally, almost 60% of undergraduate students are Pell Grant recipients, low-income students, potentially contributing to lower graduation rates. Nationally, Pell Grant recipients take a longer time to graduate (Florida International University, 2016). The in-state tuition for the year 2020 was $6,566, and out-of-state tuition was $18,964.

Table 7

FIU Descriptive Summary of Means

	Mean	Std. deviation
Graduation rate	57.7	3.01
Retention rate	88.5	1.22
Time-to-degree 4 years rate	27.5	3.5
Time-to-degree 5 years rate	21.2	0.71
Time-to-degree 6 years rate	8.6	0.62
Total Enrollment	39185	1601.8
Full-time first-time undergrad enrollment	3904	295.6
Percent of Online Students rate	62.7	11.1
Percent of Face-to-face Students rate	37.3	11.09

University of Central Florida (UCF)

UCF was established in 1963 in Orlando and is currently the largest university in the state. The total annual enrollment is over 55,000 students and almost 42,000 undergraduate enrollments. The acceptance rate is 44%, the average graduation rate is 70%, and the retention rate is 89%. Over 40% of bachelor's degree-seeking students graduate in 4 years. UCF offers 19 entirely online undergraduate programs, with almost half of students taking online courses at least part-time. Pell Grant recipients make up 30%, and less than 20% of undergraduates are over 25 years old. The in-state tuition for the 2020 year was $6317, and the out-of-state tuition was 22,467. UCF has been investing in online education for the past 25 years and focuses on quality and providing a meaningful learning environment. Its online bachelor's program was ranked among the top 15 in 2021 by U.S. News and World Report.

Table 8

UCF Descriptive Summary of Means

	Mean	Std. deviation
Graduation rate	70.6	1.5
Retention rate	89.2	0.75
Time-to-degree 4 years rate	41.3	1.77
Time-to-degree 5 years rate	23.23	0.58
Time-to-degree 6 years rate	6.0	0.41
Total Enrollment	54733	2816.4
Full-time first-time undergrad enrollment	6380	430.6
Percent of Online Students rate	56.2	4.03
Percent of Face-to-face Students rate	43.8	4.03

University of West Florida (UWF)

UWF was established in Pensacola in 1963. It is a mid-size public university with an approximate annual undergraduate enrollment of 6,700. Its total enrollment is less than 10,000 students. The acceptance rate is 31%, with a 46% graduation rate and a 75% retention rate. About 30% of students are Pell Grant recipients, and less than 35% are over the age of 25. UWF offers ten fully online bachelor's degree programs and numerous online undergraduate courses. More students prefer to take their classes online in recent years, with 57% of undergraduate students enrolled in online courses at least part-time in 2018. In 2020, the in-state tuition was $6,360, and out-of-state tuition was $19,241.

Table 9

UWF Descriptive Summary of Means

	Mean	Std. deviation
Graduation rate	46.7	3.0
Retention rate	74.5	3.56
Time-to-degree 4 years rate	25.0	2.53
Time-to-degree 5 years rate	16.1	0.87
Time-to-degree 6 years rate	5.9	1.01

Total Enrollment	9636	154.5
Full-time first-time undergrad enrollment	1255	120.5
Percent of Online Students rate	51.4	5.5
Percent of Face-to-face Students rate	48.6	5.5

Dependent Variables

Graduation Rates

Graduation rates are considered a key indicator of institutional performance by the U.S. Department of Education and are also used to assign university rankings (American Association of State Colleges and Universities, 2006). It is measured as a percentage of first-time, first-year undergraduate students who complete their program within 150% of a four-year degree program. Florida SUS uses a performance-based funding model to provide its universities financial incentives to improve their key metrics. New funding and the amount of the base state funding reallocated among the universities are determined by how they score on nine metrics (State University System of Florida, 2020). Graduation rate and Retention rate are two of nine metrics. This section analyzes the relationship between the percent of online students and graduation rates amongst SUSF universities.

First, a one-way ANOVA is performed using a continuous dependent variable (graduation rate) and categorical fixed factor variable (university) to compare the universities' graduation rate and evaluate statistical significance. The hypothesis statement is as follows:

H_0: there is no significant difference in means between any of the nine universities.

H_a: at least two universities have significantly different graduation rate means.

The test for homogeneity of variances showed the significance level of .113; therefore, variances across nine groups are the same. The null hypothesis is not rejected, and the

condition of homogeneity of variances is satisfied. ANOVA test showed a statistically significant difference between groups, $F(8,45) = 168.3$, $p < 0.001$, rejecting the null hypothesis. There is strong evidence that there are significant differences between at least two groups. A Bonferroni post hoc test revealed that the rate of graduation is statistically significant across most universities but not all. Table 10 summarizes the Multiple Comparisons results between the not statistically significant universities, $p = 1.000$, or $p > 0.05$.

Table10.

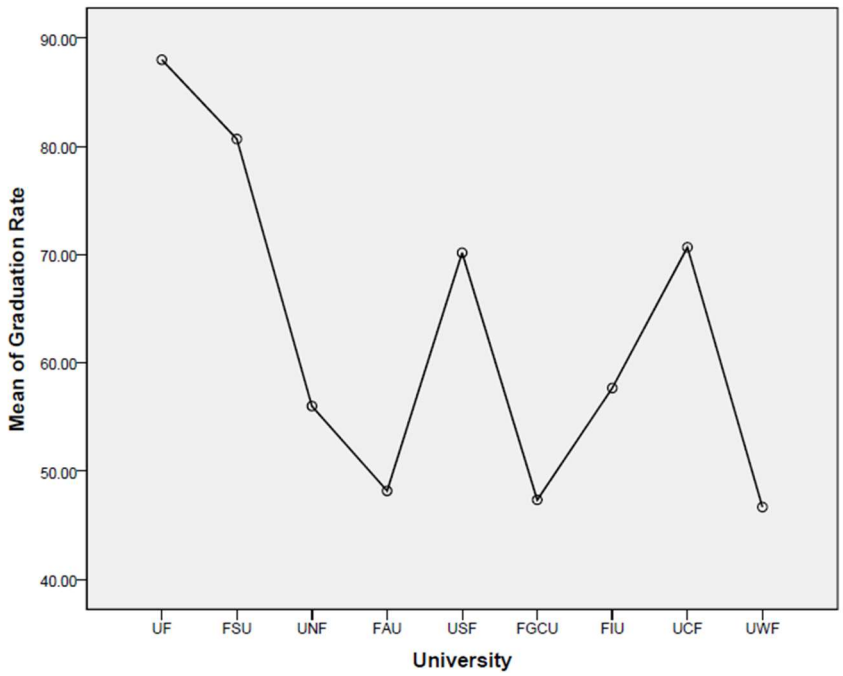
Graduation Rates

University	Mean	Std. Dev.	p
UNF	56	3.9	1.000
FIU	57.7	3	
FAU	48.2	4.1	1.000
FGCU	47.3	2.5	
UWF	46.7	3	
UCF	70.7	1.5	1.000
USF	70.2	3.4	

The scatter plot in Graph 1 confirms universities' post hoc results with non-statistically significant graduation rate means.

Graph 1

Graduation rate means across SUS universities.



A brief overview of each university explains no mean difference between graduation rates. FAU, FGCU, and UWF have no significant mean difference amongst each other, explained by several common factors such as their size, history of underperformance, high acceptance rate, and a "commuter school" culture. FIU and UNF are not significantly different in graduation rates; however, they do not have apparent common factors. FIU is a large, predominantly Hispanic university, with over half of undergraduate students being the Pell Grant recipients. UNF is a much smaller school that can also be considered a "commuter school." It is unknown what common factors they have in common to account for similar graduation rates. UCF and USF show no significant difference between graduation rate means due to their many similarities. Both schools have large enrollment rates, a traditional university structure, and vibrant on-campus student culture. Both universities also heavily invest in their online education and offer numerous fully online bachelor's degree programs. Over 50% of undergraduate students in both schools take at least half of their courses online.

The following analysis directly examines the impact of student enrollment in online courses on graduation rates. A panel data analysis using a fixed-effects dummy variable model is performed using graduation rates as a dependent variable and the percent of online students as independent variables. A fixed-effects dummy variables method is applied to control for the units', universities, effects. This method of controlling for heterogeneities across individual groups addresses the differences amongst sampled universities, accounting for other factors besides online courses that can influence the graduation rate. The equation for the fixed-effects regression model as follows:

$$Y_{it} = B_1 X_{it} + a_{fx} + u_{it}$$

Y_{it} = dependent variable accounting for entity and time

X_{it} = independent variable

B_1 = independent variable coefficient

u_{it} = error term

The panel data model is selected for this analysis as it allows for more variability and efficiency than time- series or cross-sectional data. It minimizes estimation biases that can arise from grouping a categorical variable into a single time series. A histogram test showed a normal distribution within the dependent variable. Additional regression models were performed using a univariate linear model to confirm the results. Linear regression is conducted with the dependent and independent variables, holding for the dummy variables. The results were different from other models, and the Durbin-Watson test indicated a presence of autocorrelation (less than 1), possibly skewing the results. The dummy-variable approach allows controlling for the autocorrelation. The panel-data model with two-scale variables and

least squares dummy variable estimation showed significant results ($R^2 = .980$, $F = 234.2$, $p < 0.001$). As demonstrated in Table 11, the regression model is statistically significant, $p < 0.001$, at predicting the outcome variable. The R^2 value of .980 indicates how much of the dependent variable's total variation can be explained by the independent variable, which at 98% is a significant indicator. Coefficient *t* is significant at $p < 0.001$, pointing that the independent variable, online students, is a predictor of a dependent variable, graduation rate. An unstandardized coefficient $B = .222$ indicates a positive relationship, where one unit increase in the percent of online students will increase the graduation rates by .22 points while holding other variables constant.

Table 11.

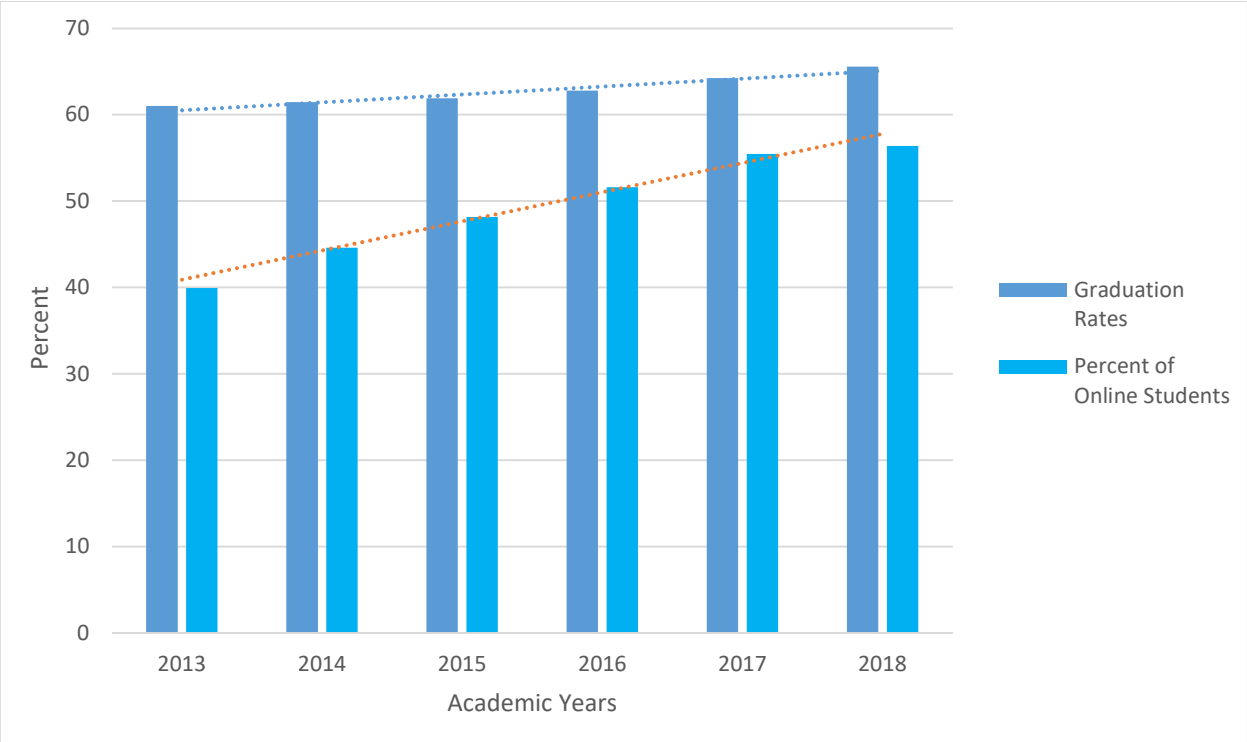
Regression Summary: Graduation Rates by Percent of Online Students

R^2	F	t	*B*
0.98	234.2	5.1	0.222
	$p < 0.001$	$p < 0.001$	

Graph 2 presents the descriptive statistics of the overview of these variables across time to visualize better the relationship between graduation rates and percent of online students.

Graph 2.

Florida State University System Graduation and Online Student Enrollment Rates



Graph 2 illustrates the positive linear relationship between the average graduation rates and online students' percent among nine SUSF universities. The unstandardized coefficient B=.222 indicates a positive effect of the predictor on the outcome. The small number of observations across time can be a limitation in capturing this relationship's full potential.

Retention Rates

Retention rate is another variable used to indicate student success and is measured as a percentage of first-time undergraduate students returning to the same institution the following year (NCES, 2021). It is one of the nine metrics used by Florida SUS to allocate performance-based funding. Improving an underperforming university's retention rate can mean crucial access to more significant state funding. This measure also helps track student success and how well universities are equipped to provide services and deliver curriculum to keep the students returning the following year. Online education played a critical role in student retention during

the COVID-19 related university campus closures. It allowed many students to return to their respective universities the following fall and continue their education. Past studies have also indicated a positive correlation between students taking online courses and retention rates (Bailey et al., 2018), meaning that online education can contribute to student success and higher university performance ratings.

One-way ANOVA is performed using a continuous dependent variable (retention rate) and categorical fixed factor variable (university) to compare the retention rate means between the universities and evaluate for statistical significance. The hypothesis statement is as follows:

H_0: there is no significant difference in means between any of the nine universities.

H_a: at least two universities have significantly different retention rate means.

ANOVA test showed a statistically significant difference between groups, $F(8,45) = 123.8$, $p < 0.001$, rejecting the null hypothesis. There is strong evidence that there are significant differences between at least two groups. A Bonferroni post hoc test revealed that the rate of graduation is statistically significant across most universities but not all. Table 12 summarizes the Multiple Comparisons results between the universities that were not statistically significant, $p = 1.000$, or $p > 0.05$.

Table 12.

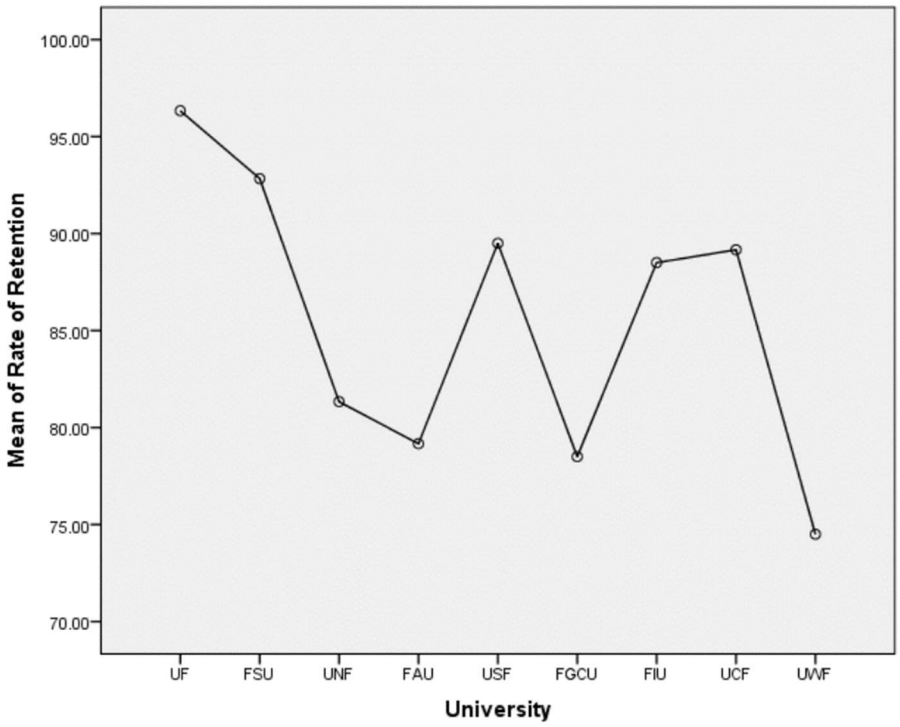
Retention Rates

University	Mean	Std. Deviation	p
UNF	81.3	1.2	0.928
FAU	79.2	2.3	
FAU	79.2	2.3	1.000
FGCU	78.5	0.55	
USF	89.5	1	1.000
UCF	89.2	0.75	1.000
FIU	88.5	1.2	1.000

The scatter plot in Graph 3 confirms the post hoc results of universities with non-statistically significant graduation rate means.

Graph 3.

Retention rate means across SUS universities.



The lack of significant difference in means between FAU, UNF, and FGCU expected as these schools are historically lower performing. They have a high acceptance rate and above 30% of undergraduate students are Pell Grant recipients. They are also considered "commuter schools," lacking the traditional university culture as some of the more prestigious SUSF universities. UCF, USF, and FIU are on the opposite side of the spectrum, with the largest enrollment rates and massive budgets. USF and UCF have a preeminent research university designation, while FIU is designated as approaching preeminence. The financial and operational structures of these universities can explain their similarities in retention rates.

The panel data analysis using a fixed-effects regression model was performed with the same independent variable, online students, and the dependent variable's retention rate. The dummy variables were applied to the model to control for the units', universities, effects. The equation where OS is online students and Uni_{fx} is universities fixed effect is as follows:

$$RetRt = b_1 OS_{it} + Uni_{fx} + u_{it}$$

A histogram test was performed before the analysis to check for normal distribution within the dependent variable. Additional regression models were performed using a univariate linear model to confirm the results. The panel-data model with two-scale variables and least squares dummy variable estimation showed significant results ($R^2 = .971$, $F = 161.2$, $p < 0.001$). The R^2 value indicates that the independent variable can explain 97% of the total variation in the dependent variable. Coefficient *t* is significant at $p < 0.001$, pointing at the independent variable, online students, as a predictor of the dependent variable, retention rate. An unstandardized coefficient $B = .118$ indicates a positive relationship, where one unit increase in the percent of online students will increase the retention rates by .12 points while holding other variables constant.

Table 13.

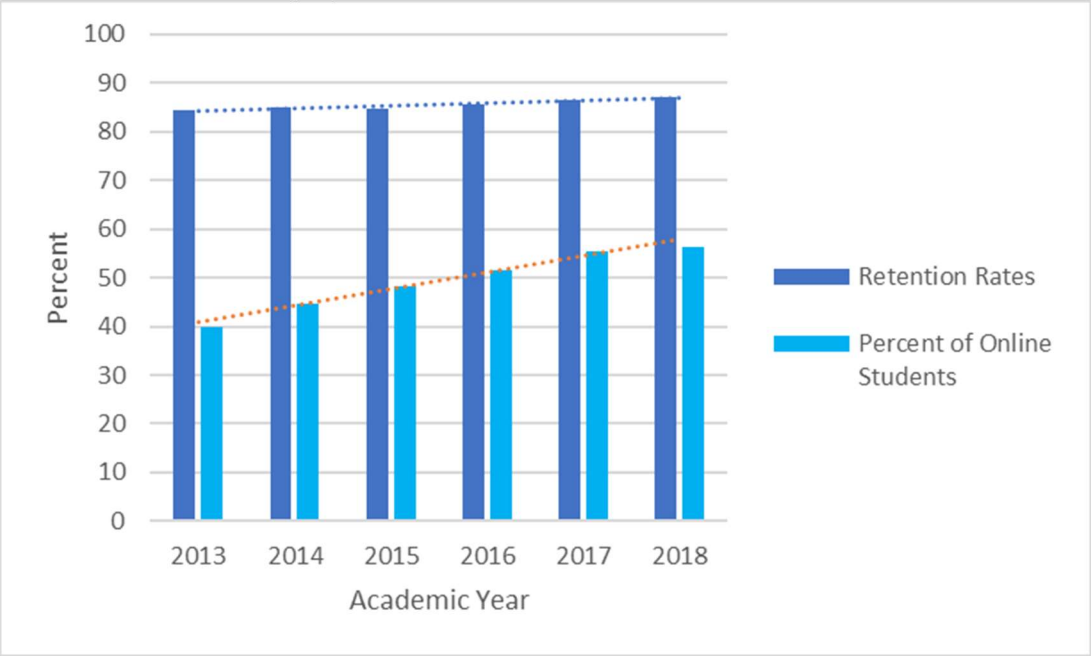
Regression Summary: Retention Rates by Percent of Online Students

R^2	F	t	*B*
0.97	161.2	4.6	0.118
	p< 0.001	p< 0.001	

Graph 4 demonstrates the descriptive statistics for the retention rates and percent of online students across the six years. The variables are displayed as averages for all universities.

Graph 4.

Florida State University System Retention and Online Student Enrollment Rates



A positive linear relationship is shown between the average retention rates and percent of online students at SUSF universities. Retention rates usually do not change drastically over a short period but can be improved long term. An increase in students taking online courses can potentially contribute to higher retention rates, especially in under-performing universities that need better performance outcomes.

Time-to-degree in 4, 5, and 6 years

Time to degree is another vital indicator of student success. Although SUSF omits time-to-degree as a metric for funding allocation, it is a relevant measure of how well a university performs. Universities with low rates of four and five years to a degree can costs students more money. When students do not attain their bachelor's degrees in proper time, they end up paying more in tuition, fees, and room and board, as well as delaying entry into the workforce and reducing their earning potential (Weldon, 2013). Increasing rates for time-to-degree in four years, while decreasing the time-to-degree in five and six years, can improve university outcome measures and student success. Studies have linked time-to-degree rates and student enrollment in online courses. One such study (Wavle & Ozogul, 2019) determined that students who took at least some online courses had completed their degrees in less time than students who took no online courses.

One-way ANOVA is conducted for each of the dependent variables, time-to-degree in four, five, and six years, using a categorical fixed factor variable (university) to compare the means between the universities and evaluate for statistical significance. The hypothesis statement is as follows:

H_0: there is no significant difference in means between any of the nine universities.

H_a: at least two universities have significantly different time-to-degree rate means.

Tables 14, 15, and 16 present the result for each ANOVA test.

Table 14.

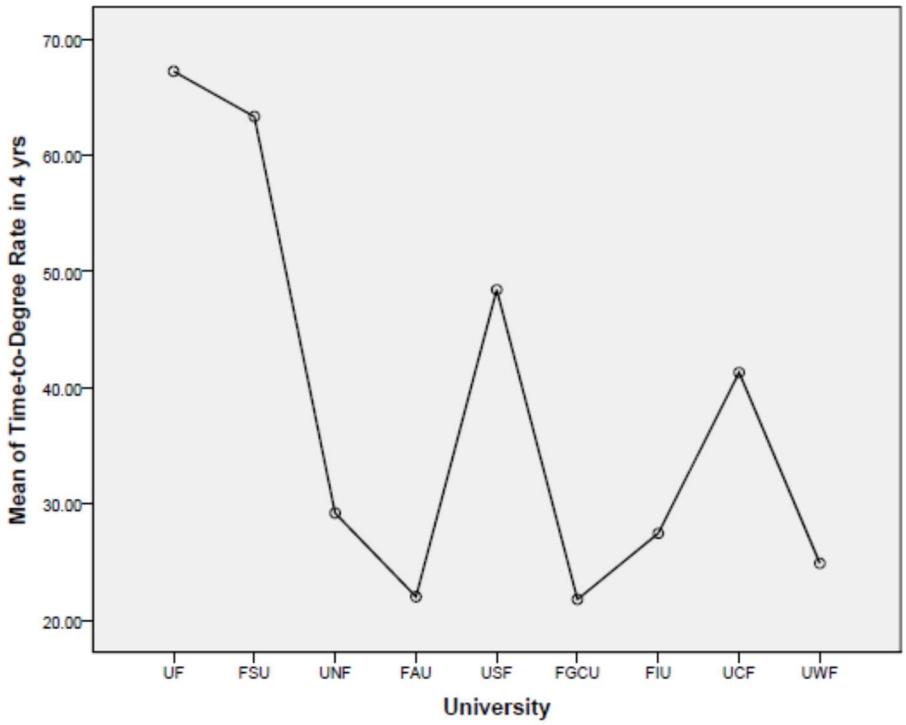
Time-to-degree 4 years Rates

University	Mean	Std. Deviation	*p*
UF	67.2	0.7	$p > 0.05$

FSU	63.3	2.1	
USF	48.4	8.1	$p > 0.05$
UCF	41.3	1.8	
UNF	29.2	3.6	
FIU	27.4	3.5	$p > 0.05$
UWF	25.0	2.5	
FAU	22.0	4.0	
FGCU	21.8	1.1	$p > 0.05$
UWF	25.0	2.5	

Graph 5.

Time-to-degree 4 years means across SUS universities.



The test for homogeneity of variances is significant at $p < 0.000$ level; therefore, variances across nine groups are not the same. ANOVA test showed a statistically significant difference between groups, $F(8,45) = 131.1$, $p < 0.001$, rejecting the null hypothesis. There is strong

evidence that there are significant differences between at least two groups. A Bonferroni post hoc test revealed that the rate of time-to-degree in 4 years is statistically significant across most universities but not all. Table 14 summarizes the Multiple Comparisons results between the universities that were not statistically significant with $p > 0.05$. Graph 5 demonstrates that universities with the highest means, UF, FSU, USF, and UCF, are the largest and most prestigious universities under the Florida SUS umbrella. These universities are consistently rated higher than the remaining five universities and have bigger budgets, which may account for their high graduation rates in four years.

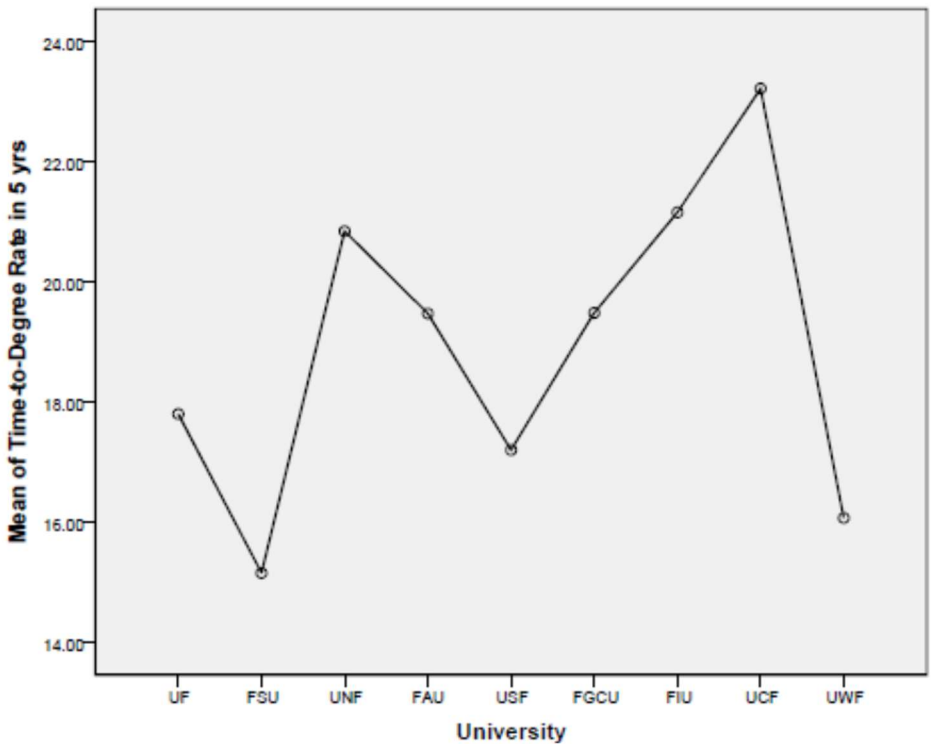
Table 15.

Time-to-degree 5 years Rates

University	Mean	Std. Dev.	*p*
FSU	15.2	1.2	p > .05
UWF	16.1	0.9	
UF	17.8	0.8	p > .05
USF	17.2	3.9	
FAU	19.5	1.3	p > .05
FGCU	19.4	1.6	
UNF	20.8	1.2	p > .05
FIU	21.2	0.7	
UCF	23.2	0.6	p > .05

Graph 6.

Time-to-degree 5 years means across SUS universities.



ANOVA test showed a statistically significant difference between groups, F (8,45) = 15.3.1, p < 0.001, rejecting the null hypothesis. There is strong evidence that there are significant differences between at least two groups. A Bonferroni post hoc test revealed that the rate of time-to-degree in five years is statistically significant in some universities but not all. Table 15 summarizes the Multiple Comparisons results between the universities that were not statistically significant with p > 0.05. Graph 6 is almost an inversion of Graph 5, where the universities with the highest rates for time-to-degree in four years have lower rates of time to degree in five years. UF, FSU, and USF have much lower rates of students graduating in five years than in four years, while UNF, FAU, FGCU, and FIU have higher means for graduation rate in five years than in four years.

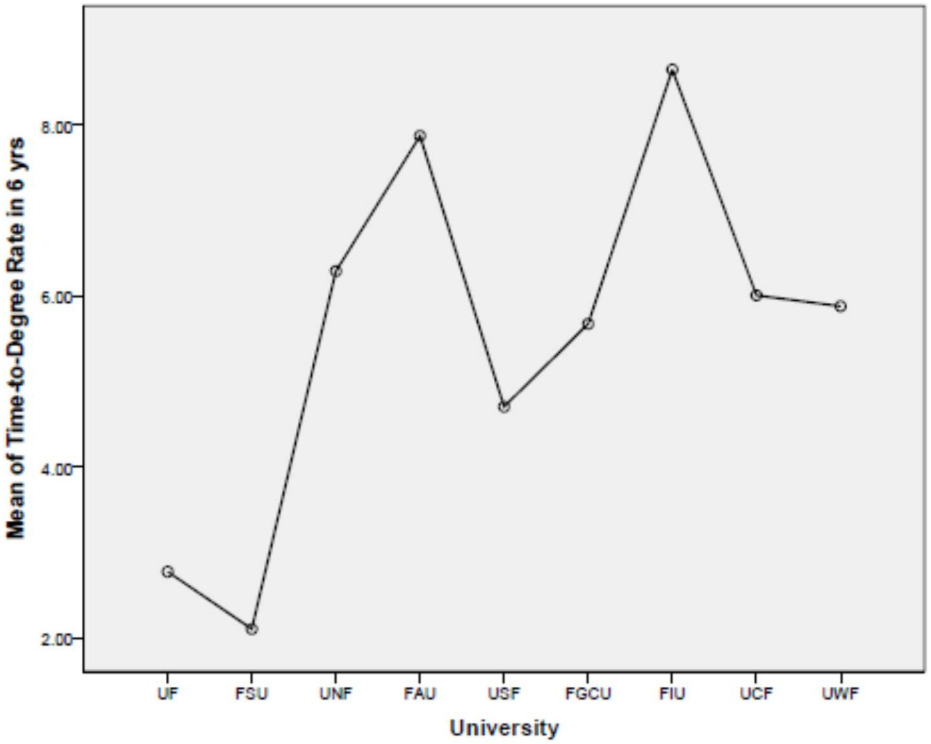
Table 16.

Time-to-degree 6 years means across SUS universities.

University	Mean	Std. Dev.	*p*
UF	2.8	0.3	p > .05
FSU	2.1	0.3	
USF	4.7	0.9	p > .05
FGCU	5.7	0.8	
UWF	5.8	2.2	p > .05
UCF	6.0	0.4	
UNF	6.3	0.7	p > .05
FAU	7.9	1.8	
FAU	7.9	1.8	p > .05
FIU	8.6	0.62	

Graph 7.

Time-to-degree 6 years means across SUS universities.



ANOVA test showed a statistically significant difference between groups, F (8,45) = 34.8, p < 0.001, rejecting the null hypothesis. A Bonferroni post hoc test revealed that the rate of time-

to-degree in five years is statistically significant in some universities but not all. Table 16 summarizes the Multiple Comparisons results between the universities that were not statistically significant with $p > 0.05$. Graph 7 follows the trend of Graph 6, where the highest performing universities have the lowest means for the time-to-degree six years. The lowest-performing universities have a higher percentage of students graduating in 6 years than the more prominent and prestigious universities.

Three separate panel data analysis tests are performed with online students' percent as an independent variable and a time-to-degree as the dependent variable. The dummy variables were applied to the model to control for the units', universities, effects. The equation where OS is online students and Uni_{fx} is universities fixed effect is as follows:

$$T_4Rt = b_1\, OS_{it} + Uni_{fx} + u_{it}$$

$$T_5Rt = b_1\, OS_{it} + Uni_{fx} + u_{it}$$

$$T_6Rt = b_1\, OS_{it} + Uni_{fx} + u_{it}$$

A histogram test was performed before the analysis to check for normal distribution within the dependent variable. The panel-data model with two-scale variables and least squares dummy variable estimation showed significant results for time-to-degree four year variable ($R^2 = .98$, $F = 196.3$, $p < 0.001$). The R^2 value indicates that the independent variable can explain 98% of the total variation in the dependent variable. Coefficient *t* is significant at $p < 0.001$, confirming that the independent variable is a predictor of the dependent variable. An unstandardized coefficient *B*=.308 indicates a positive relationship, where one unit increase in the percent of online students will increase the time to degree in 4 years by .31 points while holding other variables constant.

The analysis with the dependent variable of time-to-degree in five years also was statistically significant ($R^2 = .79$, $F = 18.6$, $p < 0.001$). The R^2 value indicates that the independent variable can explain 79% of the total variation in the dependent variable. Coefficient *t* is significant at $p < 0.001$, confirming that the independent variable is a predictor of the dependent variable. An unstandardized coefficient $B = -.099$ indicates a negative relationship, where for every unit increase in the percent of online students, the time to degree in five years will decrease by .10 points while holding other variables constant.

The panel data model showed that time-to-degree in six years was statistically significant ($R^2 = .91$, $F = 47.3$, $p < 0.001$). The R^2 value indicates that the independent variable can explain 91% of the total variation in the dependent variable. Coefficient *t* is significant at $p < 0.001$, confirming that the independent variable is a predictor of the dependent variable. An unstandardized coefficient $B = -.064$ indicates a negative relationship, where for every unit increase in the percent of online students, the time to degree in six years will decrease by .06 points while holding other variables constant.

Table 17.

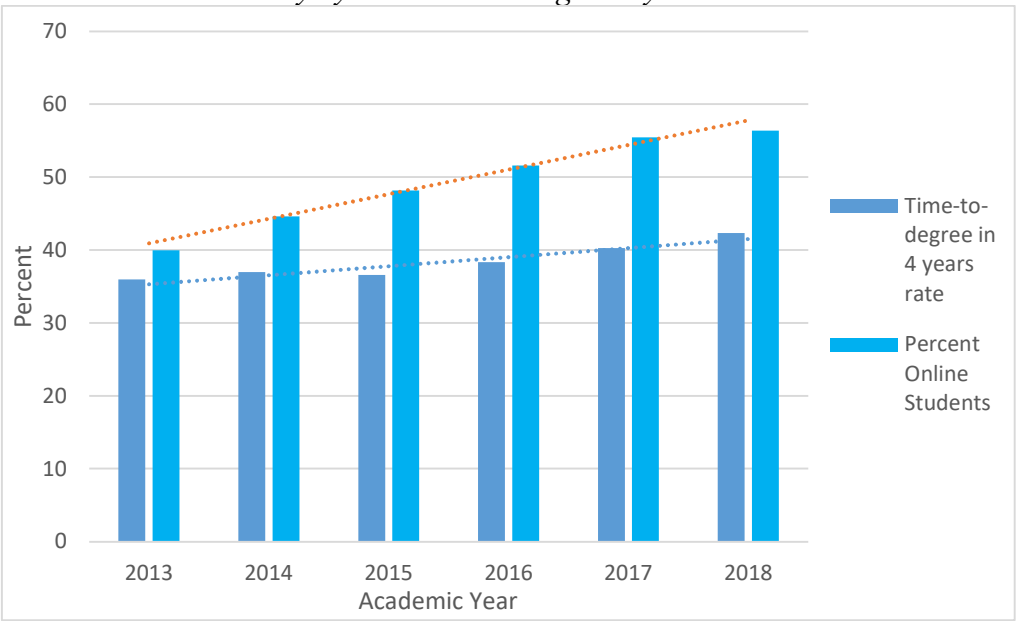
Regression Summary: Time-to-Degree Rates by Percent of Online Students

Variable	R^2	F	*B*	*p*
Time-to-Degree 4 yrs	0.976	196.3	0.308	p < .001
Time-to-Degree 5 yrs	0.792	18.6	-0.099	p < .001
Time-to-Degree 6 yrs	0.906	47.3	-0.064	p < .001

Graphs 8, 9, and 10 help visualize the descriptive statistics for the time-to-degree rates and percent of online students across the six years. The variables are displayed as averages for all universities and are labeled as SUS.

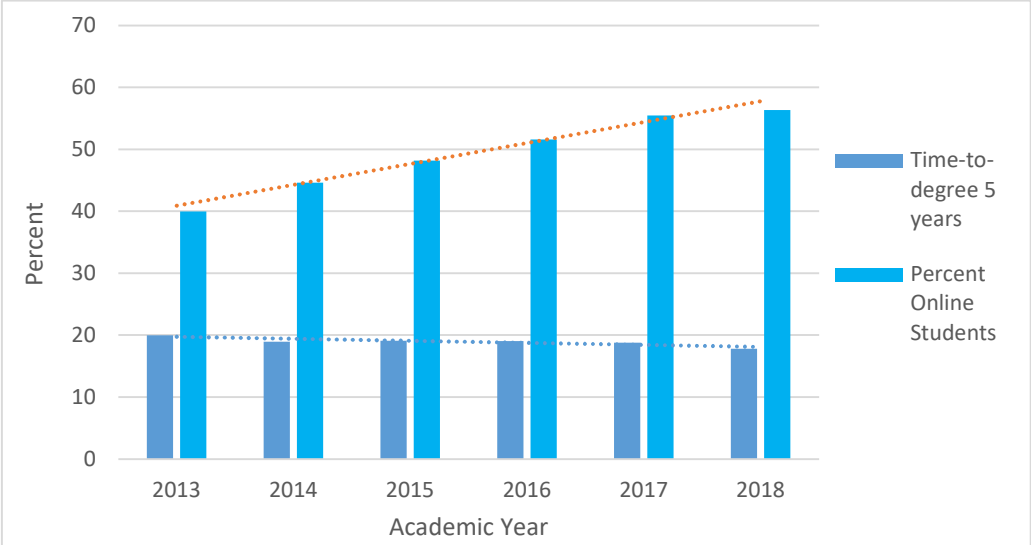
Graph 8.

Florida State University System Time-to-degree 4 years and Online Student Enrollment Rates



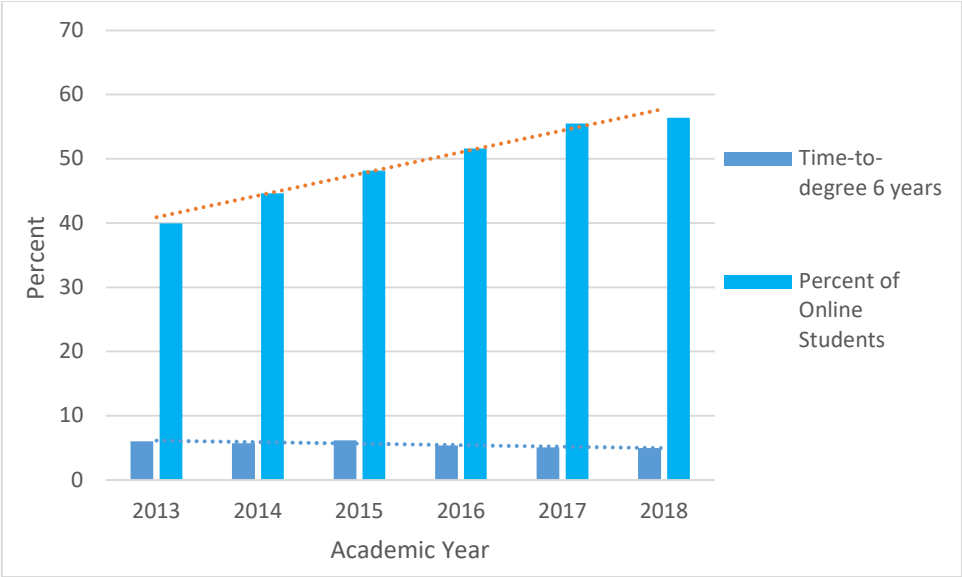
Graph 9.

Florida State University System Time-to-degree 5 years and Online Student Enrollment Rates



Graph 10.

Florida State University System Time-to-degree 6 years and Online Student Enrollment Rates



The panel regression model and descriptive statistics show a positive relationship between the percent of students in online courses and the time-to-degree in four years variable. As more students enroll in online courses, there is a steady increase in students attaining their undergraduate degrees in four years. An opposite trend is observed for the time-to-degree in five and six years. As the percent of students enrolled in online classes increases, graduation in five and six years decreases, meaning fewer students take longer to graduate. On-time graduation is a vital factor of student success and an indicator of the university's effectiveness. When undergraduate students finish their degree on time, they save money on tuition and fees and enter the job market earlier, increasing their earning potential. These results support the research question that enrollment in online courses can reduce the time to degree and help students graduate faster. Some of the lower performing SUSF universities are also beginning to see this trend as they increase their online student enrollment and further explore this option to improve their performance outcomes.

Total and First-time Full-time Undergraduate Enrollment

The enrollment rates are briefly discussed in this section but are not used as variables to answer the research question. A clear argument cannot be provided for the effects of online course enrollment on the total enrollment and first-time, full-time undergraduate enrollment rates. Many factors can contribute to the rise or drop of enrollment rates outside, which are outside of this research scope. One approach to analyzing this relationship is by testing the increase in the number of online courses offered and enrollment rates. This study, however, utilizes percent of students enrolled in online courses and would not provide an adequate statistical relationship.

There are significant differences amongst SUSF universities in academic and financial structures. A smaller "commuter school" university does not have the same resources to increase enrollment rates as one of the more prominent preeminent research universities does. Nevertheless, the enrollment rates must be touched upon in this study. Previous research drew a parallel between increased online education and improved enrollment rates in higher education amongst four-year degree-granting universities (Allen & Seaman, 2014).

Table 18.

Regression Summary: Total Enrollment and First-time Full-time Undergraduate Enrollment by Percent of Online Students

Variable	R^2	F	*B*	*p*
Total Enrollment	0.994	843.8	33.9	0.121
First-time full-time undergraduate enrollment	0.986	342.1	6.79	0.156

A data panel analysis was performed with total enrollment as the dependent variable and percent of online students as the independent variable. Dummy variables were applied to

control for the effects of categorical variable universities. Another regression was conducted with the number of first-time-full-time undergraduate enrollment as the dependent variable, leaving the independent variable and control variables in place. As noted in Table 18, both results showed no statistical significance between the predictor and the outcome variable. The impact of online education on enrollment rates can be explored further in subsequent research studies.

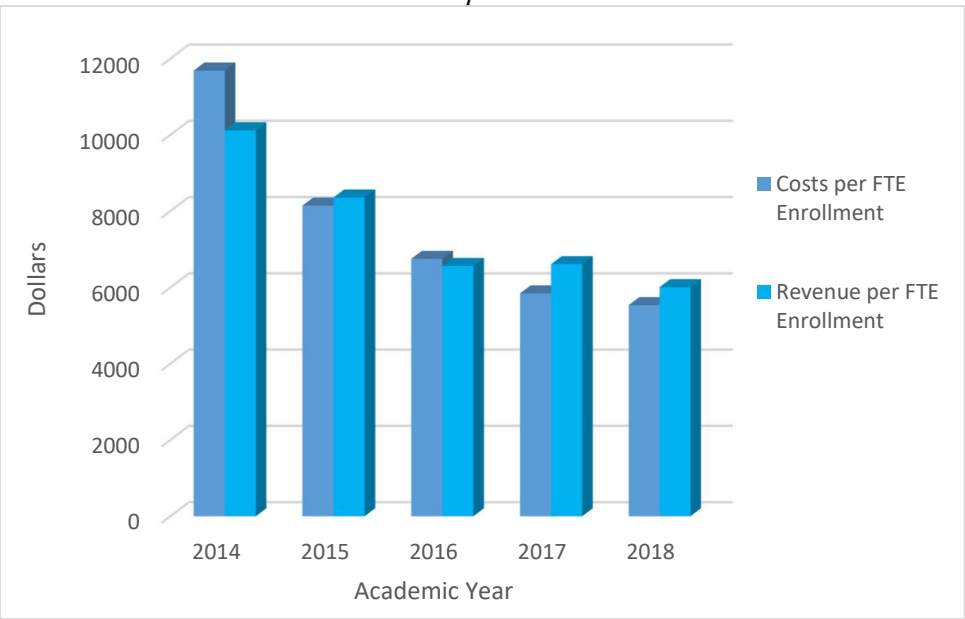
Case Analysis

In 2014, the University of Florida launched a fully online college offering undergraduate, graduate, doctorate degrees and certificates. UF Online's creation arose from a partnership between the Florida Board of Governors, UF Main's leadership, and state legislators. UF Online's mission is to offer its students a comprehensive, high-quality education at a more affordable cost (UF Online, 2019). As of 2020, 24 bachelor's degree programs are being offered, with the expectation to raise that number to 30 by 2023. UF Online students undergo the same selective admission process as students applying for on-campus programs. The classes offered online are taught by the same UF Main faculty, providing an equal level of support and guidance for traditional students. All faculty undergo vigorous training in online teaching and course design. UF Online students are paired with an academic advisor who assists with navigating online education and ensures that students stay on track to graduation. The central focus behind creating a fully online degree-granting university is to increase the accessibility and affordability of higher education. In 2021, UF Online was rated # 3 for best online programs by the U.S. News & World Report.

UF Online accepts in-state and out-of-state students, offering tuition rates almost half of UF's annual tuition and fees. The in-state tuition for UF Online and UF Main is $3,876 and $6,263, respectively. The out-of-state tuition is $16,580 for UF Online and $28,541 for UF Main. From 2014 to 2018, UF Online saved Florida resident students over $14 million in tuition and fees (UF Online, 2019). It also provides a unique fee structure where students decided for which on-campus services to pay. Students have complete discretion over their non-academic expenses, such as access to the campus facilities, sporting events, or health services. Student services such as academic advising and library access are included in the total cost of tuition. This model has shown great success at improving education affordability. UF Online obtains its revenue from two streams: through $5 million state appropriation and student tuition and fees. Since its inception and in only six years, UF Online managed to increase its revenue to offset its expenses (UF Online, 2019). Graph 11 displays the change in the institution's costs and revenues from 2014 to 2018.

Graph 11.

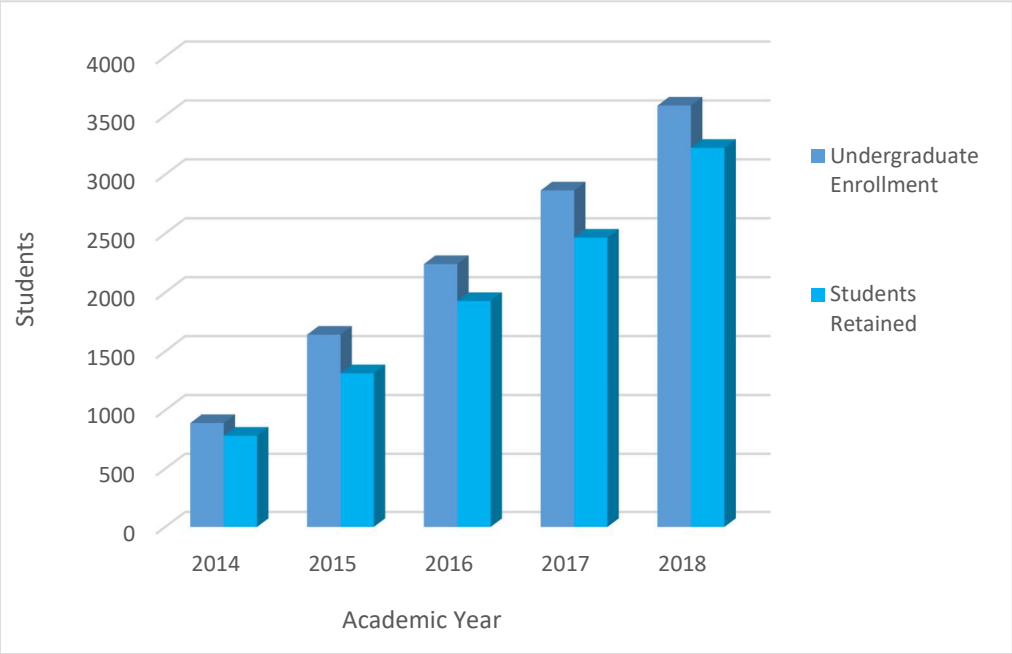
UF Online Core Costs and Revenue per FTE Enrollment



The initial start-up costs are quickly decreasing, and UF Online can generate a positive net revenue in just a few years. It is expected that the ongoings costs will continue to decline with an increase in enrollment. To evaluate the UF Online's effectiveness at meeting critical performance outcomes, graduation, retention, and time-to-degree rates will need to be explored. Unfortunately, because of how recently the university was established, the data for graduation and time to degree rates is unavailable. However, enrollment and retention rates are accessible and provide a clear picture of UF Online's rapid growth. Graph 12 shows a 300% growth in undergraduate enrollment between 2014 and 2018. The retention rates demonstrate a steady growth as well. UF Online's Comprehensive 5-year business plan (2019) projects doubling its enrollment by 2024 (Graph 13).

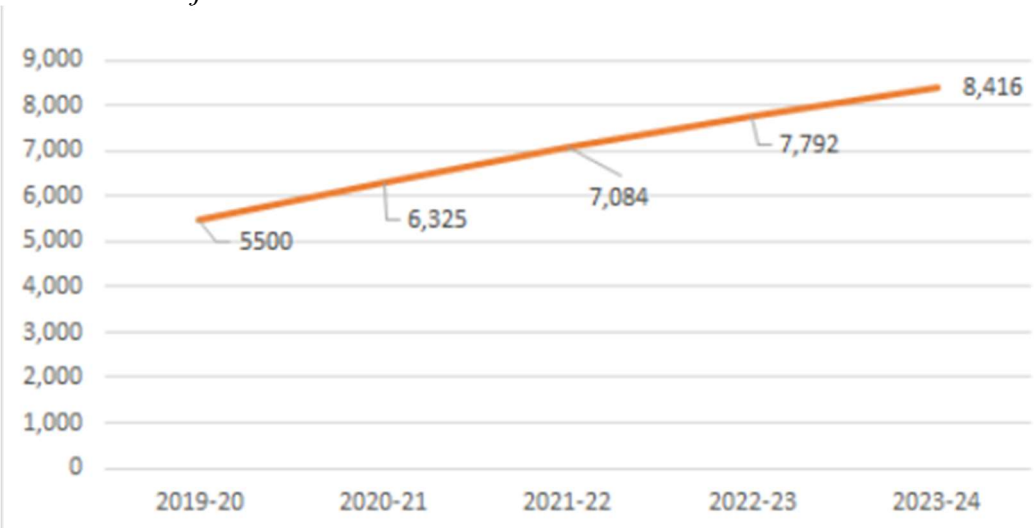
Graph 12.

UF Online Enrollment and Retention Rates



Graph 13.

UF Online Projected Headcount 2019-2024



Note. UF Online Projected Headcount Graph adapted from Comprehensive Business Plan, 2019.

UF Online serves as an example of the successful implementation of online undergraduate education to improve enrollment and retention rates and decrease operational costs. One of UF Online's reasons for its rapid growth is its accessibility, flexibility, and cost-saving for the students. The tuition for UF Online is almost half of the tuition for UF Main. Students also can customize their fees by only paying for services they select. Although not much data is currently available on graduation and time to degree rates, another case study of UF Online should be performed in a few years to gather more profound insight into this education model and its impact on student success.

Conclusion

Chapter 4 presents the data analysis results and discusses significant findings. The study examines nine public universities in Florida that are a part of the State University System over six years to determine if an increase in students who take at least some of their

undergraduate courses online affects graduation, retention, and time to degree rates. These predictors are critical to student success and serve as performance indicators of institutional effectiveness. Students who graduate on time save money and can enter the job market quicker. High retention rates indicate the universities are successful at retaining students and paving their path to graduation. A one-way ANOVA and fixed-effects panel data with least squares dummy variables are used as the quantitative methods of analysis for this study. Descriptive statistics are included to aid with the visualization of results. The tests indicated a positive significant relationship between the increase of students taking online courses and graduation, retention, and time-to-degree in 4 years. The results also showed a negative significant relationship between the percent of students in online courses and time to degree in five and six years. This negative relationship is desirable as it proves that students who take online courses can graduate at a faster rate. Although enrollment rate was briefly discussed, the variable was not a part of the research question. Numerous factors can affect enrollment rates that are beyond the scope of this study.

Case analysis of UF Online demonstrates support for the effectiveness of online education and its impact on institutional and student outcomes. UF Online was created as an entirely virtual university that offers over 20 bachelor's degree programs. The university was launched in 2014, and not much data is currently available to fully understand its potential. However, it has shown rapid growth in enrollment and high retention rates. Additionally, UF Online could offset its initial start-up costs within a few years and generate net positive revenue. Their low tuition and selective fee option result in significant cost savings for the students. UF Online should continue to be monitored and studied in the future to determine if online education can meet and exceed performance indicators of a traditional university.

Chapter 5 will present a summary of key findings, discuss limitations, and provide concluding remarks. Recommendations will be provided for future studies.

Chapter 5

Conclusion and Discussion

Introduction

Online education has been around for several decades, but only relatively recently has there been a boom of its integration into public higher education on a larger scale. Technological advances produce higher quality online courses that keep students engaged and allow for greater flexibility and accessibility. Much research has been done on the effectiveness of online education and how well it can match the learning outcomes of traditional face-to-face courses. However, very few studies examined how it can improve student success outcomes and institutional effectiveness in public four-year degree-granting institutions. This study examined Florida's State University System by analyzing the data from its nine public four-year degree-granting institutions from 2013 to 2018 to determine if online course enrollment improved the graduation, retention, and time-to-degree rates in its undergraduate student population.

Discussion of Results

The results of this study showed that the independent variable, student enrollment in online courses, impacted the measure and outcomes of student success and institutional effectiveness. The commonly used predictors for student success and institutional effectiveness are graduation, retention, and time-to-degree. High graduation rates carry many positive effects for individuals, higher education institutions, and society. Studies show that university graduates earn twice as much as non-university graduates, have increased earning potential, and a higher overall quality of life (DesJardins et al., 2002). College degree recipients are also

less likely to face poverty or require government assistance (Letkiewicz et al., 2014). A more educated population contributes to a larger workforce in high-earning positions, increases tax revenue, and lowers unemployment rates.

Retention rates are also a vital indicator of how effective universities are at meeting their students' academic needs and keeping them progressing toward a degree. Students who drop out or do not return for their second year of college are less likely to return in the next five years (DesJardins, Ahlburg, & McCall, 2002). Universities must strive to keep their students engaged and on track to graduation. The length of time to a degree also plays a critical role in students' success. The faster students can receive their degrees, the quicker they can join the workforce and increase their earning potential (Tentso et al., 2017). Prolonged time-to-degree negatively impacts students and universities. Students who take longer to graduate usually end up with higher student debt (Letkiewicz et al., 2014). Universities that cannot graduate their students on time are faced with limited resources, a decrease in new student enrollment, and implications for their budgets (Tentsho, McNeil, & Tongkumchum, 2017). Together, these outcomes are indicative of how well public universities are performing. Sound education policies and practices can improve the outcomes and ensure that the students' academic needs are being met effectively.

The fixed-effect panel data analysis results indicated a statistical significance between the dependent variables graduation, retention, time-to-degree in four, five, and six years and the independent variable, the percent of students enrolled in online courses. A dummy variable method was used to account for heterogeneity across the universities, as there are too many categorical effects that may shift the outcome. The results for the predictor's effects, percent of students enrolled in online courses, on the outcome, graduation, are statistically significant. A

positive linear relationship indicated that the higher the percentage of students enrolling in online courses, the higher their graduation rates. The unstandardized coefficient B=.222 shows that for every one-point increase in online students' percentage, the graduation rates increase by .22 points when holding other variables constant.

The effects of the percentage of online students on retention rates show statistically significant results at $p < 0.001$. The coefficient B is smaller but positive at B=.12. The analysis of the effects of the percentage of online students on time-to-degree in four years is also significant at $p < 0.001$ and has a stronger positive relationship with B=.308. The results indicate that the more students enroll in online courses, the higher the time-to-degree in four years rate is, and more students can graduate on time. The analysis results between the percent of online students and time-to-degree in five and six years yielded interesting results. Although both outcomes were statistically significant, they had a negative relationship to the predictor. The more students were enrolling in online classes, the more it impacted their time to degree. Larger online course enrollments increased the time-to-degree in four years and decreased the time-to-degree in five and six years. Results show that larger online enrollments increase timely graduation rates and reduce the time to degree.

A separate analysis was performed to evaluate the relationship between the percentage of online students and total enrollment and first-time, full-time undergraduate enrollment. Although enrollment rates were not considered indicative of student success outcomes and were not discussed at length, they were included in the analysis as part of the institutional effectiveness indicators. The panel data analysis shows no statistical significance at $p > .05$ between total enrollment rates and percentage of students online and the first-time, full-time undergraduate students and percent of students online. Previous research pointed to online

education increasing enrollment rates by accommodating more students without increasing physical space; however, this study does not account for this outcome. The measure of the predictor is a percentage of students enrolled in online courses, not the number of online courses offered, and therefore, cannot adequately account for its effects on enrollment rates.

The overall results of this study rejected the null hypothesis:

H_0: there is no statistical significance between the percent of students enrolled in online courses predictor and student success outcomes.

The fixed-effects panel data analysis results indicate that increasing student enrollment in online courses can increase graduation, retention, and time-to-degree rates. Even though the data collected was over a short period of time, it still demonstrates a positive correlation between online education and improving student success and institutional effectiveness outcomes. Academic leaders and policymakers are encouraged to work collaboratively to continue to fund and expand online education. There must be a systematic effort to provide quality online coursework offerings to undergraduate students in Florida's public degree-granting universities.

The state's legislators recognize the potential of online education and, to accommodate a growing demand, approved the creation of a fully online degree-granting university- UF Online. A case analysis of UF Online shows an exponential growth in undergraduate student enrollment, which increased by 300% between 2014 and 2018. While the university is relatively new and no data for graduation and time-to-degree is currently available, UF Online shows promising outcomes. In just a short four years, its business model successfully offsets initial investment costs and can generate revenue. The university's comprehensive plan projects more than double of current undergraduate enrollment by 2024. The increase in student

enrollments at UF Online and the other nine SUSF universities validate that students see the value of online education, and its demand will continue to rise.

Policymakers and academic leaders must prepare for the systematic integration of online education into the higher education business model. It has shown to be effective at meeting student success outcomes and improving institutional performance in the time of crisis and as a sustainable long-term strategy to addressing many modern educational challenges.

Limitations

While this research study presents valuable analysis and findings, there are certain limitations. The data on online education at SUSF universities could only be collected for six consecutive years, from 2013 to 2018. The analysis could have benefited from data over a more extended time. The limited data did not allow to examine the relationship between the dependent and independent variables for each university, individually. The number of analyzed universities was also relatively small. Only nine out of the twelve SUSF universities could be included in the study due to lack of online education at the three excluded institutions. Having a larger sample size and more data over a longer time would allow for more informative results. Additionally, all variables and non-academic factors that could potentially affect the graduation, retention, and time-to-degree outcomes for reach university cannot be accounted for.

It is worth noting that online education may not be the right fit for every student. Older students may feel uncomfortable with the technology and avoid taking courses online. Other students may lack access to a computer or stable internet, which can hinder their ability to access online materials and work on assignments in an online format. Finally, first-time undergraduate students may not want to sacrifice traditional on-campus culture and its social

aspects over flexibility. More studies are needed to understand the type of students likely to be successful in online education and who it would benefit the most.

Another limitation to this study is the region-specific population. All studied universities are located in Florida and are a part of the same State University System. The results of this study cannot be generalized to universities outside of SUSF. Florida's legislators continuously invest in the state's public higher education and proactively fund online education initiatives. Florida has been consistently rated as number one in the county for higher education based on affordability and accessibility. States that do not invest aggressively in their public higher education may not be able to produce the same results.

Future Research

Numerous studies analyze online education's quality and cost and its comparability to the traditional in-person teaching model. However, few studies focus on improving student success outcomes, especially at public four-year degree-granting institutions. Additional research is needed to evaluate SUSF universities and their student success and institutional effectiveness outcomes after more time passes. A longer time progression will allow to evaluate each university separately and make a comparison between them. Such comparison will provide more in-depth information on how the outcomes are similar or different between universities with a larger population of online students. Additionally, studies should examine the student success measures based on the number of courses taken online versus in-person to understand the relationship between quantity and outcomes.

Recently, the SUSF Board of Governors implemented a performance-based funding model. The new funding plan reallocates funds amongst universities based on how well they meet the student success outcomes and demonstrate effective performance. The plan awards

additional funding to the best-performing universities only. The chief concern is that lower-performing universities that desperately need funding may be left behind. Without the additional funding, those universities would not be able to invest in innovations to improve performance, which will continue to decline. A future study must evaluate the performance-based funding model on SUSF universities to determine its short-term and long-term impacts.

The final suggestion for future research is a comprehensive analysis of UF Online, a public SUSF university that offers undergraduate and graduate degrees entirely online. UF Online began operating in 2014, and not much data is currently available on its performance. It is essential to examine its effectiveness at meeting the student needs and improving their success outcomes. Currently, UF Online has the lowest tuition amongst the SUSF universities and has been rated as the most affordable online college by several publications. If it can match the effectiveness of other SUSF universities at a lower cost to students, then it can provide a solution not only to accessibility but to the affordability dilemma. UF Online's business model can help other public higher education systems across the country to ensure that more of their students can obtain coveted college degrees at a much lower cost.

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