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Student Demographic And Academic Characteristics That Predict Community College Student Success In Online Courses

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STUDENT DEMOGRAPHIC AND ACADEMIC CHARACTERISTICS THAT PREDICT COMMUNITY COLLEGE STUDENT SUCCESS IN ONLINE COURSES

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190 Pages

Online student success is a concern for higher education institutions especially community colleges with open enrollment admission. This study analyzed online student success using online GPA (dependent variable) and both demographic and academic characteristics of online students (independent variables) to determine which characteristics significantly correlated to and predicted student success in online courses. The sample included an unduplicated count of 4,046 online students enrolled in at least one online course during fall 2015 and spring 2016 at a public, Midwestern community college. Six research questions and twelve hypotheses were used to determine which independent variables led online students to a higher online GPA. Analysis was completed separately for students taking at least one online course and students taking only online courses using descriptive statistics, *t* tests, correlation coefficients, cross-tabulations, and logistic regression. The most significant finding was a large positive relationship between cumulative GPA and online GPA. There was also a significant, positive correlation between online GPA and cumulative credit hours as well as online GPA and number of online courses taken. There was a significant, negative correlation between online GPA and course withdrawals. Additionally, a higher online GPA was identified for older, female, and White online students while a lower online GPA was found for Black online students. Findings also indicated a significant difference in online GPA for both online student

groups based on computer experience and remedial coursework along with a significant difference in online GPA just for online only students based on financial aid.

KEYWORDS: Distance education; Online learning; Online courses; Student success; Demographic characteristics; Academic characteristics; Predictor variables; Correlation; Community college

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CONTENTS

TABLES

FIGURES

CHAPTER I: INTRODUCTION TO THE STUDY

Introduction

Online courses have become regular offerings at all types of higher education intuitions to better serve a diverse population of students. In fall 2015, nearly 20 million students attended colleges and universities in the United States; 29.8% had taken an online course at some point during their program, 15.4% were currently enrolled in at least one online course, and over 14.4% were solely taking online courses that semester (National Center for Education Statistics, 2016). Comparable online enrollment figures were found for undergraduate students and two-year, public college students such as those at the community college from this study. With an increased popularity of online courses, it is key for colleges to understand demographic and academic characteristics of online students that lead to successful online course completion.

Higher Education Enrollment

Enrollment at higher education institutions in the United States dropped more than 662,000 students or 3.2% between fall 2012 and fall 2015; this change was triggered by a nearly 10% decline in enrollment at undergraduate two-year schools during this time (Allen & Seaman, 2017). When examining the overall fall 2015 higher education enrollment by type of institution, the majority (72.3%) of students were enrolled at public institutions while 20.8% of students studied at non-profit institutions, and only 6.9% of students studied at for-profit institutions (Allen & Seaman, 2017). A downward enrollment trend was identified for all types of higher education institutions between 2012 and 2015. Public institutions experienced an enrollment decline of nearly 4%; there was a drop of nearly 3% for non-profit institutions; and enrollment was down over 31% at for-profit institutions which led to a combined overall decline of 5% and a drop of nearly a million students (Allen & Seaman, 2017).

In fall 2015, community colleges enrolled 41% of all undergraduate higher education students, and 40% of first-time freshmen (American Association of Community Colleges, 2017); however, enrollment at public two-year colleges in the United States decreased more than 885,000 students or 12.5% between fall 2009 and fall 2015 (National Center for Education Statistics, 2016). When reviewing enrollment specifically at Illinois community colleges, there was an overall 20.9% enrollment decline from 383,960 students down to 304,173 statewide between fall 2009 and fall 2016 (Illinois Community College Board, 2017). The community college in this study also experienced an enrollment decline over 15% within the same time period dipping from over 17,750 students enrolled in credit courses in fall 2009 down to about 15,000 in fall 2016 based on census enrollment data from the Institutional Research and Planning department (IR). With fewer students enrolling in higher education regardless of sector, the competition to enroll these students has increased.

Distance Education Enrollment

Despite the overall shrinking of enrollment in higher education, the number of students taking distance education courses, also known as online education and online learning, has been steadily increasing (Allen & Seaman, 2017; Hart, 2012; Jost, Rude-Parkins, & Githens, 2012; McIntire, 2015; Parke et al., 2010; Wilson et al., 2015). During fall 2015, over six million students in the United States took at least one online course, and more than 2.9 million students (one in seven students) took all their courses entirely online; nearly three-quarters of undergraduate students (72.7%) taking online courses in fall 2015 were enrolled at public institutions (Allen & Seaman, 2017). In addition, almost 30% of all higher education students in fall 2015 were taking at least one course online which was an increase of 11% over fall 2012, and half of these online students enrolled at public institutions; just about 50% of students taking

online courses in fall 2015 were taking all of their courses online (Allen & Seaman, 2017). Within the Illinois community college system, the overall annual credit headcount for online enrollments in the state increased 21.1% between 2010 and 2014, but there was only a 1.8% increase between 2013 and 2014 (Wilson et al., 2015). The number of online students is no longer expanding exponentially for all types of institutions; however, overall online enrollment has continued to grow.

Distance education enrollment fluctuations between 2012 and 2015 varied by type of institution and sector. Out of the over six million higher education students taking at least one online course in fall 2015, most online students were enrolled at public institutions (67.8%), 17.8% of online students studied at non-profit institutions, and 14.5% were enrolled online at for-profit institutions (Allen & Seaman, 2017). The largest enrollment growth for undergraduate distance education between 2012 and 2015 was by far at non-profit, two-year schools (460%) followed by non-profit four-year schools (41.7%) and public four-year schools (29.8%) (Allen & Seaman, 2017). The largest decline in undergraduate distance education enrollment was at for-profit institutions where the decline was more than 22% for both two- and four-year schools; distance education enrollment at two-year public institutions was nearly flat with a slight decline (0.6%) during this three-year period (Allen & Seaman, 2017). Graduate distance enrollment increased at public institutions (20.4%) and non-profit institutions (33%), but declined at for-profit institutions (-2.3%); online enrollment was impacted by large enrollment changes that occurred at a few very large institutions (Allen & Seaman, 2017).

Up until fall 2015 community colleges continued to enroll the most students taking at least one online course (Ginder & Stearns, 2014; Lokken, 2016; Pearson Foundation, 2011). More specifically, Ginder and Stearns (2014) reported out of all public two-year college students

in fall 2012 over 670,000 students (9.8%) were enrolled exclusively in online courses, and nearly 1.2 million students (17.3%) were enrolled in some online courses. According to Allen and Seaman (2017), between fall 2012 and fall 2015 distance education enrollment at public two-year institutions declined by 11,462 students or -0.6%; the distance education enrollment for public four-year institutions during the same time period increased by nearly 30%, or 425,714 students, making the total distance enrollment slightly higher in fall 2015 at public four-year institutions than the public two-year institutions. For the first time in a dozen years, online enrollments nationally for community colleges was flat during the 2015-16 academic years (Lokken, 2017).

Along with increasing higher education distance enrollments, the number of high school students in the United States taking online classes is also increasing (Picciano, Seaman, & Day, 2011). There are 25 states that have full-time, virtual K-12 charter schools that enrolled about 275,000 students in 2014-15 (Evergreen Education Group, 2015). More specifically, the number of high school students in Illinois taking online courses through the Illinois Virtual School (IVS) in fiscal year 2016 was 52.6% higher than in fiscal year 2015 (Illinois Virtual School, 2016). The IVS was created by the Illinois State Board of Education to offer high school students across the state fully online curriculum; IVS also supports local high schools and homeschool students by providing expanded online course offerings that allow students the opportunity to make up credit or take courses not available at their regular high school (Illinois Virtual School, 2016). In some states such as Alabama, Florida, Michigan, Idaho, Virginia, Wisconsin, Georgia, and Tennessee, high school students are mandated to take at least one online course to graduate (Sheehy, 2012). Although Illinois has a lower number of K-12 students in online education than about two-thirds of the other states with virtual schools (Evergreen Education Group, 2015), as more high school

students choose online courses, the demand and expectation for online courses to be widely available in higher education will continue to expand.

Distance Education Course Success

While there has been tremendous growth in the number of students taking online courses, the online course pass rates for these students are lower than they are for campus-based courses (Hachey, Wladis, & Conway, 2012; Hart, 2012; Lehman & Conceicao, 2014; Moore & Kearsley, 2012; Xu & Jaggars, 2011a, 2011b). In addition, not all students are ready, academically or physically, or able to engage with learning in an online environment which plays a role in their lack of success (Xu & Jaggars, 2013). Consistently lower course success rates achieved by online students demonstrate how critical it is to ascertain which specific factors impact successful online course completion.

Due to the increased popularity and availability of online courses coupled with lower online course success rates, colleges need to identify and address lower student performance particularly for their online students. In order to make a positive impact on online student success, this study examined existing online student data from one community college. The purpose was to uncover correlates and predictors of online student success that could be used to increase success for current and future online community college students.

Background and Study Setting

This study was conducted at a community college in the Midwest where there are currently thousands of students enrolled in hundreds of online, credit-bearing course sections offered each semester. According to the fall 2015 census, the Institutional Research and Planning (IR) department reported there were 2,353 students taking one or more online credit courses generating a total of 10,282 credit hours. When this online student credit enrollment figure

(2,353 students) is compared to the total college credit headcount (15, 016 students), 15.6% of all students took an online course in fall 2015 or approximately one in six students. Credit headcount for online courses increased by 8.7% (n = 188) between fall 2014 and fall 2015 while the overall credit headcount for the college decreased by 1.8% (n = 270) during the same time period.

During fall 2015 half of these 2,353 online students were enrolled full-time, and 62% identified as female. Nearly three-fourths were enrolled in a transfer degree program. The majority (85% or n = 1,993) of these online students had taken previous college courses online. The average age of online students was 25 years old. More than half (57% or n = 1,333) of the online students were between 17 and 22 years old, and nearly a quarter (24% or n = 566) were between 23 and 30 years old. Most online students enrolled in just one (69% or n = 1,620) or two (23% or n = 531) online courses. Many (71% or n = 1,673) of these online students were also enrolled in classes that met on campus.

When specifically examining the enrollment data for online students during the last ten years as provided by the college's IR department, there were a few noticeable trends. When comparing fall 2015 to fall 2006, the average age of online students at this college has decreased from 26 to 25 years old. There was a 6% increase in online students under 23 years old as well as a 4% increase in male students taking online courses. There were 13% more Hispanic students enrolled in online classes while 19% fewer White students enrolled in online classes. Since fall 2006 the number of online course sections this college offered increased more than 80% from 92 to 166 online sections, and the online unduplicated credit student enrollment increased more than 50% from 1,564 to 2,353 online students during the same 10 year period. Based on these shifting

demographics for online students, colleges should regularly monitor the types of students enrolling and successfully completing online courses to identify online student success factors.

In addition to shifting demographics for online students at this Midwestern community college, lower course success rates for online students raise concerns due to the increasing enrollment in online courses over the last ten years. Based on data gathered from the grade dashboard made available by IR, the percentage of students who passed an online course with a grade of A, B, or C in fall 2015 was considerably lower (63.9%) than students who passed an on-campus (75.7%) or hybrid course (77.6%). Most of the courses offered in an online format at this college are also offered either on-campus or in a hybrid format. The difference in course success rates between on-campus and online students is alarming, and must be further examined and addressed.

Statement of the Problem

The rising popularity of online courses at community colleges along with the lower course success rates of online students emphasize the importance of identifying and better understanding the factors that lead students to successfully complete online courses. Research about the success of online students have shown increased access to distance education did not lead to improved success in the online environment (Hachey et al., 2012; Lehman & Conceicao, 2014; Moore & Kearsley, 2012; Xu & Jaggars, 2011a, 2011b). Despite the lower student success rates, online courses are critical because they assist students who would otherwise have no means to pursue an education (Bettinger & Loeb, 2017, Clinefelter & Aslansian, 2016; Lokken, 2016). According to Clinefelter and Aslansian (2016) "up to 50% of online college students would not have, probably would not have, or are unsure whether they would have attended their current program if the program were not offered online" (p. 46). In addition to programs that are

completely online, colleges also allow residential students to take online classes. The Massachusetts Institute of Technology (MIT) Office of Digital Learning (2017) completed a recent pilot that allowed some residential students to take an online course because these students needed flexibility to overcome stress and scheduling conflicts; the pilot results showed benefits for the students including new teaching strategies such as real-time feedback and on-demand learning. Xu and Jaggars (2013) concluded online courses allowed students to take extra courses to assist in program completion despite the lower performance often noted for online students. While online courses initially appear convenient, classes offered in this format have led to lower course success rates.

When comparing online course success rates from this Midwestern community college to other community colleges using the 2016 National Community College Benchmark Project (NCCBP), data results are distressing. Nearly half of community colleges in the United States participate in this annual benchmarking project, and data on success rates in online courses are provided to the college's IR department annually. The NCCBP is designed to help community colleges benchmark their performance in 150 areas, and percentile ranks are calculated from all data submitted. In fall 2014 the percentage of students from this Midwestern community college who passed their online course with a grade of A, B, or C was 61.9%. This online course success rate is an eight percentage point improvement over the success rate in 2007 (54%); however, based on the latest NCCBP data this only positions the college in the 18th percentile for online course success when compared to peer institutions. The college continues to fall below the national median for online course success, which was 67% in 2014.

Moreover, the percentage of students who successfully completed their online course at this Midwestern community college without withdrawing (regardless of final grade) increased

seven percent in the last eight years from 76% in fall 2006 to 83% in fall 2014; however, based on NCCBP data the college is positioned in the 18th percentile for online course completion. The college has been continuously below the national median for online course completion, which gradually improved over time to 88% in fall 2014. These data show it is imperative for this Midwestern community college to identify factors that can help improve online student success.

Purpose of the Study

The purpose of this study was to generate a conceptual model of online student success as a function of student demographic and academic characteristics. The model was based on previous models, and it was tested by examining existing online student data at a Midwestern community college. Results from the quantitative analyses in this study can be used to predict and increase community college student online course success over time. Data used for the study included specific demographic and academic characteristics for students taking online courses as well as online student grade data during the 2015-2016 academic year. Demographic student data were collected by the college at the time of admission as part of the application and stored in the student information system; academic student data were entered and updated each semester during students' enrollment at the college.

Research Design and Questions

This quantitative study used a correlational research design that explored several research questions and tested various hypotheses. Research questions focused primarily on factors that correlated with and predicted online course success based on academic and demographic characteristics of online community college students. The dependent variable in this study was online student success which was defined as students who persisted to the end of the course and earned a grade of A, B, or C; an online GPA was calculated for each student based on all online

courses the student passed during the semester, and an online GPA of 2.0 or higher was considered successful. The independent variables were different demographic and academic student characteristics of online students. Six research questions guided this study:

1. What difference in online GPA exists based on an online student's distance from campus, financial aid award, previous computer courses passed, and remedial courses?
2. How do demographic characteristics of online students (age, ethnicity, and gender) correlate to online GPA?
3. How do academic factors of online students (cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses completed) correlate to online GPA?
4. Which demographic characteristics of online students most significantly predict a successful online GPA?
5. Which academic factors of online students most significantly predict a successful online GPA?
6. What combination of demographic characteristics and academic factors of online students most significantly predicts a successful online GPA?

Based on the evidence identified through the literature review, a conceptual model of online community college student success was generated. It was hypothesized that some demographic and academic student characteristics significantly impact online student success. More specifically, successful online community college students were theorized to be older, White, and female. Additionally, it was theorized these successful online students had taken courses more recently, were primarily enrolled part-time with no financial aid, had previous online course experience, had completed more credit hours overall, had fewer previous

withdrawals, and had maintained a high overall GPA. Based on results identified in the study, several implications and recommendations for continuous improvement were generated for community colleges seeking to increase online course and program offerings.

Definition of Terms

The following explanations describe key conceptual and operational terms used as part of this study.

Conceptual Definitions

Credit course. Any course offered by institutions of higher education that upon successful course completion results in the award of credit hours on a student record.

Cumulative grade point average (GPA). A number that represents the average value for all of a student's final grades for all semesters of enrollment combined.

Distance education. Courses and programs in which students are learning in a separate location than the teacher, and communication is facilitated using technology. Distance education is also known as online education and online learning.

Dual enrollment. A high school student who is also enrolled in one or more college courses.

Freshman or First-Year student. A student who has earned less than 30 credit hours.

Full-time student. A student who is enrolled in 12 or more credit hours during a semester.

Grade point average (GPA). A number that represents the average value for all of a student's final grades which is calculated at the end of each semester.

Nontraditional student. A student who is 25 years or older, and who is often working, married, and has children or other outside responsibilities that conflict with taking courses.

Part-time students. A student who is enrolled in less than 12 credit hours during a semester.

Sophomore or Second-Year student. A student who has earned at least 30 credit hours, but has not earned a degree.

Traditional education. Courses and programs in which the student and the teacher regularly meet face-to-face on the college campus.

Traditional student. A student who is less than or equal to 24 years old.

Operational Definitions

Computer experience. Experience related to whether or not a student had previously completed and passed a computer-related college course with the grade of A, B, C, or D.

Course withdrawal. A course in which a student does not drop during the 100% refund period, and a letter grade of W is recorded on the student's record.

Credit hour. One unit of academic credit earned equals one credit hour. Total credit hours includes all credit hours a student has earned.

Credit student enrollment. The count of students who are enrolled in credit-bearing courses at the census point during each semester.

Distance from campus. The number of miles calculated using zip codes between the college campus and the student's home either within the community college district or outside of the district boundaries.

Duplicated enrollment. Students who were enrolled during both fall 2015 and spring 2016 were counted once for each of these semesters, or twice in the overall enrollment count.

Enrollment status. Student enrollment status is determined by the number of credit hours for which a student is enrolled during the semester. Full-time students are enrolled in 12 or more credit hours while part-time students are enrolled in less than 12 credit hours during the semester.

Ethnicity. In this study, ethnicity was broken down into eight categories: American Indian, Asian, Black, Hawaiian, Hispanic, White, more than one race, and International.

Gender. This variable was categorized as either male or female.

Hybrid course. A course in which students and faculty meet on campus for at least one-third of the total course contact hours while using a learning management system for delivery of the remaining course content.

Occupational program. A career certificate or an Associate of Applied Science degree that is designed to provide students will skills to enter the workforce.

Online course. In this study online courses offered at least 80% of the content at a distance using the Internet. This content is delivered via a learning management system, including the facilitation of communication (faculty to student, student to student, and student to content), collection of student work, and student performance assessment. Most online courses are completed without having to visit campus in person, but some courses in this study required students to come to campus for orientation and/or testing.

Online only student. A student who is only taking online courses during a semester.

Online student. A student who is taking at least one course online during a semester.

Online student success. Success in this study is identified as students who earned an online GPA of 2.0 or higher for a semester.

Program of study. The certificate or degree a student is actively pursuing at the college.

Remedial coursework. Any courses under 100-level a student has taken to prepare for college-level coursework.

Time since last course or semester gap. A calculation of the number of semesters between fall 2015 or spring 2016 and the student's previous semester of enrollment at the college.

Transfer program. A two-year degree that is designed to help the students transfer to a four-year school where the students will pursue additional coursework or degrees.

Unduplicated enrollment count. Students who were enrolled during both fall 2015 and spring 2016 were only counted once in the enrollment count.

Theoretical Framework

There are a variety of factors that impact online student success at community colleges, and it is critical to understand the concepts related to this research topic that helped shape this study. At community colleges across Illinois students are primarily nontraditional with an average age of 30 years old; they are mainly enrolled part-time, and spend less time on campus than students at residential colleges (Illinois Community College Board, 2016). This can lead students to be less engaged with the campus, and students do not always understand what is required for them to succeed in an online class. Whether students are ready or not, they often enroll in online classes because they believe the courses will be easier since they do not have to attend class on campus, or they enroll due to scheduling conflicts; however, background characteristics, academic performance, lack of readiness, difficulties with technology, and lack of contact and connection with faculty and other students in an online class can lead to isolation and lower course success rates and attrition for some online students (Doherty, 2006; Hachey et al., 2012; Harrell & Bower, 2011; Lehman & Conceicao, 2014).

Online student success rates have been defined in different ways by researchers which has led to mixed findings and made it difficult to compare results from one study to another. Many studies describe online student success based on completion of an online course with a grade of A, B, C, or D while those who fail or withdraw from the online course are considered unsuccessful (e.g., Aragon & Johnson, 2008; Dupin & Bryant, 2004; Fetzner, 2013; Muse, 2003). Other studies narrow the definition of successful online course completion to grades of A, B, and C, considering those who withdraw or earn a grade of D or F to be unsuccessful (e.g., Hachey et al., 2012; Wilson & Allen, 2011; Wladis, Conway, & Hachey, 2015; Wojciechowski & Palmer, 2005). Occasionally online student success has been defined simply as students who pass an online class and only those who fail are unsuccessful because those who withdraw have been excluded from the study (e.g., Doherty, 2006). Sometimes online student success has been examined as student persistence to the end of the course regardless of final grade, and only students who withdraw are considered unsuccessful (e.g., Harrell & Bower, 2011). With so many different definitions of online student success, it is more challenging to determine how the results of one study relate to those of another.

At present there is no validated model for increasing online student success or reducing online student attrition (Wladis et al., 2015). Reasons why students drop out of online courses and college are not all clear cut; multiple variables influence student decisions, making online course dropout more difficult to understand. Community colleges serve a large population of nontraditional students who typically lack social connections to the college, and enter college with a wide range of experiences and abilities (Johnson, Mejia, & Cook, 2015). Because community colleges are open-access institutions, not all students are ready to take college-level courses or courses offered in an online format. Although students who need developmental

courses do not necessarily have a significantly different online course completion rate (Aragon & Johnson, 2008), students with lower academic readiness often have poor performance because they do not always acclimate easily to the online course environment (Jost et al., 2012; Xu & Jaggars, 2011b). Students with higher previous academic performance and more years of education completed are more likely to succeed in online courses while students with unsuccessful prior attempts are more likely to fail in future online course attempts (Fisher, 2010; Hachey et al., 2012; Harrell & Bower, 2011; Moore & Kearsley, 2012). Students' lack of readiness along with the differences between face-to-face and online classes compound the difficulties some students face when taking online classes.

The model of nontraditional student attrition developed by Bean and Metzner (1985), and subsequently modified by Metzner and Bean (1987), is a starting point for a theoretical framework for online student success. This model employs Tinto's (1975, 1982, 1988) model of dropout behavior; however, Bean and Metzner recognized the foundation of Tinto's work was focused on traditional students who attended a residential four-year university and dropped out of college due to a lack of social and academic integration on campus. Bean and Metzner knew that nontraditional students are less integrated into their institutions because they are older, part-time students living off-campus; their model downplayed the social interaction emphasized in Tinto's (1975) work, and instead focused on outside factors that have an important influence on nontraditional student attrition. Bean and Metzner's (1985) model consisted of four sets of factors that impact dropout decisions: (a) poor academic performance; (b) intent to leave; (c) defining variables (age, enrollment status, and residence) and background variables (educational goals, high school performance, ethnicity, and gender); and (d) environmental variables (work,

support, family responsibilities, and finances). In this model environmental factors are highly important.

Similarly, Kember (1989, 1990) created a model of dropout for distance education that was adapted from Tinto's (1975) model of dropout behavior and Bean and Metzner's (1985) nontraditional student attrition model; Kember recognized that Tinto's model focused on traditional students, and that Bean and Metzner focused on nontraditional students attending classes on campus. Thus he developed a new model more suitable for distance education students. Kember's (1989, 1990) model described how entry characteristics led distance education students down either a positive path of social and academic integration or a negative path where external concerns led to academic incompatibility which impacted their success in an online course.

More recently, Rovai (2003) created a persistence model to better identify which online students are more likely to persevere as well as those who are most likely to drop out of online courses. Rovai synthesized elements from Tinto's (1975) traditional student integration model with components from Bean and Metzner's (1985) nontraditional student attrition model while incorporating specific characteristics of distance learners. This newer model divided the student factors prior to admission from those internal and external factors that impacted students after they were admitted, theorizing how both sets of variables led to the decision to complete or drop out of an online course. Although Rovai's (2003) model is the newest one available to help identify distance education students who are likely to drop out and be unsuccessful, this model has not been validated and it is dated.

With the understanding that online students cannot succeed without persisting to the end of a course, this study generated a conceptual model of online student success (see Figure 1)

based on demographic and academic characteristics of online students using a framework that included elements primarily from the online persistence models developed by Kember (1989, 1990) and Rovai (2003) which were designed based on the earlier models from Tinto (1975) and Bean and Metzner (1985). Many of these online success factors are determined before students enter the community college (background and environmental variables) while other factors occur after enrollment. Success factors examined as part of this study were grouped into two categories: factors prior to enrollment and factors after enrollment. Each set of variables interacted and impacted academic outcomes for online students.

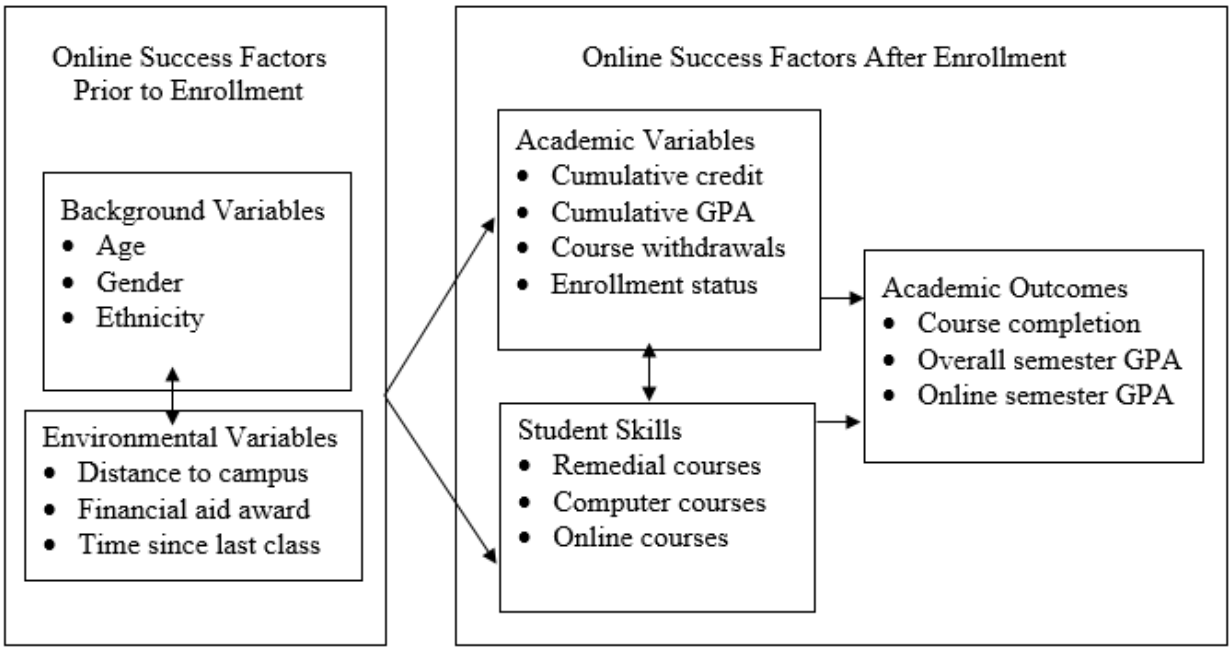

Figure 1. Initial Conceptual Model of Demographic and Academic Online Student Characteristics that Impact Online Student Success.

Although institutional data are readily available to help identify trends of online student success, they are underutilized. This study used exiting data to determine which factors significantly correlated with and predicted online student success since no prior in-depth analysis had been completed on these data at this Midwestern community college. The conceptual model

in this study assumed academic performance and certain student demographic characteristics impacted online student success.

Significance of the Study

In 2009, President Obama implemented a challenge for the United States to have the highest proportion of college graduates in the world by 2020 which meant the United States would have to increase its current number of graduates by 50 percent (U.S. Department of Education, 2011). In response to this challenge, Illinois set a goal for 60 percent of all adults between 25 and 64 years old to have a college credential by 2025; to help reach this goal, benchmarks for number of credentials to be awarded each year are set through 2025 (Illinois Community College Board, 2015). With the largest number of online students enrolled at public institutions including the community college (Ginder & Stearns, 2014; Lokken, 2016; Pearson Foundation, 2011), and with low course success rates identified for online students (Hachey et al., 2012; Hart, 2012; Lehman & Conceicao, 2014; Moore & Kearsley, 2012; Xu & Jaggars, 2011a, 2011b) it will clearly impede the state's credential attainment goals if online student success does not improve.

Higher education institutions need to know more about factors that influence student success in online courses because the interest and demand for distance education in predicted to continue (Allen, Seaman, Poulin, & Straut, 2016). Carey (2015) stated "the number of additional people who will want a college education over the next 20 years could exceed the number of people who have ever been to college in all human history" (p. 224). Institutions need to identify those factors that lead to online student success, and establish across campus collaboration and commitment to increasing online student readiness and success.

This study used existing data so there was no direct benefit to the students who already graduated or transferred; however, current and future online students will benefit from results of this study. By understanding what leads to student success in online courses, this research will assist in the development of a profile of students who will be most likely to successfully complete online courses. Using this profile, the college can provide students with more realistic online course expectations, and help students identify skills they need to successfully complete online courses. It is critical to provide additional opportunities for online students to gather course information and expectations before the semester begins to help them succeed.

Results of this study can be used to provide students with early access to information about how to succeed in online classes that will lead to improved knowledge and awareness of online course expectations; it will also provide students increased institutional support. Improvement in online student readiness and support will increase online students' confidence and successful online course completion, in turn, leading more students to enroll in future online classes. As online course completion rates improve and more students enroll in additional online classes, online student retention across semesters and between years will also improve.

Increased online student retention will cause more online students to finish their degree or certificate programs. Increasing college certificate and degree attainment is currently both a state and a national goal (Illinois Community College Board, 2015; U.S. Department of Education, 2011). Although credential attainment is important, "…what matters is the learning inherent in that credential: the knowledge, skills and abilities a student has developed while earning it" (Lumina Foundation, 2016, p.1). Increased learning and success will also lead to an increased likelihood that community college students will successfully transfer to a four-year

institution to continue their studies. These changes in online student success, retention, and degree completion would be significant for both students and for the institution.

Another group that might benefit from results of this study are online faculty. Results from this study may lead to more efficient use of faculty support resources. Information gained about how to best help online students succeed can be used to increase online faculty expertise by delivering targeted, ongoing faculty training and support for online course design and development. This training will help faculty improve their online teaching effectiveness, and identify online students likely to struggle so they can provide early interventions. Ultimately, online learning interventions should have a sizeable impact on successful online course completion.

Research examining student success in online courses at the community college is prevalent, but findings about the factors that predict online student success are mixed; student success in online courses remains a problem. There is no single factor that can account for low online student success (Fetzner, 2013) so obtaining data explaining why students complete or do not complete online courses is critical. Findings from this study may provide the impetus for future research related to factors that increase online student success. There is need for research on whether factors that influence online student success vary by institutional type. It is also possible results of this study may be significant in terms of future policy creation that could lead this college to consider of minimum qualifications or registration restrictions for online courses to increase online student success. As more evidence is gathered about student success in online courses and programs, these data can provide leaders an opportunity to create positive change in online student success.

Limitations

Merriam (2009) stated "all research designs can be discussed in terms of their relative strengths and limitations," and limitations are shortcomings of the study that impact the conclusions that can be drawn from the results which should be disclosed (p. 50). As with all research, there were some limitations to this study. Limitations included the sample population, potential database errors, open access to online courses, the scope of the study, and the quantitative research design.

The first limitation to the study was the sample population. The study focused on two semesters of archival data from one community college; since those data included just one instance in time, results may change during a different time period and they may not generalize to other groups of students or other institution types which is a threat to external validity. A future long-term quantitative study should be conducted to determine if research findings about online student success vary over time, and if intervention strategies implemented to improve online student success were effective.

In addition to the study sample limitations, there were limits to the accuracy of data in the student information system. Demographic characteristics stored in the system were self-reported by the students as part of their application. If the application was a paper version, it is possible these data could have been entered into the system incorrectly. It is also possible the student did not provide all of their background information so some data might be missing.

Based on both previous research and this study, some student characteristics increased the chance for online course success such as cumulative GPA. At this community college there were also no restrictions in place to stop students who were less likely to succeed from enrolling in online courses regardless of their course history or GPA. Furthermore, students who were

taking online courses may or may not have preferred this course delivery method. Some students might have taken an online class to speed up progress towards degree completion while others might have enrolled in an online course because it was the only course that fit into their schedule during a particular semester. These factors impacted online student success.

The scope of the study was another limitation. This study focused solely on demographic and academic factors related to individual online students; however, these were not the only factors that impacted online student success. Course design, student support, and faculty preparation also played a significant role. While many individual online courses were offered at this community college, there were no completely online programs of study available. Not all active programs offered online courses so this limited the online course selection. Some online courses at this community college required students to come to campus for in-person orientation or proctored testing. Not all online students could take a course requiring campus visits, so this limited which students could enroll in online courses. Also, if students were unaware of required on campus meetings for an online course when they registered it may have led them to withdraw or fail.

This study did not take into account online course design which was impacted by the level of faculty training. Faculty at the community college in this study were only required to take one internet course development workshop prior to teaching online for the first time. Faculty then presented their developed online materials at a public forum where they described and reflected on the development process they used to set up their online course. After that, no additional online course development training was required for faculty who continue teaching online. Online faculty were also not currently required to have student evaluations in their online

courses, so there was no formal mechanism to gather feedback from students about how the course content, course design, or support factors contributed to their success in the online course.

Finally, since this study was solely quantitative, it would be beneficial to develop future follow-up studies that incorporate different research methods such as observing or speaking directly to students and faculty. Data analysis in the current study provided solid background information for the current state of online student success at a community college; however, a related future qualitative study would allow additional data to be gathered directly from online students and online faculty which would help validate findings and develop a deeper understanding of those data from the perspective of user experiences. Despite the limitations of the study, findings were valuable and provided important analysis for data currently available that had not been thoroughly investigated at this community college.

Summary

In order to meet the needs of higher education students with varied backgrounds institutions have been offering more online courses and programs over the last dozen years (Allen et al., 2016). While overall higher education enrollment is declining, these increased online offerings have led to higher online enrollment (Allen et al., 2016; Jost et al., 2012; McIntire, 2015; Parke et al., 2010; Wilson et al., 2015). Online courses increase access to higher education, and they appeal especially to working students because they offer the benefit and opportunity for scheduling flexibility. The negative consequence of this phenomenon is a lower success rate for online students when compared to on-campus students (Hachey et al., 2012; Hart, 2012; Jost et al., 2012; Lehman & Conceicao, 2014; Moore & Kearsley, 2012; Xu & Jaggars, 2011a, 2011b). In order to reverse this trend, more data are needed about what leads to

student success in online courses. As information is collected strategies can be executed to support online students and increase online course success.

Organization of the Study

Chapter one introduced the study by providing an overview of higher education enrollment, distance education enrollment and course success, the statement of the problem, the purpose and significance of the study, definition of terms, theoretical framework, research questions, and limitations of the study. Chapter Two provides a summary of relevant literature that describes the development of distance education and its students along with various factors that impact success of online community college students. Next, Chapter Three describes the quantitative research strategies and procedures utilized to examine the data for this study along with ethical considerations. Chapter Four provides an in-depth description of the study's results for each research question. Finally, Chapter Five offers the summary, conclusions, implications, and recommendations based on the study.

CHAPTER II: REVIEW OF RELEVANT LITERATURE

Introduction

Studies about the success of online students have shown that although access to distance education has increased it has not lead students to equal success in the online environment. Overwhelmingly, no significant differences in student learning outcomes have been identified based on course delivery mode; however, research consistently identified lower student success rates for online courses when compared to success rates in face-to-face courses with fewer online students being retained until course completion (Hachey et al., 2012; Jost et al., 2012; Lehman & Conceicao, 2014; Lokken, 2016; Moore & Kearsley, 2012; WCET, 2010; Xu & Jaggars, 2011a, 2011b). Occasionally, studies have shown that distance education students outperformed campus-based students who were taking the same course with the same instructor (Neumann & Neumann, 2016; U.S. Department of Education, 2009). Based on this information the learning environment does not predict student success, and success varies for different types of students and from one learning environment to another (Moore & Kearsley, 2012).

This review of relevant literature first aimed to examine the progression of distance education along with the theories of distance education. Next, the review focused on the types of students who take online courses, and the impact of distance education on higher education. Finally, this review emphasized pre-enrollment and post-enrollment student factors that contribute to online student success, including demographic and academic characteristics. Related research for these various factors areas are included as part of this review.

Problem Statement

The rising popularity of online courses at the community college and the inconsistency in success rates between online students and face-to-face students help underscore the importance

of identifying and better understanding the factors that lead students to successful online course completion. Once online success factors are identified, colleges should examine their current online student population along with their distance education policies and practices, and use the findings to plan and implement interventions that will increase successful online course completion.

Generations of Distance Education

Historically, distance education started as independent study, self-directed learning, and open education (Wedemeyer, 1975); it progressed through several different generations over time based on advances in technology including correspondence, broadcast radio and television, audio and video conferencing, and computer or web-based education (Moore, 2003; Moore & Kearsley, 2012). Each of these generations of distance education still exists today, and is used for different purposes in different locations (Archer & Garrison, 2010). Each generation built upon the available previous technology, and helped shape the expansion of distance education and the way teaching at a distance was structured.

Correspondence education provided the groundwork for anyone without easy access to education to study and receive instruction from home despite being located in a different place than the instructor (Garrison, 1985). It helped bridge the time and distance barriers of education, and it created the potential to educate a large number of students using printed materials and mail service. This individualized type of education was quite different than face-to-face education. It was cost effective, but it was basically one-way communication between teacher and student with a significant delay in feedback (asynchronous distance education) based on the speed of mail delivery, and this negatively impacted student satisfaction and dropout rates. There was also criticism of the lack of quality for correspondence education (Archer & Garrison, 2010).

Education using broadcast radio for education emerged next. It had potential, but this instructional method lacked support from faculty and administrators due to an absence of interaction between instructor and student. Use of telephone and teleconferencing as a methods of education developed and were also less viable because they only allowed for a limited number of participants, and there were time constraints requiring everyone to be learning at the same time (synchronous distance education) (Archer & Garrison, 2010; Garrison, 1985). Television stations also began broadcasting instructional programs with the support of the Ford Foundation; there was more support for this model than for radio, but the interaction was still deficient (Moore & Kearsley, 2012).

The development of open universities starting in the late 1960's provided a comprehensive approach for offering programs for adults exclusively via distance education. This expansion of distance education combined correspondence with audio and video as well as radio and television, but initially these programs were set-up with no control over faculty, resources, or academic credit and degrees (Moore & Kearsley, 2012). After learning from this initial model, the concept of open universities spread, and these institutions developed and retained control over all aspects of distance education: curriculum, faculty, support, and funding.

When audio and video conferencing began in distance education it provided the opportunity for two-way communication which was closer to the traditional educational model (Moore & Kearsley, 2012). Instructors could now teach a class in one location, and broadcast audio and video from their classroom to students in another location which led to some simultaneously group interaction (synchronous distance education). These early attempts at interactive distance education allowed students and faculty to be together at the same time which augmented quality, but the number of participants was limited, and technology was expensive

(Archer & Garrison, 2010; Garrison, 1985; Hurst, 2001). Finally, computer-based and internet-based courses and programs became more commonly available after the World Wide Web was developed. With the increased computer speed it led to the possibility of more efficient, effective, and interactive education along with the tremendous improvement, growth, and popularity of distance education.

The growth of distance education represented "one of the transformational innovations in American higher education" (Thelin, 2011, p. 368). Online learning currently, much like correspondence, radio, and television learning of the past, provides the learner with flexible, innovative learning methods where learning is accessible when and where it is most convenient. Distance education requires a shift in responsibility of learning from the teacher to the learner, and places an increased emphasis on the course design and curriculum content itself.

Many shifts have occurred in distance education based on the evolution of technology. Each method of distance education had different advantages and disadvantages based on the interaction and independence available as part of class. Correspondence education led to an awareness that education was possible outside of the traditional classroom methods; students could maintain high independence, but interaction and quality was low. Audio and video education allowed students both lower independence and lower interaction within class. Current technology provides the potential for distance education courses to be more robust. Carey (2015) explained that "organizations will need to use technology to provide something markedly better than what traditional schools offer" (p. 89). Unfortunately, the credibility issues of the early forms of distance education are still evident in higher education today. According to Allen et al. (2016), just over 41% of institutions included distance education in their strategic plan, and less than 30% of academic leaders believed their faculty accepted "the value and legitimacy of online

education" (p. 26); these trends have not improved in the last dozen years. Distance education has promise because it currently allows institutions to expand their reach while offering higher student independence and higher interaction within online courses than was available in the past, but as shown by perpetually low online course success rates there is undeniably room for improvement.

Distance Education Theories

The term distance education has been used interchangeably with online education and online learning. Definitions for distance education have been around for nearly four decades. Wedemeyer (1978) described learning using technology as having some key differences to traditional classroom teaching: (a) teaching and learning happened anytime and anywhere even if teachers and students were not in the same place at the same time; (b) greater responsibility for learning was placed on the student; (c) used all effective teaching media and technology; and, (d) provided the opportunity for teaching to adapt to individual differences (pp. 10-11). Similarly, Keegan (1980) described distance education as having six main elements: (a) separation of teacher and learner; (b) influence of an educational organization; (c) use of technical media; (d) two-way communication between teacher and student; (e) possibility of occasional meetings; and, (f) participation in industrialized form of education that separates distance education from other forms of education (p. 33). These early definitions are comparable to more recent definitions. For example, Moore and Kearsley (2012) defined distance education as "teaching and planned learning in which teaching normally occurs in a different place from learning, requiring communication through technologies" (p. 2), and they emphasized the importance of using the term distance education instead of distance learning because the word education designates a mutual experience involving both learners and teachers. Over time there has been

tremendous change and growth in distance education through the use of online courses and programs, and technological innovations continue to shape distance education at all types of higher education institutions.

Despite this growth no comprehensive, unifying theory for distance education or online learning exists (Hachey, Conway, & Wladis, 2013; Garrison, Anderson, & Archer, 2010) although some theories have been developed to specifically help colleges understand the features of distance education that impact student success. The distance between the teacher and the learner is historically what distinguished distance education from traditional education, and this distance or separation influences teaching and learning. Three critical elements interconnected with distance in teaching and learning are described in the theory of transactional distance (Moore & Kearsley, 2012) including (a) learner independence (autonomy), (b) course design (structure), and (c) two-way communication using technology (dialogue). These three elements will be further discussed. Knowledge of these features leads to a better understanding of what makes distance education different, and what factors impact distance education student success.

Autonomy

Student success in distance education depends on the needs and characteristics of the learners, and autonomy consists of learner's freedom to make self-directed decisions about learning (Andrade, 2012; Moore & Kearsley, 2012). How a learner interacts with structure and dialogue in a distance education course is explained through adult learning theory (Dewey, 1916/2013; Knowles, 1974; Lindemann, 1961/1989), constructivist learning theory (Bruner, 1985; Moore, 2016), and self-regulated learning theory (Andrade, 2012; Zimmerman, 2002). These theories describe how adult students are independent individuals who come to campus with much experience which allows them to be autonomous, and actively participate in their own

learning. Self-regulated learning allows students to efficiently create knowledge by having responsibility for when, where, and how they learn; they take control of learning by actively participating and relying more on themselves for the structure of the course than the instructor (Andrade, 2012; Andrade & Butler, 2009). As these adult learners face new situations they shape or construct their learning and actively create new knowledge through problem solving and integrating new information using their prior knowledge and experience (Bruner, 1985; Dewey 1916/2013; Knowles, 1974; Lindeman, 1961/1989; Moore, 2016). When the distance education learner is more self-directed and has a higher level of autonomy, he can be more comfortable with greater transactional distance in a course that includes less dialogue and less structure while a learner who is less independent will need increased dialogue and structure in the course to help reduce transactional distance so he can be more successful.

Structure

Structure describes the specific course design components which vary by course and instructor. Unlike traditional education, distance education courses are typically structured to emphasize written communication which allows for additional reflection on the concepts that can lead increased critical thinking skills (Garrison, Anderson, & Archer, 2000). Student success also depends on how well the course structure meets the needs of the individual learners, and promotes an online learning community. As clarified in the community of inquiry theory (Archer & Garrison, 2010; Garrison et al., 2000, 2010), courses that create online community through the interaction and interdependence of cognitive presence, social presence, and teaching presence can improve student success. Teaching presence is the structure and processes used within the class to facilitate an appropriate course design which allows participants to develop a sense of belonging and a social identity as part of class communication (social presence); the presence of

the teacher also encourages communication and critical thinking that produces knowledge (cognitive presence) (Archer & Garrison, 2010; Garrison et al., 2000; 2010). Teaching presence for distance education depends on the technical ease, knowledge, and expertise of the faculty members. Online course structure is critically related to how much dialogue will occur within the course.

Dialogue

Dialogue refers to all interactions that take place during the course. There are three main types of interactions for effective distance education: (a) student to student, (b) student to instructor, and (c) student to content (Moore & Kearsley, 2012). Interaction and two-way communication are used in distance education to minimize the detachment between instructor and student. In distance education courses communication takes place through use of technology, and as interaction within a distance education course increases it minimizes the distance or isolation for the learner. Student success in distance education can be enhanced by increased dialog and interaction along with the use of effective communication methods that capitalize on technology to reach new audiences using a variety of teaching methods as described in the theory of communication (Perraton, 1981) and the theory of teaching-learning conversations (Holmberg, 1988, 1995). These theories explained how distance is minimized using guided two-way conversation as a means to facilitate learning in distance education by promoting independence and freedom of choice for students while enhancing personal relationships.

Throughout history, the student and the instructor were in separate locations for all formats of distance education, and that distance often had an adverse effect on the teaching and learning process. It is important to minimize the effect of transactional distance in order for effective online learning to occur (Moore & Kearsley, 2012). Learner autonomy, dialogue, and

structure work together to increase or decrease the effect of transactional distance. Perfecting the balance between autonomy, dialogue, and structure is difficult as each class has a variety learners with different needs and abilities. Each one of these related theories in conjunction with knowledge about transactional distance theory can provide a framework to help colleges identify academic and demographic characteristics of online students that lead to an increased sense of distance; this knowledge can lead to a better understanding of distance education students in order to enhance student success. As more is discovered about what causes online students to succeed, new theories can be developed and existing theories can be adapted to incorporate additional dimensions relevant to improving distance education.

Distance Education Students

Overall enrollment in higher education in fall 2014 was over 20.5 million students, and 72% of these students were studying at public institutions (Poulin & Straut, 2016). The number of these higher education students taking one or more distance education courses continues to rise. Eighty-five percent of students taking online courses along with courses in other formats in fall 2014 were enrolled at public institutions (Poulin & Straut, 2016). Close to 30% of two-year students in fall 2014, had taken some or all of their courses online, and nearly 11% of those students were taking courses exclusively online (National Center of Educational Statistics, 2015). Other recently predicted general trends of higher education included declining college enrollment and high school graduates with increasing enrollments for students over 25 years old, part-time students, non-White students, females, and students at public institutions (Hussar & Bailey, 2016). When examining all higher education sectors, community colleges had the lowest decrease in overall enrollment over the last five years including a decrease in the number of students over 24 years old (Juszkiewicz, 2016). Community colleges in Illinois serve a majority

of public higher education students (65%) as well as two-thirds of minority students (Illinois Community College Board, 2016).

According to the American Association of Community Colleges (2017), generally community colleges students are attending part-time (62%) and taking credit classes (59%); these students are largely White (48%), first generation (36%), single parents (17%) who are working (62% of full-time students and 73% of part-time students work). During 2014 in Illinois, the average age for online community college students was higher than a traditional college students at 27.5 years old with a mean age of 23.6 years old; almost three-fourths of the online community college students were White (72.7%), and nearly two-thirds (64.7%) were female (Wilson et al., 2015). Additionally, Illinois community colleges reported a combined increase of 21% in online enrollments between 2010 and 2014, and in 2014 nearly 20% of all credit enrollments were based on distance education (Wilson et al., 2015).

The online course format is convenient and provides access to education for busy learners who also have other responsibilities such as work and family (Bailey, Jaggars, & Jenkins, 2015). Early distance education courses and programs were originally intended to serve part-time, adult learners (Matthews, 1999). Adult students who enrolled in distance education appreciated having control over and making decisions about their learning (Lehman & Conceicao, 2014; Moore & Kearsley, 2012). These older students were generally more motivated and self-directed; they had life experiences to bring into the online class that helped them to understand how to apply the course concepts directly to their work (Lehman & Conceicao, 2014). Recently, Clinefelter and Aslanian (2016) found that students who are taking online courses are now younger, and they are increasingly single with fewer children. Although the age of online students has been decreasing, it was evident even as early as 1998 that some traditional-aged students were interested in using

online classes to ease their schedules (Matthews, 1999). As the online student profile changes, institutions need to examine and rethink their approaches to student academic support and services to ensure online students succeed.

Impact of Distance Education on Higher Education

Distance education has been around in many formats for more than a century; it has expanded and changed with advances in technology. Distance education was developed based on adult learning principles (Archer & Garrison, 2010; Moore, 2003), and it has become a very central component in higher education. Adults have various situational, institutional, and dispositional barriers to learning (Cross, 1981), and distance education initially existed to address these barriers and provide access to education for adult students who would otherwise have no opportunity to learn (Archer & Garrison, 2010; Holmberg, 1988; Saba, 2011). Now distance education attracts all types of students who are willing to take online courses out of both convenience and need.

Enrollment in distance education has grown exponentially over the last 20 years (Allen et al., 2016). Technology has been used to automate, individualize, and improve teaching and learning since the invention of programmed instruction using teaching machines in the early to mid-1900s (Skinner, 1958). Despite the longevity and growing popularity for technology-based higher education, it is still not completely acknowledged with equal quality and legitimacy as traditional campus-based education (Allen et al., 2016). Although developments in technology enhanced possibilities for communication and interaction in distance education it did not improve student success. When distance education is compared to campus-based or traditional education there is a long trend of growing distance education student participation rates; however, there is also a trend of lower online student course success and completion rates that

needs to be addressed (Hachey et al., 2012; Hart, 2012; Johnson et al., 2015; Lehman & Conceicao, 2014; Moore & Kearsley, 2012; Xu & Jaggars, 2011a, 2011b).

Factors Contributing to Online Student Success

The online course opportunities provided by community colleges are substantial, and the research about which factors significantly impact online student success at the community college is increasing, but results have been mixed. The goal of this review is to examine research on distance education at the community college to identify the student factors that have the most influence on student success in online courses. It is important to pinpoint factors and student characteristics that are positively related to student success in online courses, and that influence and help predict successful completion as well as non-completion of online courses at the community college. Community college students are typically older students who attend part-time due to their family and work responsibilities outside of the classroom; they choose online courses because they believe it will be easier to fit them into their busy schedule, but research has shown not all students who take online courses succeed.

Many factors that influence student success in online courses have been identified through research, and they relate to three primary categories: student factors, course factors, or support factors. This study emphasized how pre-enrollment and post-enrollment student factors, including both demographic and academic characteristics, predicted community college student success in online courses. Overall research revealed varied results for individual student factors that impacted online success; even the factors that were significant predictors or correlates of online success in some studies had no relationship or the opposite relationships to online student success in other studies (see Appendices A and B). With conflicting research results, more data analysis is needed to help predict online student success.

Based on the previous research findings, including over 20 studies examining existing institutional data (see Appendix C), online student success for this study was predicted to be significantly correlated with age, gender, ethnicity, grade point average, enrollment status, cumulative credit hours, online course experience, and course withdrawals. Each of these factors will be further examined.

Age

Research has identified a significant difference between community college students who successfully completed an online course and those who did not based on student age. Recently, Clinefelter and Aslanian (2016) found that students enrolling in online courses are now younger, and they are increasingly single with fewer children. Many studies also identified younger students were at risk of being less successful in online courses, and they needed additional support to succeed (Cummings, 2009; Doherty, 2006; Gregory, 2016; McPhaul-Moore, 2013; Moore, Bartkovich, Fetzner, & Ison, 2002; Muse, 2003; Porta-Merida, 2009; Riordan, 2013; Williams, 2008; Wladis et al., 2015; Wojciechowski & Palmer, 2005; Xu & Jaggars, 2013). These studies indicated older students were more likely to succeed in online courses while other studies found no significant differences in successful online course completion by age (Akpom, 2013; Aragon & Johnson, 2008; Foster, 2012; Gibson, 2015; Jost et al., 2012; Riordan, 2013).

This study examined online student age as it related to online student success, and results were significant. In spring 2016 the average age of online students was 34.9, and 58% of students taking online courses at this Midwestern community college were 17 to 22 years old. If younger students are increasingly more likely to enroll in online courses, and they are also less likely to succeed, it is important for colleges to be prepared to intervene and assist to improve online student success.

Gender

Some research revealed a significant difference between community college students who completed an online course and those who did not based on gender. Females tended to enroll more frequently in online courses because they needed the increased flexibility to fit classes in with their other responsibilities (Aragon & Johnson, 2008; Doherty, 2006; Xu & Jaggars, 2011a). Many studies identified a positive correlation between female students and online success (Aragon & Johnson, 2008; Doherty, 2006; Porta-Merida, 2009; Wladis et al, 2015; Xu & Jaggars, 2013). On the other hand, one study found women may be more likely to fail or drop out of online science, technology, engineering, and mathematics courses (Wladis et al., 2015). Additionally, differences have been identified in the impact of gender on online course success based on lower and higher achieving students; in the lower GPA group, females earned significantly higher grades than males, but in the middle and higher GPA groups no differences were found in online success related to gender (Kupczynski, Brown, Holland, & Uriegas, 2014). Numerous other studies also found no significant difference in online course success based on gender even though females enrolled in online courses usually outnumbered males (Akpom, 2013; Bull, 2015; Cummings, 2009; Gregory, 2016; James, Swan, & Daston, 2016; Jost et al., 2012; Moore et al., 2002; Riordan, 2013; Wilson & Allen, 2011; Wojciechowski & Palmer, 2005).

This study identified significant results when examining online student success and gender. In spring 2016, 63% of students taking online courses at this Midwestern community college were female. Since such a large percentage of online students are female, it is important for the college to better understand what will help them succeed. Additionally, the percent of

male students taking online courses at this college is increasing, so if male students are at risk of poor performance interventions should be planned to support them.

Ethnicity

Community colleges are open access institutions so most programs are available to any student who applies; only some programs have selective admission criteria. Most studies showed no significant difference between community college students who finished an online course and those who did not based on race or ethnicity (Aragon & Johnson, 2008; Gibson, 2015; Jost et al., 2012; Wladis et al., 2015). A few studies have identified a significant difference in online course success rates based on ethnicity, and found White students were more successful than students of other ethnicities (Berling, 2010; Bull, 2015; Moore et al., 2002; Palacios & Wood, 2016; Porta-Merida, 2009; Rodriguez, 2011; Williams, 2008; Xu & Jaggars, 2013).

This study examined ethnicity as it related to online student success, and results indicated it was a significant factor. At this Midwestern community college during fall 2015, 66% of online students were White which is a decrease of 17% from fall 2006. If the number of minority students taking online courses at this college has increased, and minorities are less successful in online courses, it means an increasing number of students may be at risk for lower performance in online classes so the college needs to plan ways to help these students.

Grade Point Average

Grade point average (GPA) has been the most significant predictor of online student success across all studies examined. All studies examined showed GPA had a significant impact in predicting community college student success in online courses. Research concluded a higher GPA was related to lower course withdrawal rate (Aragon & Johnson, 2008; Harrell & Bower, 2011) and higher online course success (Akpom, 2013, Aragon & Johnson, 2008, Berling, 2010;

Bull, 2015; Cochran, Campbell, Baker, & Leeds, 2014; Cummings, 2009; Dupin-Bryant, 2004; Foster, 2012; Gibson, 2015; Harrell & Bower, 2011; Hawkins, 2012; Jost et al., 2012; McPhaul-Moore, 2013; Muse, 2003; Porta-Merida, 2009; Riordan, 2013; Rodriguez, 2011; Smith, 2005; Wilson & Allen, 2011; Wladis et al., 2015; Wojciechowski & Palmer, 2005; Xu & Jaggars, 2013). If students have a lower GPA it could lead community college students to drop out regardless of course format. Bettinger and Loeb (2017) and Xu and Jaggars (2013) both identified negative effects to online course success for students with poor previous academic performance. Bettinger and Loeb (2017) specifically found students who take online courses earn a lower GPA, receive worse grades, learn less, and are more likely to drop out.

This study examined online student success based on cumulative GPA, and results were significant. This Midwestern community college had not previously examined the GPA of its online students in relation to their success. This study provided data to show successful online students at this community college followed the same pattern as other studies having higher GPAs.

Enrollment Status

The majority of community college students enroll part-time (Allen et al., 2016; American Association of Community Colleges, 2017; Illinois Community College Board, 2016). Some research indicated students enrolled in fewer total credit hours during the semester were more likely to succeed in their online courses (Doherty, 2006; Gregory, 2016; Hawkins, 2012; Moore et al., 2002; Riordan, 2013; Rodriguez, 2011) while other studies showed students enrolling in more total hours were significantly more likely to complete their online courses (Aragon & Johnson, 2008; Smith, Lange & Huston, 2012). Additionally, some studies found no

relationship between student enrollment status and final grades for online courses (Akpom, 2013; Muse, 2003; Wladis et al., 2015; Wojciechowski & Palmer, 2005).

Although research showed mixed results for online student success based on enrollment status, this study identified some significant results. More online students at this Midwestern community college were attending part-time. In some cases part-time students were identified as more likely to succeed in online courses. The college should do more to urge students to be mindful of their course load if they choose to enroll in online courses.

Underprepared Students

Students who enroll in college have a wide range of abilities, and not all students are ready for college-level classes. Students lack of readiness along with the differences between face-to-face and online classes compound the difficulties some students face. Although students who needed developmental courses did not necessarily have a significantly different online course completion rate (Aragon & Johnson, 2008), students with lower academic readiness often had poor performance because they did not always adapt easily to the online course environment (Jost et al., 2012; Xu & Jaggars, 2011a, 2011b). Students with higher previous academic performance and more formal education were more likely to succeed in online courses while students who placed into remedial courses were more likely to fail in online course attempts (Fisher, 2010; Hachey et al., 2012; Harrell & Bower, 2011; Jost et al., 2012). The success of underprepared students was often hindered when they took online courses. Online course completion rates have been lower for students who were referred into remedial courses based on low placement scores (Xu & Jaggars, 2011a, 2011b, 2013).

Not all students are equally prepared for what to expect or what is required for success in online classes which is evident due to their lower online course success rates. In order to help

students be more prepared for online classes, this study examined online student success assuming students who took remedial courses were less successful. This Midwestern community college had not previously examined remedial course taking for its online students. This study confirmed online students were less successful if they were taking remedial courses and were less prepared for college-level coursework.

Total Credit Hours

In most studies examined, significantly higher success rates were noted in online classes for students who had completed more credit hours overall (Berling 2010; Bull, 2015; Cochran et al., 2014; Cummings, 2009; Doherty, 2006; Dupin-Bryant, 2004; Foster, 2012; Gregory, 2016; Moore et al., 2002; Smith et al., 2012; Wilson & Allen, 2011; Wojciechowski & Palmer, 2005). The previous success in higher education helped these students succeed in their online classes. One study found a significant negative relationship between credit hours earned and online course success (Rodriguez, 2011), and students with fewer hours were more successful.

This study examined online student success finding cumulative credit hours earned was a significant positive factor. This Midwestern community college had not previously examined the total credit hours earned by its online students in relation to their success. This study confirmed online students were more successful if they were further along in their program.

Online Coursework

Previous online course success was a significant predictor for future online course success in nearly all studies examined. Students with previous successful online course experiences were much more likely to succeed in future online courses while students with unsuccessful prior attempts were more likely to fail in future online course attempts (Dupin-Bryant, 2004; Hachey et al., 2013; Hachey et al., 2012; McPhaul-Moore, 2013; Moore et al.,

2002; Porta-Merida, 2009; Williams, 2008; Wladis et al., 2015; Wojciechowski & Palmer, 2005; Xu & Jaggars, 2011b). Community college students who had more unsuccessful online course attempts were less likely to be successful in future online courses, and future success was less predictable for students with mixed previous online course success or no experience with online courses (Smith et al., 2012). Two studies found no significant relationship between previous online courses and future online course success (Apkom, 2013; Muse, 2003), and another study found that students with fewer online courses completed were more likely to succeed in their current online course (Smith, 2005).

This study examined online student success assuming students who had previously taken online classes would perform better overall that those who have never taken an online class. This Midwestern community college had not previously examined the previous coursework for its online students in relation to their success. This study provided some significant research findings indicating online students were more successful if they had already taken online courses.

Course Withdrawals

Most research did not examine prior course withdrawals in relation to online course success. Wojciechowski and Palmer (2005) identified a negative correlation between previous course withdrawals and online student success; students who had more withdrawals were less successful in their online courses. Research conducted by Cochran, Campbell, Baker, and Leeds (2014) identified students who had previously withdrawn from their online courses were more likely to withdrawn again leading to an unsuccessful online course attempt.

Since there was limited information in previous research about the connection between previous course withdrawals and online student success, this factor was included in this study.

This Midwestern community college had not previously examined the number of previous withdrawals of its online students. This study examined online student success assuming students who had previously withdrawn from more classes would perform worse overall that those who had fewer withdrawals. Some of the significant research findings supported this assumption.

Other Factors

There are some additional student characteristics that also impacted online student success, but have been the subject of fewer studies. The following student factors were examined as part of this study because this Midwestern community college had never examined those data, and it also provided an original contribution to the sparse literature available in these areas: (a) distance to campus; (b) time since last course; (c) computer experience; (d) financial aid award; and (e) online student groups.

Distance. Research about how distance from campus influenced online student success in higher education was very limited; only one study was identified. Hawkins (2012) identified a negative relationship between distance and online student success. Although no significant findings were identified for any online students in this study, results provided additional research about how distance from campus impacted online student success.

Time since last course. Only one other study that examined how time off between semesters of enrollment, or semester gap, impacted online student success was located. Muse (2003) found a positive relationship between online student success and the time since the students' last course. Analyzing how semester gap influenced online student success in this study added needed research findings. Results of this study showed this factor was not significantly related to online student success.

Computer experience. Research is less available to help determine how computer experience is related to online student success. Dupin-Bryant (2004) identified a positive relationship between computer experience and online student success while Harrell and Bower (2011) found that students who identified themselves as having higher technological skills had lower online student success. Also, some studies did not find any significance between computer experience and online success (Akpom, 2013, Cummings, 2009; Muse, 2003; Riordan, 2013, Shaw, Burrus, & Ferguson, 2016). Based on limited research on how computer experience impacted online student success, the significant research findings from this study were needed.

Financial aid. Some studies examined students who were eligible for financial aid or who had accepted a financial aid award and found no significance related to their online success (Aragon & Johnson, 2008; Berling, 2010; Foster, 2012; Gibson, 2015; Riordan, 2013). A few studies, including this one, found a negative relationship between financial aid and online student success (Gregory, 2016; Rodriguez, 2011) while one study identified a positive relationship for students who were awarded financial aid (Bull, 2015). Significant results from this study added needed research on the impact of financial aid on online student success.

Online student groups. Another way this study made a new contribution to existing research about online student success was by analyzing data for two separate online student groups: online students who also took courses in other formats and online only students. Few studies separated these populations for analysis. James, Swan, and Daston (2016) explored online student success by analyzing data about students who took courses exclusively online separately from those who took a mix of both online and on campus courses. James et al. (2016) found that students who took only some of their courses online attempted more credit hours and were retained at a higher rate than those taking courses exclusively online or on campus. In

contrast, another study looked at students who had ever taken any online courses as just one group and found successful online course completion rates were lower than successful on campus course completion rates (Xu & Jaggars, 2011b). Studies separating online students into multiple groups for analysis are limited, and should be subject to more investigation. At the community college in this study, 71% of students taking online courses were also taking campus-based courses while 29% of students were taking exclusively online courses. Based on these figures it was important to determine if demographic and academic student characteristics related to online course success were different between these two groups.

Overall research has shown primarily mixed results for factors that impact online student success. In previous studies, community college student gender and ethnicity were less predictive of success in online courses overall; however, GPA, age, previous credits earned, and prior online course experience were more significant predictors for online student success. Variations in research results could be based on the participants chosen for the studies, the differences in definition of student success, the sample size used in the study, the fluctuation in community college student registration patterns, or the types of courses the students took. With so many variables and definitions to consider, it makes it more difficult to compare the research results obtained.

Summary

Online course enrollment has been increasing for many years, and this trend is not predicted to change in the near future (Allen et al., 2016). Clearly the growth, interest, and demand for distance education have had a significant impact on community colleges and other higher education institutions. Since research shows student success for online courses is lower than it is for campus-based courses there is an increased need to continue to research online

education to help identify student factors that lead to increased success for online students especially in the community college setting where the number of students enrolled in online courses is the highest (Ginder & Stearns, 2014; Lokken, 2016).

Many studies have been conducted to identify which factors led to online student success at community colleges, but there have been wide-ranging results; this leaves unanswered questions about the most important factors impacting online student success and what colleges should focus on to improve online student success rates. There are many variables for online courses and programs that impact student success including student characteristics, course design, and support factors. Due to the acknowledged lower success rates for online students it is imperative to continue to identify the factors that help students succeed in the online learning environment (Allen et al., 2016; Moore & Kearsley, 2012). Since community college online student enrollment continues to increase and they serve the largest number of online students ongoing research is needed specifically to help this population succeed as younger students continue to enroll in online courses (Ginder & Stearns, 2014; Lokken, 2016; Pearson Foundation, 2011).

Student data is continuously collected and maintained at all institutions, and it should be examined and analyzed more frequently to identify factors that can be used to help improve online student success. This study explored community college student success factors, and the results enhance the literature already available. The data obtained from this study can be used in conjunction with previous research findings to design and implement initiatives intended to assist online students. As more evidence is gathered about student factors that lead to success in online courses and programs, these data can provide leaders in higher education with new knowledge

and an opportunity to improve student success and completion in distance education. The research methods and procedures used during this study are described in Chapter Three.

CHAPTER III: METHODOLOGY AND PROCEDURES

Introduction

As previously noted, there has been a rise of online student enrollment in higher education coupled with low online course success rates. In order to determine what factors impact online student success, a quantitative study was conducted. This chapter will provide details about the study population sample, research questions and design, data sources and collection procedures, data analysis employed in this study as well as ethical considerations.

Statement of the Problem

The rising popularity of online courses at community colleges in light of the lower course success rates of online students emphasize the importance of identifying and better understanding the factors that lead students to successfully complete online courses. Research about the success of online students have shown increased access to distance education did not lead to improved success in the online environment (Hachey et al., 2012; Lehman & Conceicao, 2014; Moore & Kearsley, 2012; Xu & Jaggars, 2011a, 2011b). Despite the lower student success rates, online courses are critical because they serve a population of students who would otherwise have no means to pursue an education (Clinefelter & Aslansian, 2016; Lokken, 2016). According to Clinefelter and Aslansian (2016) "up to 50% of online college students would not have, probably would not have, or are unsure whether they would have attended their current program if the program were not offered online" (p. 46). While online courses appear convenient on the surface, classes offered in this format do not lead every student to success.

Purpose of the Study

The purpose of this study was to generate a conceptual model of online student success as a function of student demographic and academic characteristics by examining existing online

student data at a Midwestern community college. Results from the quantitative analysis of this study can be used to predict and increase community college student online course success over time. Data used for the study included specific demographic and enrollment characteristics for students taking online courses as well as online student grade data during the 2015-2016 academic year. These demographic data were collected by the college at the time of admission as part of the application, and academic data were updated in the student record system at the end of each semester during students' enrollment at the college.

Research Questions and Related Hypotheses

This study analyzed existing data related to both demographic and academic characteristics that impacted online student success. Success for online students was measured based on students who earned a GPA of 2.0 or higher for all online courses during the semester. The following research questions and hypotheses guided this study:

1. What difference in online GPA exists based on an online student's distance from campus, financial aid award, previous computer courses passed, and remedial courses?

   H_0: There is no significant difference in online GPA based on distance from campus, financial aid award, previous computer courses, and remedial courses.

   H_1: There is a significant difference in online GPA based on distance from campus, financial aid award, previous computer courses, and remedial courses.

In order to determine if differences existed between students who earned an online GPA of 2.0 or higher and students who earned an online GPA under 2.0 based on distance from campus, financial aid award, computer courses, and remedial courses, independent samples *t*-tests were performed for each of the four independent variables using the Statistical Package for the Social Sciences (SPSS).

2. How do demographic characteristics of online students (age, ethnicity, and gender) correlate to online GPA?

H_0: Age, ethnicity, and gender have no correlation to online GPA.

H_1: Age, ethnicity, and gender have a correlation to online GPA.

In order to determine which independent demographic variables were significantly related to the dependent variable online student success (students who earned online GPA of 2.0 or higher), SPSS was used to compute the Pearson correlation coefficients. A two-way contingency table was also created to evaluate whether statistical relationships existed between online GPA for students and each independent demographic variable.

3. How do academic factors of online students (cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses completed) correlate to online GPA?

H_0: Cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses do not correlate to online GPA.

H_1: Cumulative GPA, enrollment status, semesters since last course, course withdrawals, cumulative credit hours, and total online courses have a correlation to online GPA.

Similar to research question two, Pearson correlation coefficients were computed using SPSS to determine the relationship between online GPA for students as it relates to the various independent academic variables. A two-way contingency table was also created to evaluate whether statistical relationships existed between online student success and each independent academic variable.

4. Which demographic characteristics of online students most significantly predict a successful online GPA?

H_0: Age, ethnicity, and gender do not predict a successful online GPA.

H_1: Age, ethnicity, and gender predict a successful online GPA.

In order to answer research question four, logistic regression was conducted with SPSS to determine which independent demographic student variables were predictors of a successful online GPA.

5. Which academic factors of online students most significantly predict a successful online GPA?

H_0: Cumulative GPA, enrollment status, semesters since last course, course withdrawals, cumulative credit hours, and total online courses completed do not predict a successful online GPA.

H_1: Cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses completed predict a successful online GPA.

In order to answer research question five, logistic regression was conducted to determine which independent academic student variables were predictors of online student success.

6. What combination of demographic characteristics and academic factors of online students most significantly predicts a successful online GPA?

H_0: A combination of demographic characteristics and academic factors of online students does not predict a successful online GPA.

H_1: A combination of demographic characteristics and academic factors of online students predicts a successful online GPA.

In order to answer research question six, a logistic regression model was conducted to determine which combination of independent demographic and academic student variables were the best predictors of online student success.

The academic and demographic variables that were part of this study and impacted online student success could be grouped into two categories. Some factors related to the research questions in this study were variables in place prior a student enrolling such as (a) age, (b) gender, (c) ethnicity, (d) distance to campus, (e) financial aid award, and (f) time since last course. Other variables did not come into place until after students started to take courses such as (a) enrollment status, (b) cumulative credit hours, (c) remedial courses, (d) computer related courses, (e) online courses, (f) course withdrawals, and (g) course format. All of the variables impacted student outcomes including course completion and GPA. Figure 1 contains a conceptual model of the variables prior to and after enrollment impacting online student success used in this study.

Research Design

This study was conducted at a large, Midwestern community college. According to the college's research department, the college enrolls over 32,000 credit and noncredit students on an annual basis. The focus of this correlational study was to test twelve hypotheses about online course success based on academic and demographic characteristics of online community college students. According to Creswell (2003) a quantitative research approach is appropriate when "the problem is identifying factors that influence an outcome, the utility of an intervention, or understanding the best predictors of outcomes" (p. 21-22). A quantitative method is also used when the study is "an inquiry into a social or human problem, based on testing a theory composed of variables, measured with numbers, and analyzed with statistical procedures, in order to determine whether the predictive generalizations of the theory hold true" (Creswell, 2003, p. 2). This study was designed to use previous research findings to identify the correlates of online student success as well as to isolate what student characteristics predict online student

success for this college. Since online course success has been lower than campus-based courses at this college, identifying correlates or predictors of online success will allow the college to understand the best ways to intervene to help online students succeed

Data Sources and Data Collection Procedures

This study was classified as exempt from Institutional Review Board (IRB) review by the Office of Research Ethics and Compliance at Illinois State University, and submission of an IRB protocol was not required. The research involved the use of existing data with student identifiers removed so the project did not meet the definition of human subject research. Permission was received for the study upon review by the study college's IRB (see Appendix D). After project approval by the study college, archival data comprised of community college students taking online credit-bearing courses was provided to the researcher. Various demographic and academic student characteristics along with course taking patterns for online students were extracted and provided in the dataset.

Data Sources

For this study existing data for online credit students were extracted and compiled by the college's IR department using the student information system. This system stores all student admissions data including student demographic and background information along with academic performance data that is recorded for enrolled students at the end of each semester. The benefit to using archival data is that these data already exist, and they do not have to be created. According to Vogt, Gardner, and Haeffele (2012), secondary data analysis is a "type of archival research conducted on data…that have been collected by others… not original to the researcher" (p. 351). Data about online students at this college were readily available and had not previously been analyzed. Data were provided to the researcher in Excel format for analysis.

Sample Population

The sample for this study included all degree and certificate-seeking students at one Midwestern community college who took at least one online, credit course during fall 2015 or spring 2016. The sample included both students who successfully completed their online coursework during these semesters as well as those who were unsuccessful. Most of the online students in this study also took courses in other formats during the semester. In addition to looking at all students who took online classes, this study also analyzed students who only took only courses separately. The total duplicated student enrollment count for this study was 4,903 online students during the two semesters combined, and there was a duplicated enrollment count of 1,425 for online only students.

Data Collection Procedures

After receiving approval from the local college's Institutional Review Board, existing data including students taking online courses during fall 2015 and spring 2016 was obtained from the college's IR department. The data set included a variety of available independent variables related to online student academic performance as well as student demographics and enrollment characteristics as available including age, gender, ethnicity, grade point average, enrollment status, program of study, credit hours attempted, credit hours earned, number of course withdrawals, remedial coursework, number of online courses, distance from campus, and transfer credit awards. Study variables were analyzed and comparisons were made to determine which factors significantly predicted online student success for both online students who also took courses on campus or in a hybrid format, and students taking only online courses.

Data Analysis

Data in this study were analyzed using SPSS. A correlational research design was used to explore and examine the relationships among the variables (Green & Salkind, 2014). Correlation analysis is appropriate for determining the degree of the relationship between variables, and this design assisted in weighing variables against other variables without suggesting one caused another (Vogt, Vogt, Gardner & Haeffele, 2014). The goal of the study was to find an association between successful online course completion and demographic and academic student factors. The correlations between variables were tested for statistical significance, and used to help draw conclusions about what led to online student success.

Online course success was the dependent variable in this study, and it was determined based on the students' online GPA calculated by using final semester grades recorded in the student record system, and included the dataset for all online courses completed during the semester. SPSS was used to transform online GPA into two categories: successful online students who received an online GPA of 2.0 or higher were coded as "1," and unsuccessful students who received an online GPA under 2.0 were coded as "0." Students who dropped their online courses within the refund period were excluded from the analysis because no grades appear on record for these students. The independent variables included within this study were student demographics and background characteristics as well as academic performance variables as previously described. Online student data were analyzed to determine what factors were significant in predicting online student success for each group: online students who took at least one course online and students taking only online courses.

Both descriptive and inferential statistics were generated for online students and online only students to show which factors most influenced and predicted online student success.

Descriptive analysis including percentages, means, and standard deviations were performed. These data were a vital part of the narrative to provide "a key diagnostic role" that helped pinpoint problems and led to deeper analysis (Vogt et al., 2014, p. 206). Descriptive statistics were used to explore, understand, and summarize all of the data in this study.

Inferential statistics were utilized in order to analyze complex relationships among study variables as well as to make predictions and draw conclusions about the online student success at the community college (Vogt et al., 2014). First, independent samples *t* tests were performed to determine if there was a significant difference in mean online GPA based on an online student's distance from campus, financial aid award, computer courses, or remedial courses. Overall, eight *t* tests were completed: one for each of the four variables for both the online student group and the online only student group. Effect size was calculated using a one-way analysis of variance (ANOVA). Next, Pearson correlation coefficients were generated to measure the strength of the association between online GPA, the dependent variable, and both the demographic independent variables (age, gender, and ethnicity) and the academic independent variables (enrollment status, time since last course, course withdrawals, cumulative credit, and online courses) in the study. Correlation coefficients were examined for both the online student group and the online only student group. Then, two-way contingency table analyses were generated for both the online student group and the online only student group to help summarize the relationship between a successful online GPA and demographic and academic student characteristics.

Additionally, a total of eight binary logistic regression models were constructed using the enter method as part of the research design, four for online students and four for online only students, to look at the effect of multiple predictors on the outcome of online student success. Logistic regression is appropriate when the dependent variable (outcome) is categorical such as

the one in this study: successful or unsuccessful completion of an online course; this study included a variety of independent variables, and when using multiple logistic regression these variables can be of any type (Vogt et al., 2014). Using logistic regression helped explain and test a model to predict the odds a student would successfully complete an online course (outcome or dependent variable) based on the variance of the independent or known factors or predictor variables (student characteristics and academic performance) (Vogt et al., 2014). The influences of the different independent factors related to successful online course completion were investigated using demographic characteristics first and then academic factors.

The first two logistic regression models were built to determine which demographic student characteristics were significant in predicting online student success. Regression models were built separately for all online students and online only students. The next two logistic regression models were built to determine which academic student characteristics were significant in predicting online student success. These two models used six academic characteristics, and there was one model for all online students and another one for online only students. Following these models, two additional models were built by eliminating three academic characteristics that were not significant predictors in the previous models. Lastly, two logistic regression models were built using both demographic and academic characteristics to determine how a combination of factors were significant in predicting online student success for online students and online only students.

The purpose of the data analysis in this study was to identify demographic and academic characteristics that correlated with and predicted online student success. Existing student data at one large community college were used for this study. Results were examined for both all online students as well as online only students.

Ethical Considerations

Although this researcher was also employed as a dean at the community college where the study took place, ethical procedures were used in collecting, analyzing, and reporting all findings from these data. Only those data provided by the college's IR department were used in this study despite other data the researcher had access to as an employee in academic affairs at the college. In order to gain access to data for this study, approval was sought and received through a research request submission to the IR department at the Midwestern community college (see Appendix D). After approval was received, the online student records were gathered by the research office. Once the dataset was finalized, the data was de-identifed prior to analysis so there was no way to trace the data back to any particular student. To maintain confidentiality these data were kept secure at the residential dwelling in the researcher's password protected, private laptop. No unethical manipulation of these data was involved as part of the analysis that would have skewed results in favor of the institution.

The research from this study involved no procedures for which written consent would normally be required outside of the research context since data was not gathered from human subjects. There was no risk associated or expected from this study, and results are only presented as an aggregate. Benefits of the study justify any unforeseen or unintended risks.

Summary

This chapter detailed the research questions, research design, data sources and data collection procedures, data analysis, and ethical considerations for this quantitative study. Existing student record data were extracted from the student record system by the IR department and provided in order for the researcher to examine academic and demographic factors that impacted and predicted online student success. Data analysis included both descriptive and

inferential statistics. Descriptive statistics helped better understand the profile of online students at this community college. The inferential statistics including *t*-tests, correlations, and cross-tabulations were examined to see how online student success differed by student characteristics or student performance. Eight binary logistic regression models were developed to determine which variables helped to significantly predict online student success. Chapter Four will provide specific details about results from the data analysis in this study.

CHAPTER IV: RESULTS, ANALYSIS, AND DISCUSSION

Introduction

The purpose of this study was to generate a conceptual model of community college online student success as a function of student demographic and academic characteristics. Data used in this study were obtained from a large, Midwestern community college. This quantitative study used a correlational research design to identify the demographic and academic characteristics that helped predict and draw conclusions about online student success. Results of this study were guided by these six research questions:

1. What difference in online GPA exists based on an online student's distance from campus, financial aid award, previous computer courses passed, and remedial courses?
2. How do demographic characteristics of online students (age, ethnicity, and gender) correlate to online GPA?
3. How do academic factors of online students (cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses completed) correlate to online GPA?
4. Which demographic characteristics of online students most significantly predict a successful online GPA?
5. Which academic factors of online students most significantly predict a successful online GPA?
6. What combination of demographic characteristics and academic factors of online students most significantly predicts a successful online GPA?

Detailed analyses of archival data were performed; this chapter presents a summary of the results including both descriptive and inferential statistics.

Descriptive Statistics of Study Population

In order to examine the study population more closely, online students were divided up into two groups for analysis. The first group studied included all students taking at least one online course. In addition to the overall online student group, students enrolled in only online courses were examined as a separate group to identify any differences that existed between the groups. Analyses for data related to an individual online student such as (a) age, (b) gender, (c) ethnicity, (d) distance from campus, and (e) enrollment status were typically completed using the combination of unduplicated enrollment data from fall 2015 and spring 2016. Other analyses were completed using fall 2015 or spring 2016 data; some examples include (a) time since last course, (b) remedial coursework, (c) financial aid award, (d) cumulative credit hours, (e) cumulative GPA, and (f) online GPA. Descriptive statistics for each variable will follow.

Enrollment

The total census day duplicated credit enrollment at this large, Midwestern community college was 30,661 students during the 2015-2016 academic year: 15,016 students during fall 2015 and 15,645 students in spring 2016. This study focused only on online, credit students seeking a degree or certificate. The college census day report for fall 2015 identified 2,353 students who had taken at least one online course during the semester, and of those students 2,345 were seeking a degree or certificate. The college census day enrollment report for spring 2016 identified 2,564 students taking at least one online credit course, and of those students 2,558 were degree or certificate seeking. As seen in Table 1, the overall duplicated online credit student enrollment at the college during the 2015-2016 academic year was 4,903. These were all degree and certificate-seeking students enrolled in at least one course online during one or both

of the two (fall and spring) semesters. This online enrollment figure represents 16% of the total college duplicated enrollment during fall 2015 and spring 2016.

Table 1
Total Duplicated Credit Student Enrollment

Semester	Total Credit Student Enrollment	Online Student Enrollment	Percent Online
Fall 2015	15,016	2,345	15.6%
Spring 2016	15,645	2,558	16.4%
Total	30,661	4,903	16.0%

As seen in Table 2, out of the 4,903 online students enrolled online during the fall and spring semesters 1,425 took all of their courses online; this figure represents 4.65% of the total student enrollment, and 29% of the total online student enrollment. Out of the 2,345 online degree and certificate seeking students in fall 2015, 679 (29%) took all of their courses online. Similarly, 746 (29.2%) of the 2,558 degree and certificate seeking students took only online courses in spring 2016. Conversely, about 71% of online students were also enrolled in hybrid or face-to-face courses in addition to their online courses during these two semesters.

Table 2
Total Duplicated Online Student Enrollment by Semester and Type of Student

Semester	Online Students	Online Only Students	Percent Online Only
Fall 2015	2,345	679	29.0%
Spring 2016	2,558	746	29.2%
Total	4,903	1,425	29.1%

It is important to note that some students were enrolled in online courses during both fall and spring semesters. There were 857 students who took online courses during both fall 2015 and spring 2016, and when these students were counted only once the unduplicated overall count of online student enrollment was 4,046. There were 239 online only students enrolled during both fall 2015 and spring 2016, and when these students were counted only once the unduplicated count of online only enrollment was 1,186 students (see Table 3).

Table 3
Overall Online Student Enrollment by Type of Student

Type of Student	Duplicated Online Enrollment	Online Students Enrolled in both Semesters	Unduplicated Online Enrollment
Online Students	4,903	857	4,046
Online Only Students	1,425	239	1,186

Gender

The majority (61.8% or *n* = 2,500) of the online students enrolled during fall 2015 and spring 2016 were female while only 38.2% (*n* = 1,546) were male. As shown in Table 4, the gender for online only students was similar to the overall online student population: two-thirds (66.3% or *n* = 786) of the students were female and one-third (33.7% or *n* = 400) were male.

Table 4
Gender Comparison by Type of Student

	Online Students		Online Only Students	
Gender	*n*	%	*n*	%
Female	2,500	61.8%	786	66.3%
Male	1,546	38.2%	400	33.7%
Total	4,046	100.0%	1,186	100.0%

Age

The mean age for the online student population during fall 2015 and spring 2016 was nearly 25 years old with a median of 22 years old, and mode of 19 years old. The students who were taking only online courses were found to be older; the mean age was just over 28 years old, the median was 25 years old, and the mode was 21 years old (see Table 5).

Table 5
Online Student Age by Type of Student

Type of Student	*N*	*M*	Median	Mode	*SD*
Online Students	4,046	24.99	22.00	19.00	8.52
Online Only Students	1,186	28.32	25.00	21.00	9.73

The age range for online students was 16 years old to 65 years old. When reviewing the online student population as either traditional (less than or equal to 24 years old) or nontraditional students (greater than or equal to 25 years old), considerably more students were younger. Table 6 shows over two-thirds (67.3% or n = 2,721) of the online students were traditional aged while only about one-third (32.7% or n = 1,325) were nontraditional aged.

Table 6
Traditional vs. Nontraditional Student Age by Type of Student

	Online Students		Online Only Students	
Age Groups	*n*	%	*n*	%
24 or under	2,721	67.3%	579	48.8%
25 and over	1,325	32.7%	607	51.2%
Total	4,046	100.0%	1,186	100.0%

The age of the online only students was higher than the age for the overall online student population. Just over half (51.2% or *n* = 607) of the online only students were nontraditional and just under half (48.8% or *n* = 579) were traditional students.

When inspecting the age groups for the overall online student population nearly half (48.6% or *n* = 1,967) of these students were in the 18 to 21 year old group, more than one-fifth (21.6% or *n* = 873) were in the 22 to 25 year old group, and 18.1% (*n* = 733) were in the group of students who were over 30 years old (see Table 7). When examining age groups for online only students there was a higher percentage of older students. The largest percentage (29.8% or *n* = 353) of online only students were in the over 30 year old group while 27.3% (*n* = 324) were in the 22 to 25 year old group followed closely by 26.1% (*n* = 309) of online only students who were in the 18 to 21 year old group.

Table 7
Age Groups by Type of Student

	Online Students		Online Only Students	
Age Groups	*n*	%	*n*	%
17 or under	33	0.8%	8	0.7%
18 - 21	1,967	48.6%	309	26.1%
22 - 25	873	21.6%	324	27.3%
26 - 30	440	10.9%	192	16.2%
Over 30	733	18.1%	353	29.8%
Total	4,046	100.0%	1,186	100.0%

Distance from Campus

When examining the residency status for online students the majority (82.3% or *n* = 3,329) lived within the community college district while about one-sixth (15.7% or *n* = 636) of online students lived outside of the district. As shown in Table 8, there were also 70 (1.7%)

International students taking online courses and 11 (0.3%) online students who lived in another state. Although 98% (*n* = 3,965) of students lived in Illinois including both in-district and out-of-district students, there were also online students enrolled from six other states: Colorado, Indiana, Iowa, Michigan, Tennessee, and Wisconsin.

As shown in Table 8, the residency status of the students who took only online classes was similar to the overall online student group: 82% (*n* = 972) lived in the district while 17.3% (*n* = 205) of the students lived outside of the district, and only a few (0.5% or *n* = 6) students lived out-of-state or were International (0.3% or *n* = 3). Although 99.3% (*n* = 1,178) of online only students lived in Illinois, there were also students taking all of their classes online who lived in Colorado, Indiana, Michigan, Tennessee, and Wisconsin.

Table 8
Residency Status by Type of Student

	Online Students		Online Only Students	
Residency Status	*n*	%	*n*	%
In-district	3,329	82.3%	972	82.0%
Out-of-district	636	15.7%	205	17.3%
Out-of-state	11	0.3%	6	0.5%
International	70	1.7%	3	0.3%
Total	4,046	100.0%	1,186	100.0%

The distance a student lived from campus was calculated in miles by entering the zip code where the online student lived and the zip code for the main college campus using the zip code distance calculator found at www.zip-codes.com. Students who lived in the same zip code as the college were coded as zero miles. Two zip codes in the dataset were invalid leaving 134 different valid zip codes for 4,044 online students, and 1,185 online only students. Online students lived an average of 9.02 miles from campus with a standard deviation of 20.25 (see

Table 9). The average distance online only students lived from campus was slightly further at 11.22 miles and the standard deviation was also larger at 35.91. The median and mode number of miles from campus were the same for online and online only students: 7.99 miles for the median and 5.46 miles for the mode.

Table 9
Summary of Miles from Campus by Type of Student

Type of Student	*N*	*M*	Median	Mode	*SD*
Online Students	4,044	9.02	7.99	5.46	20.25
Online Only Students	1,185	11.22	7.99	5.46	35.91

Nearly all (96% or n = 3,886) of the students taking online classes lived within 20 miles of campus. As seen in Table 10, about two-thirds (66.8% or n = 2,703) of the online students lived within ten miles of campus, and over 29% (29.2% or n = 1,183) lived 10 to 20 miles away.

Table 10
Distance from Campus by Type of Student

	Online Students		Online Only Students	
Mile Range	*n*	%	*n*	%
0 - 10	2,703	66.8%	752	63.4%
10.01 - 20	1,183	29.2%	364	30.7%
20.01 - 30	116	2.9%	44	3.7%
30.01 - 40	26	0.6%	12	1.0%
40.01 - 50	3	0.1%	2	0.2%
50.01 - 60	2	0.0%	1	0.1%
Over 60	11	0.3%	10	0.8%
Missing	2	0.0%	1	0.1%
Total	4,046	100.0%	1,186	100.0%

These figures were similar for online only students. There were 1,116 (94.1%) online only students who lived within 20 miles of campus: the majority (63.4% or *n* = 752) lived within 10 miles of campus, and just over 30% (30.7% or *n* = 364) lived 10 to 20 miles away.

Ethnicity

Online students in this study reported a variety of ethnicities, and a summary of this breakdown can be found in Table 11. The top three ethnicities represented by online students were as follows: White (60.5% or *n* = 2,448) followed by Hispanic (16.6% or *n* = 672), and Black (8.4% or *n* = 340). Only 2.4% (*n* = 97) of online students were Asian while 1.9% (*n* = 78) of online students claimed more than one race. Additionally, 1.7% (*n* = 70) of online students were International, and 0.2% (*n* = 10) were American Indian. The ethnicity was unknown for 330 (8.2%) online students.

Table 11
Ethnicity Comparison by Type of Student

	Online Students		Online Only Students	
Ethnicity	*n*	%	*n*	%
White	2,448	60.5%	730	61.6%
Hispanic	672	16.6%	162	13.7%
Black	340	8.4%	131	11.0%
American Indian	10	0.2%	2	0.2%
Hawaiian	1	0.0%	1	0.1%
Asian	97	2.4%	27	2.3%
More than one race	78	1.9%	20	1.7%
International	70	1.7%	3	0.3%
Unknown	330	8.2%	110	9.3%
Total	4,046	100.0%	1,186	100.0%

Similarly, most of the online only students also identified with one of three ethnicities: White (61.6% or *n* = 730), Hispanic (13.7% or *n* = 162), or Black (11% or *n* = 131). A few online only students were also Asian (2.3% or *n* = 27), American Indian (0.2% or *n* = 2), Hawaiian (0.1% or *n* = 1), International (0.3% or *n* = 3). Furthermore, 20 (1.7%) students had more than one race. The ethnicity was unknown for 110 (9.3%) online only students.

Program of Study

As seen in Table 12, over three-fourths (75.8% or *n* = 3,067) of online students were enrolled in transfer programs, and about one-fourth (24.2% or *n* = 979) were enrolled in occupational certificate or degree programs. Likewise, nearly 80% (78% or *n* = 925) of the online only students were enrolled in transfer programs while 22% (*n* = 261) were enrolled in occupational programs.

Table 12
Program of Study by Type of Student

	Online Students		Online Only Students	
Program	*n*	%	*n*	%
Transfer	3,067	75.8%	925	78.0%
Occupational	979	24.2%	261	22.0%
Total	4,046	100.0%	1,186	100.0%

Student Level

As displayed in Table 13, most (61.4% or *n* = 2,484) of the online students had sophomore or second-year status while half as many (32.1% or *n* = 1,299) were freshmen or first-year students; additionally, there were 17.3% (*n* = 698) of online students who had some transfer credit. A few (0.3% or *n* = 12) online students enrolled at this community college during fall 2015 and spring 2016 were dual enrolled both in high school and this community college.

Some (6.2% or *n* = 251) students were unclassified meaning they did not meet minimum requirements for entrance as regular college-level students, already had an associate's degree or higher, or were course enrollees only without the intention of earning a degree or certificate.

Table 13
Student Level by Type of Student

	Online Students		Online Only Students	
Student Level	*n*	%	*n*	%
Dual Enrolled	12	0.3%	7	0.6%
Freshmen	1,299	32.1%	452	38.1%
Sophomore	2,484	61.4%	611	51.5%
Unclassified	251	6.2%	116	9.8%
Total	4,046	100.0%	1,186	100.0%

A higher percentage of online only students were freshmen or first-year students with fewer sophomore or second-year students when compared to all online students as seen in Table 13. Just over half (51.5% or *n* = 611) of the online only students were sophomores or second-year while 38.1% (*n* = 452) were freshmen or first-year students. There were also several (0.6% or *n* = 7) online only students who were dual enrolled in both high school and online college courses which was similar to the overall online student population.

Enrollment Status

The breakdown of enrollment status was different for online students and online only students. As displayed in Table 14, the enrollment status of online students was split fairly evenly between those enrolled part-time (50.8% or *n* = 2,056) and full-time (49.2% or *n* = 1,990) during the study. On the other hand, online only students were primarily enrolled part-time (90.2% or *n* = 1,070) with only about 10% (9.8% or *n* = 116) enrolled full-time.

Table 14
Enrollment Status by Type of Student

	Online Students		Online Only Students	
Enrollment Status	*n*	%	*n*	%
Part-time	2,056	50.8%	1,070	90.2%
Full-time	1,990	49.2%	116	9.8%
Total	4,046	100.0%	1,186	100.0%

Course Enrollment

The average number of total courses taken by online students in a semester was 3.30 courses for fall 2015 and 3.26 courses for spring 2016; the median and the mode for online students were both four courses for fall and spring (see Table 15). The average number of courses online only students took was lower at only 1.85 courses during both fall 2015 and spring 2016; the median and the mode for online only students were both just one course for both fall and spring.

Table 15
Total Course Enrollment Summary by Semester and Type of Student

Fall 2015	*N*	*M*	Median	Mode	*SD*
Online Students	2,345	3.30	4.00	4.00	1.42
Online Only Students	679	1.85	1.00	1.00	1.09
Spring 2016	*N*	*M*	Median	Mode	*SD*
Online Students	2,558	3.26	4.00	4.00	1.41
Online Only Students	746	1.85	1.00	1.00	1.07

The total number of classes that online students enrolled in each semester, including all course formats, varied as shown in Table 16. The highest number of courses an online student was taking during fall 2015 semester was eight courses (less than 1.0% or $n = 1$), and during

spring 2016 it was nine courses (less than 1.0% or *n* = 1). About 30% of online students during fall 2015 (29.5% or *n* = 691) and spring 2016 (30.3% or *n* = 775) were taking four courses.

Table 16
Number of Courses Taken by Semester and Type of Student

	Online Students		Online Only Students	
Fall 2015 Courses	*n*	%	*n*	%
1	341	14.5%	341	50.2%
2	419	17.9%	196	28.9%
3	381	16.2%	69	10.2%
4	691	29.5%	52	7.7%
5	443	18.9%	20	2.9%
6	61	2.6%	0	0.0%
7	8	0.3%	1	0.1%
8	1	0.0%	0	0.0%
Total	2,345	100.0%	679	100.0%
	Online Students		Online Only Students	
Spring 2016 Courses	*n*	%	*n*	%
1	379	14.8%	379	50.8%
2	461	18.0%	197	26.4%
3	427	16.7%	88	11.8%
4	775	30.3%	70	9.4%
5	446	17.4%	10	1.3%
6	59	2.3%	2	0.3%
7	8	0.3%	0	0.0%
8	2	0.1%	0	0.0%
9	1	0.0%	0	0.0%
Total	2,558	100.0%	746	100.0%

Time since Last Course

The time fall 2015 students had between semesters of enrollment, or semester gap, ranged from zero for new students to 101 semesters; the range in spring 2016 was zero to 87 semesters between enrollments (see Table 17). When examining the number of semesters since

online and online only students had previously taken a course prior to fall 2015, between 10.5% and 11.8% of the students were new and had a zero semester enrollment gap. The largest percentage (42% or *n* = 984) of the fall online students and online only students (34.9% or *n* = 237) were enrolled in the previous semester and had a one semester enrollment gap. During the spring 2016 there were fewer (8.1% or *n* = 207) new online students than new online only students (12.5% or *n* = 93). When compared to fall online students, a higher percentage of spring online students were enrolled in the previous term: 74.2% (*n* = 1,897) of all online students and 54.4% (*n* = 406) of online only students. Also, there were more (18.1% or *n* = 135) online only students with a longer semester gap of four or more semesters than online students (10.2% or *n* = 262).

Table 17
Summary of Semesters since Last Course by Semester and Type of Student

	Online Students		Online Only Students	
Fall 2015 Semester Gap	*n*	%	*n*	%
0	247	10.5%	80	11.8%
1	984	42.0%	237	34.9%
2	749	31.9%	180	26.5%
3	89	3.8%	40	5.9%
4 - 101	276	11.8%	142	20.9%
Total	2,345	100.0%	679	100.0%
	Online Students		Online Only Students	
Spring 2016 Semester Gap	*n*	%	*n*	%
0	207	8.1%	93	12.5%
1	1,897	74.2%	406	54.4%
2	93	3.6%	61	8.2%
3	99	3.9%	51	6.8%
4 - 87	262	10.2%	135	18.1%
Total	2,558	100.0%	746	100.0%

The average number of semesters between fall 2015 and the students' last course was higher (3.84 semesters) for online only students than for online students (2.68 semesters) as seen in Table 18. The median number of semesters between courses prior to fall 2015 for online students was one semester with a standard deviation of 6.11, and for fall online only students it was two semesters with a standard deviation of 8.53. Similar findings were identified for spring 2016 with a higher mean number of semesters between enrollments for online only students. The mode was one semester between enrollments for both online student groups and both semesters.

Table 18
Semesters since Last Course by Semester and Type of Student

Fall 2015	*N*	*M*	Median	Mode	*SD*
Online Students	2,345	2.68	1.00	1.00	6.11
Online Only Students	679	3.84	2.00	1.00	8.53
Spring 2016	*N*	*M*	Median	Mode	*SD*
Online Students	2,558	2.33	1.00	1.00	6.09
Online Only Students	746	3.51	1.00	1.00	8.63

Course Withdrawals

The 2,345 online students during fall 2015 were enrolled for 7,731 course sections including all course formats, and 2,558 students enrolled in spring 2016 and took 8,347 course sections for a combined total of 16,078 course sections over the two semesters (see Table 19). In fall 2015 online students started with 7,731 course sections, and there were 1,227 (15.9%) section withdrawals overall during the semester; 545 of the fall 2015 section withdrawals were online course sections which is 7.0% of the total sections and 44.4% of the withdrawn sections. In spring 2016 initially there were 8,347 course sections counting all course formats taken by online students, and before the end of the semester there were 1,165 (14.0%) section withdrawals

in total; of these withdrawals 560 were online course sections which is 6.7% of the total sections taken and 48.1% of the withdrawn sections.

Table 19
Course Section Withdrawals by Semester and Type of Section

Semester	Total Sections	Course Section Withdrawals				
		Withdrawn Sections	% of Total	Online Section Withdrawals	% Online Withdrawals	% of Total Sections
Fall 2015	7,731	1,227	15.9%	545	44.4%	7.0%
Spring 2016	8,347	1,165	14.0%	560	48.1%	6.7%
Overall	16,078	2,392	14.9%	1,105	46.2%	6.9%

Table 20 displays the total number of course withdrawals made by online students; these figures include course withdrawals prior to and during fall 2015 and spring 2016. The range of total withdrawals for online students was 0 to 33 courses. About one-third (35.1% or *n* = 1,420)

Table 20
Number of Course Withdrawals by Type of Student

Course Withdrawals	Online Students		Online Only Students	
	n	%	*n*	%
0	1,420	35.1%	370	31.2%
1	858	21.2%	231	19.5%
2	563	13.9%	173	14.6%
3	364	9.0%	112	9.4%
4 - 33	841	20.8%	300	25.3%
Total	4,046	100.0%	1,186	100.0%

of online students never withdrew from any courses, approximately another third (35.1% or *n* = 1,421) of students had a total of one or two course withdrawals, and the remaining (29.8% or *n* = 1,205) students had three or more course withdrawals. Online only students also had about one

third (31.2% or *n* = 370) of students without any course withdrawals, another third (34.1% or *n* = 404) with one or two course withdrawals, and the remaining third (34.7% or *n* = 412) with three or more course withdrawals.

The average number of course withdrawals was 2.10 courses for all online students, and 2.17 courses for online only students as displayed in Table 21. The median number of course withdrawals was one course for both online students and online only students. The mode number of course withdrawals was zero for both online and online only student groups so most online students had never withdrawn from a course.

Table 21
Summary of Course Withdrawals by Type of Student

Type of Student	*N*	*M*	Median	Mode	*SD*
Online Students	4,046	2.10	1.00	0.00	2.92
Online Only Students	1,186	2.17	1.00	0.00	3.41

Remedial Coursework

The total number of remedial sections taken by online and online only students is found in Table 22. When examining the total course sections for fall 2015 and spring 2016 combined, there were 16,078 total course sections taken by online and online only students. There were only 835 (5.2%) remedial course sections out of the total course sections taken during this time.

Table 22
Percent of Remedial Courses Taken by Semester

Semester	Total Course Sections	Total Remedial Course Sections	% Remedial of Total
Fall 2015	7,731	401	5.2%
Spring 2016	8,347	434	5.2%
Overall	16,078	835	5.2%

Table 23 provides a summary of the number of remedial courses online and online only students were taking during fall 2015 and spring 2016. Most online students were not taking any remedial classes: 85.1% (*n* = 1,995) of students in fall 2015 had no remedial courses, and 85.5% (*n* = 2,186) of students in spring 2016 were not taking any remedial courses. During fall 2015, 13.1% (*n* = 308) of online students were taking one remedial course, and during spring 2016 only12.7% (*n* = 324) of students were taking one remedial courses. Under 2% of online students were taking two or three remedial courses each semester.

Table 23
Number of Remedial Courses Taken by Semester and Type of Student

	Online Students		Online Only Students	
Fall 2015	*n*	%	*n*	%
0	1,995	85.1%	611	90.0%
1	308	13.1%	65	9.6%
2	33	1.4%	2	0.3%
3	9	0.4%	1	0.1%
Total	2,345	100.0%	679	100.0%
	Online Students		Online Only Students	
Spring 2016	*n*	%	*n*	%
0	2,186	85.5%	655	87.8%
1	324	12.7%	82	11.0%
2	34	1.3%	7	0.9%
3	14	0.5%	2	0.3%
Total	2,558	100.0%	746	100.0%

Much like the overall online students, most of online only students did not take any remedial courses: 90% (*n* = 611) in fall 2015 took no remedial courses, and 87.8% (*n* = 655) in spring 2016 took no remedial courses. About 10% (9.6% or *n* = 65) of online only students took one remedial course in fall 2015, and 11% (*n* = 82) took one remedial course in spring 2016.

Less than 0.5% (n = 3) of online only students in fall 2015 took two or three remedial courses, and just over 1% (1.2% or n = 9) of online only students in spring 2016 took two or three remedial courses.

Financial Aid Award

Over one-third of students taking online courses during fall 2015 and spring 2016 were using financial aid to help pay for their courses (see Table 24). There were 819 (34.9%) online students out of 2,345 who received financial aid during fall 2015, and 958 (37.5%) online students out of 2,558 who accepted a financial aid award during spring 2016 which was a duplicated total of 1,777 online students with financial aid. Fewer online only students received financial aid awards. There were 205 (30.2%) online only students out of 679 in fall 2015 who received financial aid, and 181 (24.3%) online only students out of 746 in spring 2016 who received financial aid; this was a duplicated total of 386 online only students with financial aid.

Table 24
Percent of Students with Financial Aid Awards by Semester and Type of Student

Fall 2015	Overall Total	Total with Financial Aid	%
Online Students	2,345	819	34.9%
Online Only Students	679	205	30.2%
Spring 2016	Overall Total	Total with Financial Aid	%
Online Students	2,558	958	37.5%
Online Only Students	746	181	24.3%

For online students the mean financial aid award amount during fall 2015 was $1,837.56 and during spring 2016 it was $1,916.46 (see Table 25). The median financial aid award was $2,109 in fall 2015 and $2,165 in spring 2016, and the mode financial aid award amount was $2,887 for both semesters for online students. For online only students the mean financial aid award was $1770.46 during fall 2015 and $1,493.33 in spring 2016. The median financial aid

award for online only students was $1,512 in fall 2015 and $1,444 during spring 2016 while the mode financial aid award was $2,887 in fall 2015 and $1,444 during spring 2016.

Table 25
Summary of Financial Aid Awards by Semester and Type of Student

Fall 2015	*N*	*M*	Median	Mode	*SD*
Online Students	819	1,837.56	2109.00	2887.00	944.19
Online Only Students	205	1,770.46	1512.00	2887.00	971.48
Spring 2016	*N*	*M*	Median	Mode	*SD*
Online Students	958	1,916.46	2165.00	2887.00	936.52
Online Only Students	181	1,493.33	1444.00	1444.00	869.05

Computer Coursework

Table 26 shows of the 4,046 unduplicated students taking online courses during fall 2015 and spring 2016, only about one-fourth (24.4% or n = 989) of these students had ever passed one or more computer-related courses with a grade of A, B, C, or D, and slightly fewer (22.2% or n = 263) online only students had passed computer courses of the 1,186 unduplicated online only student count. Most online and online only students had not passed any computer courses.

Table 26
Number of Computer Courses Passed by Type of Student

	Online Students		Online Only Students	
Courses Passed	*n*	%	*n*	%
0	3,057	75.6%	923	77.8%
1	685	16.9%	183	15.4%
2	291	7.2%	75	6.3%
3	10	0.2%	4	0.3%
4	1	0.0%	0	0.0%
5	0	0.0%	0	0.0%
6	2	0.0%	1	0.1%
Total	4,046	100.0%	1,186	100.0%

When looking just at computer courses passed since 2010, there were 734 (18.1%) online students who had passed a computer course. These 734 online students passed a total of 1,166 courses since 2010; the distribution of the five different computer courses they passed is shown in Table 27. Most of the students who took and passed a computer course had taken either Microsoft Office I (84.0% or *n* = 980) or Introduction to Computer Systems (11.4% or *n* = 133).

Table 27
Computer Courses Passed since 2010 for Online Students

Computer Course	*n*	%
Personal Computer Basics	33	2.8%
Internet Basics	4	0.3%
Introduction to Computer Systems	133	11.4%
Microsoft Office I	980	84.0%
Microsoft Office II	16	1.4%
Total	1,166	100.0%

Total Online Courses

The average number of courses online students had ever taken was 4.26 in fall and 4.08 during spring 2016; for online only students the average number of online courses taken was higher with an average of 5.25 courses in fall 2015 and 4.95 during spring 2016 (see Table 28).

Table 28
Online Course Summary by Semester and Type of Student

Fall 2015	*N*	*M*	Median	Mode	*SD*
Online Students	2,345	4.26	3.00	1.00	3.85
Online Only Students	679	5.25	4.00	1.00	4.67
Spring 2016	*N*	*M*	Median	Mode	*SD*
Online Students	2,558	4.08	3.00	1.00	3.67
Online Only Students	746	4.95	4.00	2.00	4.66

For online students during both fall 2015 and spring 2016, the median was three online courses and the mode was one online course; for online only students the median number of online courses ever taken was four courses while the mode was one course during fall 2015 and two courses during spring 2016.

Table 29 displays the total number of online courses ever taken by the online students at the completion of this study; these figures included all online courses taken before and during the study. The overall number of online courses ever taken by the online students ranged from 1 to 42 online courses. Online only students had taken more online courses overall. The highest percentage (29% or n = 1,174) of online students had previously taken just one online course while 28.7% (n = 341) of the online only students had previously taken six or more online courses.

Table 29
Number of Online Courses by Type of Student

	Online Students		Online Only Students	
Online Courses	*n*	%	*n*	%
1	1,174	29.0%	275	23.2%
2	788	19.5%	219	18.5%
3	521	12.9%	144	12.1%
4	422	10.4%	129	10.9%
5	311	7.7%	78	6.6%
6 - 42	830	20.5%	341	28.7%
Total	4,046	100.0%	1,186	100.0%

Cumulative Credit Hours

Table 30 provides a summary of cumulative credit hours earned by online students. When comparing the mean, median, and mode for cumulative credit hours earned by online students, students taking only online courses had earned fewer credit hours overall. The average number

of cumulative credit hours earned by online students was 53.38 total hours in fall 2015 and 51.75 hours in spring 2016, and these totals were lower for online only students with an average of 45.61 total hours in fall 2015 and 43.52 hours in the spring.

Table 30
Summary of Cumulative Credit Hours Earned by Semester and Type of Student

Fall 2015	*N*	*M*	Median	Mode	*SD*
Online Students	2,345	53.38	59.00	62.00	28.89
Online Only Students	679	45.61	47.00	3.00	30.76
Spring 2016	*N*	*M*	Median	Mode	*SD*
Online Students	2,558	51.75	56.00	63.00	28.88
Online Only Students	746	43.52	39.00	3.00	31.70

The median number of credit hours for the overall online student group was higher than the online only students: for online students the average was 59 total credit hours for fall 2015 and 56 for spring 2016, and for online only students the average was 47 total credit hours during fall 2015 and 39 credit hours for spring 2016. The highest number of cumulative credit hours earned for online students was 207 in fall 2015 and 236 in spring 2016, and for online only students it was 163 credit hours in fall 2015 and 174 in spring 2016. The mode for online only students was three cumulative credit hours for both fall 2015 and spring 2016 while the mode was 62 total credit hours in fall 2015 and 63 credit hours during spring 2016 for the overall online student group.

Grade Point Average

As displayed in Table 31, not all students who registered for online courses completed them to earn an online GPA. During fall 2015, 303 (12.9%) of the 2,345 online students who registered for online courses did not complete them, and during spring 2016, 303 (11.8%) of the

2,558 online students also withdrew and did not complete their online courses. Of the 679 students who registered for only online courses in fall 2015 there were 74 (10.9%) students who withdrew from their online courses before the end of the semester and did not earn an online GPA. During spring 2016, there were 75 (10.0%) online only students who withdrew from all of their online courses before the end of the semester and did not earn an online GPA. Overall there were 2,042 (87.1%) online students with a valid online GPA for fall 2015, and 2,255 (88.1%) for spring 2016. There were 605 (89.1%) online only students with a valid GPA for fall 2015, and 671 (89.9%) for spring 2016.

Table 31
Online GPA Count by Semester and Type of Student

	Valid Online GPA		Cases Missing		Total	
Fall 2015	*n*	*%*	*n*	*%*	*N*	*%*
Online Students	2,042	87.1%	303	12.9%	2,345	100.0%
Online Only Students	605	89.1%	74	10.9%	679	100.0%
	Valid Online GPA		Cases Missing		Total	
Spring 2016	*n*	*%*	*n*	*%*	*N*	*%*
Online Students	2,255	88.1%	303	11.8%	2,558	100.0%
Online Only Students	671	89.9%	75	10.0%	746	100.0%

The cumulative GPA for the overall online student population was higher than both the semester GPA and the online GPA calculated using only their online course grades each semester. As seen in Table 32, the average cumulative GPA for all students who took online courses during fall 2015 was 2.82 (N = 2,345) and for spring 2016 the average cumulative GPA was 2.86 (N = 2,558); likewise, the cumulative GPA for online only students was 2.82 (N = 679) in fall 2015 and 2.80 (N = 746) in spring 2016.

Table 32
Mean GPA by Semester and Type of Student

Fall 2015	*N*	Cumulative GPA	*n*	Online GPA	*n*	Semester GPA
Online Students	2,345	2.82	2,042	2.55	2,345	2.56
Online Only Students	679	2.82	605	2.58	605	2.58
Spring 2016	*N*	Cumulative GPA	*n*	Online GPA	*n*	Semester GPA
Online Students	2,558	2.86	2,255	2.56	2,558	2.63
Online Only Students	746	2.80	671	2.51	671	2.51

When calculating GPA based on the online courses students completed each semester, the average online course GPA for fall 2015 students was 2.55 (n = 2,042), and in spring 2016 the online GPA was 2.56 (n = 2,255); for online only students the average online course GPA was 2.58 (n = 605) for fall 2015 and 2.51 (n = 671) for spring 2016 (see Table 32 above). For the overall online student group, the mean online GPA was the lower than both the mean semester GPA and the cumulative GPA; similarly, the mean online GPA or semester GPA for the online only students was the lower than the mean cumulative GPA. For both semesters, all three GPA types, and both online student groups, the median GPA was 3.0 and the mode GPA was 4.0.

Online Student Success

Successful online GPA. When exploring the number of online students who earned a 2.0 or higher GPA for their online courses less than two thirds of online students earned this GPA. In fall 2015 there were 1,530 (65.2%) online students out of 2,345 who earned a GPA of 2.0 or higher in their online courses, and in spring 2016 there were 1,685 (65.9%) out of 2,558 online students earned a 2.0 or higher GPA in their online courses (see Table 33). The number of online only students who earned a 2.0 or higher GPA was slightly lower than the overall online student

population: there were 378 (55.7%) online only students out of 679 in fall 2015, and there were 480 (64.3%) out of 746 in spring 2016 who earned a 2.0 or higher GPA.

Table 33
Online GPA 2.0 and Higher by Semester and Type of Student

	Online Students			Online Only Students		
Semester	*N*	Online GPA 2.0 and Higher	% Online GPA 2.0+	*N*	Online GPA 2.0 and Higher	% Online GPA 2.0+
Fall 2015	2,345	1,530	65.2%	679	378	55.7%
Spring 2016	2,558	1,685	65.9%	746	480	64.3%

Successful online course grades. As displayed in Table 34, out of the 16,078 course sections taken by online students during fall 2015 and spring 2016, 37.9% (n = 6,100) of these course sections taken were online. In fall 2015 online students took 2,867 online course sections which was 37.1% of the total sections taken that semester. In spring 2016 online students took 3,233 online course sections which was 38.7% of total sections taken that semester.

Table 34
Overall Course Sections by Semester and Type of Section

	Course Sections		
Semester	Total Taken	Online	% Online
Fall 2015	7,731	2,867	37.1%
Spring 2016	8,347	3,233	38.7%
Overall	16,078	6,100	37.9%

As found in Table 35, online students took a combined total of 6,100 online course sections during fall 2015 and spring 2016. Overall, students passed more than three-quarters (77.2% or n = 4,710) of these online course sections with a grade of A, B, or C. During fall 2015 there was a total of 2,867 online course sections taken by online students. Of these online course

sections, students passed 2,222 (77.5%) of these sections with a final grade of A, B, or C. During spring 2016 there were 3,233 online course sections taken by students. Of these online sections, students passed 2,488 (77.0%) of these sections with a final grade of A, B, or C.

Table 35
Online Course Sections Passed with A, B, or C Grades by Semester

Semester	Total Online Course Sections	Sections Passed with A, B, C Grades	% Sections Passed
Fall 2015	2,867	2,222	77.5%
Spring 2016	3,233	2,488	77.0%
Total	6,100	4,710	77.2%

There were also some online students with mixed success during the two semesters included in this study. During fall 2015 there were 110 students who successfully passed one or more online course sections in addition to receiving a D or F in one or more online classes. Similarly, there were 121 students in spring 2016 who passed some online courses with a grade of A, B, or C who received a D or F grade in other online classes.

Based on this in depth descriptive analysis of the study population, both similarities and differences were identified for online students overall when compared to the online only students. In summary, students taking online courses during fall 2015 and spring 2016 at this large, Midwestern community college were primarily females with sophomore status who lived within the district and were pursuing transfer programs. The ethnicity of online students was mostly White, followed by Hispanic, and then Black. Students taking all of their classes online tended to be older than the students who were taking a mix of online and on-campus courses during the semester. Online only students were primarily enrolled part-time taking only one or two courses during a semester while students with a mix of course formats were more evenly

split between full- and part-time taking about four courses each semester. Most students taking online courses were not enrolled in any remedial courses, and some online students had previously passed a computer-related course. About a third of online students did not have any course withdrawals while another third had withdrawn from one or two courses over time. About two-thirds of the online students had been previously enrolled for courses within the last two semesters, and over one-third of online students were receiving financial aid during the semester. The mean, median, mode, and maximum value for cumulative credit hours were higher for the overall online group than for the online only group. For both semesters and both online student groups, the cumulative GPA was the highest GPA, and the online GPA was the lowest GPA. Just under two-thirds of online students earned an online GPA of 2.0 or higher, but only about six of ten online only students earned an online GPA of 2.0 or higher. When examining overall online course sections in the study, students passed over three-fourths of these sections with a grade of A, B, or C during fall 21015 and spring 2016. Some patterns were identified when examining demographic and academic factors related to online students success; these patterns will be further explored as part of the inferential statistics generated to answer the six research questions.

Research Issue

The purpose of this study was to identify factors that contributed to the success of online community college students so a model of success could be generated. Online success was identified as online students who earned an online GPA of 2.0 or higher during the semester. Community college online courses provide students access and convenience to complete courses at a low cost while allowing students the flexibility to maintain their other responsibilities. According to Allen and Seaman (2017) at the same time the overall higher education enrollment has been declining for more than a dozen years, the number of students taking courses online has

been increasing. This trend of increasing online enrollment would be positive except that there have been mixed findings on factors that impact online student success, and research shows online students have not been as successful as students who take courses in a traditional, campus-based format (Hachey et al., 2012; Lehman & Conceicao, 2014; Moore & Kearsley, 2012; Xu & Jaggars, 2011a, 2011b). There is an increased need for more evidence about factors that lead to student success in online courses. Once obtained, this data can provide higher education leaders with information to improve online student success. The rest of this chapter is dedicated to describing the data analysis and inferential statistics specifically completed to address each of the six research questions related to online student success.

Research Question One

The first research question centered on what difference in online GPA existed based on online students' distance from campus, whether or not they had a financial aid award, if they had previously passed computer courses, and whether or not they had taken remedial courses during the study. The following were the related hypotheses:

H_0: There is no significant difference in online GPA based on distance from campus, financial aid award, previous computer courses, and remedial courses.

H_1: There is a significant difference in online GPA based on distance from campus, financial aid award, previous computer courses, and remedial courses.

Only data for online students who completed their online coursework during the study were analyzed to address research question one. There were 3,530 (87.2%) online students out of the 4,046 unduplicated fall 2015 and spring 2016 combined online student total who earned an online GPA by persisting until the end of the semester while 516 (12.8%) students did not complete their online course(s) and did not have an online GPA (see Table 36). Out of the 1,186

unduplicated students taking only online courses, 1,064 (89.7%) students earned an online GPA by completing their online coursework during the study while 122 (10.3%) students did not complete their online course(s).

Table 36
Online GPA Summary by Type of Student

	Valid Online GPA		Cases Missing		Total	
Type of Student	*n*	*%*	*n*	*%*	*N*	*%*
Online Students	3,530	87.2%	516	12.8%	4,046	100.0%
Online Only Students	1,064	89.7%	122	10.3%	1,186	100.0%

Eight separate independent samples *t* tests were conducted using SPSS to evaluate the research hypothesis that a significant difference existed in online GPA for online students and online only students based on distance, financial aid, computer experience, and remedial coursework. The effect size for significant findings were interpreted using eta squared (η^2) from a one-way ANOVA based on Cohen's (1988) guidelines: small (0.01), medium (0.06), or large (0.14). Results of each *t* test will follow.

Distance from Campus and Online GPA

In order to determine if there was a significant difference in online GPA for online and online only students based on their distance from campus, independent samples *t* tests were performed. First, distance from campus was calculated using the zip code of the student's home and the zip code of the main college campus. Next, distance was separated into two groups: students who lived 10 or fewer miles from campus, and those who lived more than 10 miles from campus. These groups for distance from campus were chosen because the mean distance from campus for online students was 9.02 miles, and for online only students the mean distance was 11.22 miles.

When the independent samples *t* test was performed for the overall online student group, the Levene's Test was not significant so equal variances between these groups could be assumed. Results from the *t* test for online students overall showed no significant difference in success based on student distance from campus t (3,526) = .30, p = .77 so the null hypothesis was accepted (see Table 37). Online students who lived 10 or fewer miles from campus had a higher online GPA (M = 2.55, SD = 1.49) than students who lived over 10 miles away (M = 2.53, SD = 1.49), but the difference was not significant.

Table 37
Online GPA Means by Distance and Type of Student

	Distance from Campus			
	0 – 10 miles	10.01 miles and further	*t*	*df*
Online Students	2.55	2.53	0.30	3,526
	(1.49)	(1.49)		
Online Only Students	2.56	2.61	-0.57	835.15
	(1.51)	(1.41)		

Note. Standard Deviations appear in parenthesis below means.

When the independent samples *t* test was performed for the online only student group, the Levene's Test was significant so equal variances between these groups could not be assumed. The *t* test results for online only students showed no significant difference in success based on student distance from campus t (835.15) = -.57, p = .57 so the null hypothesis was accepted (see Table 37). Online only students who lived more than 10 miles from campus had a higher online GPA (M = 2.61, SD = 1.41) than students who lived 10 miles or less (M = 2.56, SD = 1.51), but the difference was not significant.

Financial Aid Award and Online GPA

In order to identify if there was a significant difference in online GPA for online and online only students based on their financial aid award, independent samples *t* tests were generated. Prior to the analysis, the financial aid variable was broken down into the following two groups for both online students groups: students who received a financial aid award during the study, and those who did not. When the independent samples *t* test was performed for the overall online group, the Levene's Test was not significant so equal variances between these groups could be assumed. Results of the *t* test for online students showed no significant difference in success based on student financial aid award t (3,528) = 1.11, p = .27 (see Table 38). Online students who received no financial aid had a higher online GPA (M = 2.56, SD = 1.49) than those who received some financial aid (M = 2.50, SD = 1.47), but the difference was not significant. The null hypothesis was accepted for online students because those who received financial aid and those who did not were different in their online course success.

Table 38
Online GPA Means by Financial Aid Award and Type of Student

	Financial Aid Award			
	No	Yes	*t*	*df*
Online Students	2.56	2.50	1.11	3,528
	(1.49)	(1.47)		
Online Only Students	2.66	2.27	3.51*	1,062
	(1.46)	(1.50)		

Note. * $p < .001$. Standard Deviations appear in parenthesis below means.

When an independent samples *t* test was performed for online only students the Levene's Test was not significant so equal variances between these groups was assumed. There was a significant difference in success based on receiving a financial aid award for online only students

t (1,062) = 3.51, *p* < .001. Online only students who received no financial aid had a significantly higher online GPA (*M* = 2.66, *SD* = 1.46) than those who received some financial aid (*M* = 2.27, *SD* = 1.50). Based on these results, online only students who received financial aid and those who did not were different in their online course success so the null hypothesis was rejected. Although the differences in online GPA were significant, practically speaking financial aid award only had a small effect as defined by Cohen (1988), and it explained about 1% of the variance in online GPA as assessed by eta squared (η^2) using a one-way ANOVA.

Computer Experience and Online GPA

Before assessing if computer experience led to a significant difference in online GPA for online and online only students, computer experience was divided into two categories: students who previously completed at least one computer course with a grade of A, B, C, or D, and those who did not take or pass any computer course. When the independent samples *t* test was performed for the overall online student group, the Levene's Test was significant so equal variances between these groups could not be assumed. Results of the *t* test identified a statistically significant group difference based on computer experience, *t* (1,775.50) = -6.18, *p* < .001 (see Table 39).

Table 39
Online GPA Means by Computer Experience and Type of Student

	Passed Computer Courses			
	No	Yes	*t*	*df*
Online Students	2.46	2.79	-6.18*	1,775.50
	(1.53)	(1.31)		
Online Only Students	2.51	2.81	-3.03**	440.23
	(1.51)	(1.30)		

Note. * *p* < .001. ** *p* =.003. Standard Deviations appear in parenthesis below means.

Students who had previously completed computer courses successfully had a significantly higher online GPA (M = 2.79, SD = 1.31) than those who had not (M = 2.46, SD = 1.53) so the null hypothesis was rejected.

When the independent samples t test was performed for the online only student group, the Levene's Test was significant so equal variances between these groups could not be assumed. A significant group difference based on computer experience was also obtained during the t test performed for online only students, t (440.23) = -3.03, $p < .001$. Online only students who had previously completed computer courses had a significantly higher mean online GPA (M = 2.81, SD = 1.30) than those who had not (M = 2.51, SD = 1.51) so the null hypothesis was again rejected (see Table 39). Although the differences in online GPA were significant, practically speaking less than 1% of the variance in online GPA for both groups of online students could be explained by successful computer experience as assessed by η^2 using a one-way ANOVA.

Remedial Coursework and Online GPA

In order to identify if a significant difference in online GPA existed for online and online only students based on whether or not students were taking remedial courses, independent samples t tests were generated. First, remedial coursework was categorized into two groups: students who did not take any remedial course during the study, and those who took at least one remedial course while enrolled in online courses during the study. When the t test was performed for online students, the Levene's Test was significant so equal variances between these groups could not be assumed. Results of the t test identified a statistically significant group difference based on remedial coursework, t (635.05) = 18.12, $p < .001$ (see Table 40). Online students who were also enrolled in remedial courses had a significantly lower mean online GPA (M = 1.41, SD = 1.50) than those who had no remedial courses (M = 2.72, SD = 1.40) so the null hypothesis

was rejected. Over 9% of the variance in online GPA for online students was explained by remedial coursework as assessed by η^2 using a one-way ANOVA; this is a medium effect size as defined by Cohen (1988).

When the *t* test was performed for online only students, the Levene's Test was also significant so equal variances between these groups could not be assumed. The *t* test performed for online only students produced similar results, t (127.12) = 14.26, $p < .001$. Online only students who were not taking remedial courses had a significantly higher mean online GPA (M = 2.75, SD = 1.40) than those who were enrolled in remedial courses (M = 0.95, SD = 1.17) so the null hypothesis was rejected again (see Table 40). These differences for online only students were more significant since between 12 and 13% of the variance in online GPA was explained by remedial coursework as assessed by η^2 using a one-way ANOVA, and this is a medium to large effect size as defined by Cohen (1988).

Table 40
Online GPA Means by Remedial Coursework and Type of Student

	Taking Remedial Courses			
	No	Yes	*t*	*df*
Online Students	2.72	1.41	18.12*	635.05
	(1.40)	(1.50)		
Online Only Students	2.75	0.95	14.26*	127.12
	(1.40)	(1.17)		

Note. * $p < .001$. Standard Deviations appear in parenthesis below means.

In order to answer research question one, eight independent samples *t* tests were performed to determine if a significant difference in online GPA existed for online students and online only students based on four independent variables: distance from campus, financial aid award, computer course experience, and remedial coursework. First, no significant difference

was found based on distance from campus. Second, although no significant findings were generated for online students based on financial aid award, a significant difference was identified for online only students based on financial aid; online only students who received no financial aid had a significantly higher online GPA, but the variance in online GPA explained by financial aid was small. Finally, there was a significant difference identified for both online student groups based on computer experience as well as remedial coursework. A significantly higher mean online GPA was identified for online and online only students who had previously taken computer-related courses although the effect size was small. Online and online only students who were not taking remedial coursework also had a significantly higher mean online GPA and this was a medium effect size.

Research Question Two

The second research question for this study concentrated on how the demographic characteristics of age, ethnicity, and gender for online students correlated to online GPA. The following were the related hypotheses:

H_0: Age, ethnicity, and gender have no correlation to online GPA.

H_1: Age, ethnicity, and gender have a correlation to online GPA.

As found in research question one, fall 2015 and spring 2016 data were combined and unduplicated for the analysis. In order to determine which independent demographic variables (age, ethnicity, and gender) were significantly related to the dependent variable (online GPA), SPSS was used to compute the Pearson correlation coefficients. Two-way contingency table analyses were also created for both online students and online only students to evaluate whether statistical relationships existed between a successful online GPA and the demographic variables.

The Cramér's *V* values for effect size were interpreted based on Cohen's (1988) guidelines as small (0.1), medium (0.3), or large (0.5).

Relationships between Study Variables

Correlation coefficients were generated to measure the strength of relationships between online GPA and age, ethnicity, and gender to answer research question two. As seen in Table 41, all three of the correlation coefficients associated with online GPA were statistically significant at either the 0.01 or the 0.05 level so the null hypothesis was rejected. Age (r = .126, p < .01) and gender (r = .081, p < .01) were positively correlated with online GPA while ethnicity (r = -.040, p < .05) was negatively correlated with online GPA; these were all small correlations.

Table 41
Correlation Coefficients between Online GPA and Online Student Demographics

Variable	Age	Ethnicity	Gender
Age	1.000	-	-
Ethnicity	.031*	1.000	-
Gender	.060**	-.005	1.000
Online GPA	.126**	-.040*	.081**

** p < .01. * p < .05.

For online only students, two of three correlation coefficients generated between online GPA and demographic independent variables were significant: age and ethnicity. Table 42 displays all of the correlation coefficients generated. There was a significant, but small positive correlation between age and online GPA (r = .183, p < .01) while ethnicity had a small negative correlation with online GPA (r = -.073, p < .05).

Two-way contingency table analyses were also conducted for online and online only students to evaluate whether age, ethnicity, or gender were significantly related to a successful online GPA. Online GPA was separated into two groups to distinguish a successful online GPA

of 2.0 or higher from an unsuccessful online GPA under 2.0 for analysis. Students who did not complete their online courses were excluded since they did not earn an online GPA during the study. The relationship between online GPA and the three independent demographic variables will be further discussed.

Table 42
Correlation Coefficients between Online GPA and Online Only Student Demographics

Variable	Age	Ethnicity	Gender
Age	1.000	-	-
Ethnicity	.000	1.000	-
Gender	.091**	.017	1.000
Online GPA	.183**	-.073*	-.034

** $p < .01$. * $p < .05$.

Age and Online GPA

Table 43 shows results for the two-way contingency table analysis for age and online GPA. For this analysis, age was separated into two groups: traditional and nontraditional students. When comparing the online GPA of traditional and nontraditional online students there was a significant relationship with a very small effect, Pearson χ^2 (1, N = 3,530) = 13.60, $p <$ .001, Cramér's V = .062.

As displayed in Table 43, there were more traditional online students (65.2% or n = 1,710) who earned a successful online GPA than nontraditional online students (34.8% or n = 914). When comparing online GPA of traditional and nontraditional online only students using a two-way contingency table analysis there was also a significant relationship with a small effect, Pearson χ^2 (1, N = 1,064) = 9.11, p = .003, Cramér's V = .093. As shown in Table 43, there were more nontraditional online only students (54.1% or n = 366) with a successful online GPA than

traditional students (45.9% or *n* = 311). Successful online only students were generally older than the successful online students overall.

Table 43
Online GPA and Age Cross-tabulation by Type of Student

	Student Age		
Online Student GPA	Traditional	Nontraditional	Total
Under 2.0	651	255	906
	(71.9%)	(28.1%)	(100%)
2.0 and Higher	1,710	914	2,624
	(65.2%)	(34.8%)	(100%)
Online Total	2,361	1,169	3,530
	(66.9%)	(33.1%)	(100%)
	Student Age		
Online Only Student GPA	Traditional	Nontraditional	Total
Under 2.0	215	172	387
	(55.6%)	(44.4%)	(100%)
2.0 and Higher	311	366	677
	(45.9%)	(54.1%)	(100%)
Online Only Total	526	538	1,064
	(49.4%)	(50.6%)	(100%)

Gender and Online GPA

A two-way contingency table analysis was performed between gender and online GPA, and Table 44 shows a summary of these results. Gender and online GPA were significantly related with a very small effect for online students, Pearson χ^2 (1, N = 3,530) = 12.34, $p < .001$, Cramér's V= .059. There were more (62.9% or N = 2,221) female online students overall than males as well as more (64.6% or n = 1,695) successful female online students with an online GPA of 2.0 or higher than males (35.4% or n = 929). When examining online only students there were more (66.4% or N = 707) females than males overall as well as more (65.1% or n = 441) successful female online only students than males (34.9% or n = 236) with an online GPA of 2.0

or higher (see Table 44). The relationship between a successful online GPA and gender was not significant for online only students, Pearson χ^2 (1, N = 1,064) = 1.43, p = .232, Cramér's V = .037.

Table 44
Online GPA and Gender Cross-tabulation by Type of Student

	Gender		
Online Student GPA	Female	Male	Total
Under 2.0	526	380	906
	(58.1%)	(41.9%)	(100%)
2.0 and Higher	1,695	929	2,624
	(64.6%)	(35.4%)	(100%)
Online Total	2,221	1,309	3,530
	(62.9%)	(37.1%)	(100%)
	Gender		
Online Only Student GPA	Female	Male	Total
Under 2.0	266	121	387
	(68.7%)	(31.3%)	(100%)
2.0 and Higher	441	236	677
	(65.1%)	(34.9%)	(100%)
Online Only Total	707	357	1,064
	(66.4%)	(33.6%)	(100%)

Ethnicity and Online GPA

When online GPA and online student ethnicity were examined using a two-way contingency table analysis results indicated a significant relationship with a small effect, Pearson χ^2 (8, N = 3,530) = 54.21, p < .001, Cramér's V = .124. Online students of some ethnicities were more successful than others. As shown in Table 45, nearly two-thirds (63.3% or n = 1,661) of all online students with a successful online GPA of 2.0 or higher were White, and over 15% (15.5% or n = 408) of the students were Hispanic followed by Black (6.5% or n = 171), Asian (2.7% or n = 71), more than one race (2.0% or n = 52), International (1.8% or n = 47), and American Indian

(0.2% or *n* = 6). There were no Hawaiian online students with an online GPA of 2.0 or higher, and nearly 8% of student ethnicities were unknown or missing (7.9% or *n* = 208).

Ethnicity for online only students and online GPA were also found to be significantly related with a small effect, Pearson χ^2 (8, *N* = 1,064) = 22.04, *p* = .005, Cramér's *V* = .144. Online only students of some ethnicities were more successful than others. As found in Table 45, nearly two-thirds (64.7% or *n* = 438) of all online only students with a successful online GPA were White and 14% (*n* = 95) of the online only students were Hispanic followed by Black (7.7% or *n* = 52), Asian (2.5% or *n* = 17), more than one race (1.8% or *n* = 12), International (0.1% or *n* = 1), and American Indian (0.3% or *n* = 2). There were no online only students with an online GPA of 2.0 or higher that were Hawaiian, and about 9% (8.9% or *n* = 60) of student ethnicities were unknown or missing.

Table 45
Online GPA 2.0 and Higher by Ethnicity and by Type of Student

	Online GPA 2.0 and Higher			
	Online Students		Online Only Students	
Ethnicity	*n*	%	*n*	%
White	1,661	63.3%	438	64.7%
Hispanic	408	15.5%	95	14.0%
Black	171	6.5%	52	7.7%
American Indian	6	0.2%	2	0.3%
Hawaiian	0	0.0%	0	0.0%
Asian	71	2.7%	17	2.5%
More than one race	52	2.0%	12	1.8%
International	47	1.8%	1	0.1%
Unknown	208	7.9%	60	8.9%
Total	2,624	100.0%	677	100.0%

Table 46 shows some of the online student ethnicities and the percent of students within each ethnicity that earned a successful online GPA as well as those who did not. When examining online success within each specific ethnicity, American Indian online students had the highest success rate with 85.7% (n = 6) earning an online GPA of 2.0 or higher followed by Asian (81.6% or n = 71), and then White online students (77.6% or n = 1,661). Black online students had only 60.6% (n = 171) earning an online GPA of 2.0 or higher which was the lowest percentage of success for all online ethnic groups.

Table 46
Online GPA and Ethnicity Cross-tabulation by Type of Student

	Ethnicity					
Online Student GPA	American Indian	Asian	White	Hispanic	International	Black
Under 2.0	1	16	480	180	20	111
	(14.3%)	(18.4%)	(22.4%)	(30.6%)	(29.9%)	(39.4%)
2.0 and Higher	6	71	1,661	408	47	171
	(85.7%)	(81.6%)	(77.6%)	(69.4%)	(70.1%)	(60.6%)
Online Total	7	87	2,141	588	67	282
	(100%)	(100%)	(100%)	(100%)	(100%)	(100%)
	Ethnicity					
Online Only Student GPA	American Indian	Asian	White	Hispanic	International	Black
Under 2.0	0	6	217	56	2	59
	(0.0%)	(26.1%)	(33.1%)	(37.1%)	(66.7%)	(53.2%)
2.0 and Higher	2	17	438	95	1	52
	(100%)	(73.9%)	(66.9%)	(62.9%)	(33.3%)	(46.8%)
Online Only Total	2	23	655	151	3	111
	(100%)	(100%)	(100%)	(100%)	(100%)	(100%)

When examining online success within each specific ethnicity for online only students, American Indian students had the highest success rate with 2 out of 2 (100%) students earning an

online GPA of 2.0 or higher followed by Asian (73.9% or *n* = 17) and then White online students (66.9% or *n* = 438). Only 52 out of 111 (46.8%) Black online students earned an online GPA of 2.0 or higher which was the lowest of all groups except International online students which was 33.3% or 1 out of 3 students (see Table 46).

Demographic variables had a small, but significant effect on online GPA. All three demographic student variables (age, gender, and ethnicity) examined in conjunction with online GPA as part of research question two significantly correlated to online GPA for online students overall while only age and ethnicity were significantly correlated to online GPA for online only students; the same significant results were achieved for each online group using two-way contingency table analyses. Overall, for online students with a higher online GPA, there was a higher percentage of younger, female, and White students; for online only students there was also a higher percentage of female and White students, but these students were typically older.

Research Question Three

The third research question for this study focused on which academic factors of online students (cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses) correlated to online GPA. The following were the related hypotheses:

H_0: Cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses do not correlate to online GPA.

H_1: Cumulative GPA, enrollment status, semesters since last course, course withdrawals, cumulative credit hours, and total online courses have a correlation to online GPA.

Similar to research question two, Pearson correlation coefficients were computed using SPSS to determine the relationship between online GPA and the various independent academic variables:

cumulative GPA, enrollment status, time since last course, previous withdrawals, cumulative credit hours, and online courses. Two-way contingency table analyses were also created for both online student groups to evaluate whether statistical relationships existed between a successful online GPA and these independent academic variables. The Cramér's *V* values for effect size were interpreted based on Cohen's (1988) definitions as small (0.1), medium (0.3), or large (0.5).

Data for online and online only students who completed their online coursework during fall 2015 were analyzed to address research question three. As previously shown in Table 31, there were 2,042 (87.1%) online students out of the 2,345 total fall 2015 online students who earned an online GPA by persisting until the end of their online courses while 303 (12.9%) students did not complete their online courses, and they did not have an online GPA. Out of the 679 online only students for fall 2015 there were 74 (10.9%) students who did not complete their online courses while 605 (89.1%) students completed their online courses to earn an online GPA. Only data from online students who had a valid online GPA were analyzed.

Relationships between Study Variables

Correlation coefficients were produced to measure the relationship strength between online GPA and (a) cumulative GPA, (b) enrollment status, (c) semester gap since last course, (d) total course withdrawals, (e) cumulative credit hours, and (f) total online courses. As seen in Table 47, four of the six correlation coefficients associated with online GPA were statistically significant at the 0.01 level for online students: cumulative GPA, total online courses, total withdrawals, and cumulative credit hours. For these variables the null hypothesis was rejected.

The null hypothesis was accepted for enrollment status and semester gap since last course because results were not significant. There were 15 significant correlation coefficients out of the 22 total generated between study variables: six were negatively correlated while nine were

positively correlated. Most of the significant correlations generated were small, but several of these correlations were more medium or large. The correlation between cumulative GPA and online GPA was the largest (r =.704) followed by cumulative GPA and cumulative credit (r =.395), online GPA and cumulative credit (r =.292), and online courses and cumulative credit (r =.286); all of these correlations were significant at the 0.01 level.

Table 47
Correlation Coefficients between Online GPA and Academic Variables for Online Students

Variable	Cumulative GPA	Online Courses	Enrollment Status	Semester Gap	Total Withdrawals	Cumulative Credit
Cumulative GPA	1.00	-	-	-	-	-
Online Courses	.107**	1.00	-	-	-	-
Enrollment Status	-.018	-.043*	1.00	-	-	-
Semester Gap	-.021	-.079**	-.142**	1.00	-	-
Total Withdrawals	-.162**	.060**	-.038	.027	1.00	-
Cumulative Credit	.395**	.286**	.139**	-.067**	.071**	1.00
Online GPA	.704**	.072**	-.035	.040	-.111**	.292**

** $p < 0.01$. * $p < 0.05$.

Correlation coefficients were also generated for online only students to measure the strength of relationships between online GPA along with (a) cumulative GPA, (b) enrollment status, (c) semester gap since last course, (d) total course withdrawals, (e) cumulative credit hours, and (f) total online courses. As seen in Table 48, only three of the correlation coefficients associated with online GPA for online only students were statistically significant: cumulative GPA, enrollment status, and cumulative credit hours.

Out of 22 total correlation coefficients generated between study variables, nine were significant: seven were positively correlated while two were negatively correlated. Most of the significant correlations generated were small, but several of these correlations had a medium or large effect. The correlation between cumulative GPA and online GPA was the largest (r =.693)

followed by online courses and cumulative credit (r =.356), cumulative GPA and cumulative credit (r =.261), and enrollment status and online courses (r = .239); all of these correlations were significant at the 0.01 level.

Table 48
Correlation Coefficients between Online GPA and Academic Variables for Online Only Students

Variable	Cumulative GPA	Online Courses	Enrollment Status	Semester Gap	Total Withdrawals	Cumulative Credit
Cumulative GPA	1.00	-	-	-	-	-
Online Courses	.091*	1.00	-	-	-	-
Enrollment Status	-.025	.239**	1.00	-	-	-
Semester Gap	-.054	-.148**	-.063	1.00	-	-
Total Withdrawals	-.053	.085	-.081	.041	1.00	-
Cumulative Credit	.261**	.356**	.065	-.046	.137**	1.00
Online GPA	.693**	.024	-.101*	.039	.019	.166**

** $p < 0.01$. * $p < 0.05$.

In addition to the correlations generated between the dependent and independent variables, two-way contingency table analyses were also conducted as an additional measure to evaluate whether or not academic characteristics were significantly related to a successful online GPA for each online student group. Online GPA from fall 2015 was separated into two groups to distinguish a successful online GPA of 2.0 or higher from an unsuccessful online GPA under 2.0. The online and online only students who did not complete their online courses were excluded from this analysis since they did not earn an online GPA during the study. The relationship between online GPA and for the independent academic variables as measured by the two-way contingency table analyses for the overall online student group and the online only student group will be further discussed.

Cumulative GPA and Online GPA

For the overall online student population, the largest correlation between any two academic study variables was found between cumulative GPA and online GPA. There was a large, positive, and significant correlation between cumulative GPA and online GPA for both online students (r = .704, p = .01) as previously shown in Table 47, and online only students (r = .693, p = .01) as seen in Table 48; as cumulative GPA increased online GPA also significantly increased and online students had higher online success.

Table 49
Online GPA and Cumulative GPA Cross-tabulation by Type of Student

	Cumulative GPA			
Online Student GPA	Less than 2.0	2.0 through 2.99	3.0 and higher	Total
Under 2.0	212	250	50	512
	(41.4%)	(48.8%)	(9.8%)	(100.0%)
2.0 and Higher	31	551	948	1,530
	(2.0%)	(36.0%)	(62.0%)	(100.0%)
Online Total	243	801	998	2,042
	(11.9%)	(39.2%)	(48.9%)	(100.0%)
	Cumulative GPA			
Online Only Student GPA	Less than 2.0	2.0 through 2.99	3.0 and higher	Total
Under 2.0	81	114	32	227
	(35.7%)	(50.2%)	(14.1%)	(100.0%)
2.0 and Higher	5	110	263	378
	(1.3%)	(29.1%)	(69.6%)	(100.0%)
Online Only Total	86	224	295	605
	(14.2%)	(37.0%)	(48.8%)	(100.0%)

There were more than 1,000 values for cumulative GPA, so in order to conduct a two-way contingency table analysis these GPA values were divided into three groups: less than 2.0, between 2.0 and 2.99, and 3.0 and higher. When examining the cumulative GPA of successful

online students with an online GPA of 2.0 and higher using a two-way contingency table analysis, 62% (n = 948) of successful online students had a cumulative GPA of 3.0 or higher and 69.6% (n = 263) of successful online only students had a cumulative GPA of 3.0 or higher (see Table 49). Cumulative GPA and online GPA were significantly related with a large effect for online students, Pearson χ^2 (2, N = 2,042) = 729.83, p < .001, Cramér's V = .598 as well as for online only students Pearson χ^2 (8, N = 605) = 224.41, p < .001, Cramér's V = .609.

Enrollment Status and Online GPA

For online students there was a small, negative correlation (r = -.035) between enrollment status and online GPA so as the total number of hours in which online students were enrolled for during the semester increased their online GPA decreased, but this correlation was not significant (see Table 47). When examining the enrollment status of online students along with online GPA of 2.0 and higher using two-way contingency table analysis, 49.5% (n = 757) were taking classes part-time and 50.5% (n = 773) were taking classes full-time (see Table 50). Enrollment status and online GPA were not significantly related, Pearson χ^2 (2, N = 2,042) = 1.26, p = .261, Cramér's V = .025.

When looking at the correlation between the enrollment status of online only students and their online GPA the result was small, negative, and significant (r = -.101, p < .05); as the number of hours online only students were enrolled for during the semester increased their online GPA decreased (see Table 48). Unlike the overall online population, online only students with an online GPA of 2.0 or higher were primarily (90.5% or n = 342) taking courses part-time with only 9.5% (n = 36) enrolled full-time (see Table 50). Despite the high percentage of part-time online only students, the two-way contingency table analysis indicated enrollment status and

online GPA were not significantly related, Pearson χ^2 (1, N = 605) = 1.56, p = .211, Cramér's V = .051.

Table 50
Online GPA and Enrollment Status Cross-tabulation by Type of Student

	Enrollment Status		
Online Student GPA	Part-time	Full-time	Total
Under 2.0	268	244	512
	(52.3%)	(47.7%)	(100.0%)
2.0 and Higher	757	773	1,530
	(49.5%)	(50.5%)	(100.0%)
Online Total	1,025	1,017	2,042
	(50.2%)	(49.8%)	(100.0%)
	Enrollment Status		
Online Only Student GPA	Part-time	Full-time	Total
Under 2.0	198	29	227
	(87.2%)	(12.8%)	(100.0%)
2.0 and Higher	342	36	378
	(90.5%)	(9.5%)	(100.0%)
Online Only Total	540	65	605
	(89.3%)	(10.7%)	(100.0%)

Semester Gap and Online GPA

As shown earlier on Table 47, there was a small, positive correlation (r = .040) between semester enrollment gap for online students and their online GPA, but this correlation was not significant. The number of semesters between enrollments for online students ranged from 0 to 101 semesters. Students with a semester gap of zero were new, and of the students who earned an online GPA of 2.0 or higher 9.5% (n = 146) were new. When a two-way contingency table analysis was performed, semester gap and online GPA were found to be significantly related with a small effect, Pearson χ^2 (43, N = 2,042) = 68.56, p = .008, Cramér's V = .183. Nearly half

(46.1% or *n* =705) of the online students with an online GPA of 2.0 or higher had a one semester gap which means they were enrolled in the previous semester. Close to one-third (29.7% or *n* = 455) of the online students with an online GPA of 2.0 or higher had a two semester gap meaning they took the summer semester off before their fall 2015 enrollment.

As seen previously on Table 48, there was a small, positive correlation (r = .039) between semester enrollment gap and online GPA for online only students, but this correlation was not significant. When reviewing the two-way contingency table analysis for online only students with an online GPA of 2.0 and higher along with number of semesters between enrollments, results were not significant, Pearson χ^2 (34, N = 605) = 24.37, p = .888, Cramér's V = .201. Despite the lack of significant findings, more than one-third (36.5% or *n* = 138) of the successful online only students had been enrolled during the previous semester, and about one-fourth (25.7% or *n* = 97) had taken the previous semester off.

Course Withdrawals and Online GPA

As displayed before in Table 47, there was a significant, small, negative correlation (r = -.111, p < .01) between total course withdrawals for online students and their online GPA; as the number of course withdrawals for online students increased their online GPA significantly decreased indicating lower online success. Out of the 2,345 fall 2015 online students, 1,278 (62.6%) students had a least one course withdrawal while 764 (37.4%) students had none. The number of total course withdrawals for online students who earned an online GPA of 2.0 or higher in fall 2015 ranged from 0 to 24 withdrawals. More than 40% (40.1% or *n* = 613) of the online students with an online GPA of 2.0 or higher had no course withdrawals. There were 22.4% (*n* = 343) of these students with an online GPA of 2.0 or higher who had one course withdrawal, 12.4% (*n* = 343) had two withdrawals, and 12.4% (*n* = 189) had three withdrawals.

When a two-way contingency table analysis was performed, total course withdrawals and online GPA were also found to be significantly related with a small effect, Pearson χ^2 (21, N = 2,042) = 50.72, p < .001, Cramér's V = .158.

As shown earlier in Table 48, there was a small, positive correlation (r = .019) between total course withdrawals and online GPA for online only students; as the number of course withdrawals for online only students increased their online GPA increased, but this increase was not significant. For online only students, there was also no significant relationship identified between total course withdrawals and online GPA of 2.0 and higher using a two-way contingency table analysis, Pearson χ^2 (16, N = 368) = 13.30, p = .630, Cramér's V = .190.

Cumulative Credit Hours and Online GPA

For the online students in fall 2015 who had earned an online GPA of 2.0 or higher, the cumulative credit hours they had earned ranged from 0 to 207 credit hours. After completing a two-way contingency table analysis, cumulative credit hours and online GPA were found to be significantly related with a medium effect, Pearson χ^2 (167, N = 2,042) = 324.22, p < .001, Cramér's V = .398. As found previously in Table 47, there was a significant, medium, positive correlation (r = .292, p < .01) between cumulative credit hours and online GPA; as the number of credit hours online students earned increased, their online GPA also significantly increased demonstrating higher online success.

For online only students who had earned an online GPA of 2.0 or higher, no significant relationship was found between cumulative credit hours earned and online GPA during the two-way contingency table analysis, Pearson χ^2 (122, N = 605) = 141.10, p = .114, Cramér's V = .483. As seen before in Table 48, there was a significant, small, positive correlation (r = .166, p < .01) between cumulative credit hours of online only students and online GPA; as the number of credit

hours an online only student earned increased, their online GPA also significantly increased signifying higher online success.

Online Courses and Online GPA

The total number of online courses that students in fall 2015 had taken ranged from 1 to 42 courses. A two-way contingency table analysis was completed for online students based on total online courses and online GPA, and a significant relationship with a small effect was identified, Pearson χ^2 (25, N = 2,042) = 39.95, p = .030, Cramér's V = .140. As seen earlier in Table 47, there was a significant, small, positive correlation (r = .072, p < .01) between total online courses and online GPA; as the number of online courses students had taken increased their online GPA also increased indicating higher online success.

For online only students the relationship between total online courses and online GPA of 2.0 or higher was not found to be significant during the two-way contingency table analysis, Pearson χ^2 (23, N = 605) = 17.69, p = .774, Cramér's V = .171. As displayed previously in Table 48, there was a small, positive correlation (r = .024) between total online courses and online GPA for online only students; as the number of online courses online only students took increased their online GPA also increased, but not significantly.

Of the six independent academic variables that were examined as part of research question three, four of these were significantly correlated to online GPA for online students overall: (a) cumulative GPA, (b) course withdrawals, (c) cumulative credit, and (d) online courses. When examining the relationship between the academic variables and online GPA using two-way contingency table analysis, these four variables were also significantly related to online GPA for the overall online student population, and semesters since last course also had a significant relationship with online GPA. Enrollment status was not significantly related to

online GPA for the online students overall. When reviewing results for which academic characteristics correlated to success for online only students fewer variables were significant. Only three of the six variables were significantly correlated to online GPA: (a) cumulative GPA, (b) enrollment status, and (c) cumulative credit hours earned. When examining the relationship between the academic variables and online GPA by performing two-way contingency table analysis only cumulative credit was significant for online only students.

Research Question Four

The fourth research question for this study focused on which demographic characteristics of online and online only students most significantly predicted a successful online GPA. The following were the related hypotheses:

H_0: Age, ethnicity, and gender do not predict student success in online courses.

H_1: Age, ethnicity, and gender predict student success in online courses.

In order to answer research question four, binary logistic regression was conducted for online students and online only students to determine which independent demographic student variables were predictors of a successful online GPA. The dependent variable was categorical: online GPA was categorized as either under 2.0 (unsuccessful) and coded as "0," or 2.0 and higher (successful) and coded as "1." Fall 2015 and spring 2016 data were combined and unduplicated for this analysis. The three independent variables used in this model were student demographics: age, gender, and ethnicity. All three demographic variables were entered at the same time using the enter method.

Online Student Regression Model

In the logistic regression model for online students, the Hosmer and Lemeshow Test was not significant (p = .738) which implied the prediction model fit significantly better to the data

than the null model without predictors for online students. Also, the Omnibus Tests of model coefficients was significant ($p < .001$) also indicating the model was a good fit. Logistic regression results indicated the overall prediction model including all demographic variables correctly classified 74.2% of the cases for online students using the default cut off value of .500 to classify each outcome which was essentially no change from the base model (74.3%). The regression coefficients are shown in Table 51.

Table 51
Regression Coefficients for Demographic Characteristics of Online Students

	B	*Wald*	*df*	*p*	*Exp(B)*
Age	.027	26.596	1	.000	1.027
Gender	-.317	15.608	1	.000	.728
Ethnicity		61.314	8	.000	
White	.314	4.860	1	.027	1.369
Hispanic	-.090	.313	1	.576	.914
Black	-.644	12.512	1	.000	.525
American Indian	.898	.678	1	.410	2.456
Hawaiian	-22.192	.000	1	1.000	.000
Asian	.634	4.236	1	.040	1.885
2 or more races	.182	.341	1	.559	1.199
International	-.028	.008	1	.927	.973
Constant	.394	4.315	1	.038	1.484

In this regression model, age, gender, and ethnicity were significant predictors of a successful GPA so the null hypothesis was rejected. Based on the Cox & Snell R^2 and Nagelkerke R^2, only 2 to 4% of online success or having an online GPA of 2.0 or higher was explained by the demographic variables in the model. Based on the odds ratio values higher than one for the significant variables, older online students were 2 to 3% more likely to have an online GPA of 2.0 or higher than younger students (*Exp(B)* = 1.027, $p = .027$). White online students were nearly 37% more likely to have an online GPA of 2.0 than other races (*Exp(B)* = 1.369, $p <$

.001) as were Asian online students who were nearly 89% more likely to have an online GPA of 2.0 or higher (*Exp(B)* = 1.885, $p = .040$). Black online students were about 47.5% less likely to earn a successful online GPA based on the odds ratio value less than one (*Exp(B)* = .525, $p < .001$). Male online students were about 27.2% less likely than females to earn an online GPA of 2.0 or higher based on the odds ratio value less than one (*Exp(B)* = .728, $p < .001$).

Online Only Student Regression Model

Results of another logistic regression model built for online GPA and demographic characteristics of online only students was similar to the model for the overall online student population. The Hosmer and Lemeshow Test was not significant ($p = .632$) which implied the prediction model fit significantly better to the data than the null model without predictors for online students, and the Omnibus Tests of model coefficients was significant ($p < .001$) also indicating the model was a good fit. Logistic regression results indicated the overall prediction model including all three demographic variables correctly classified 64.9% of the cases for online only students using the default cut off value of .500 to classify each outcome which was slightly higher than the base model (63.6%). The regression coefficients are shown in Table 52. Using the output from the logistic regression model, the null hypothesis was rejected for age and ethnicity, but it was accepted for gender.

Based on the Cox & Snell R^2 and Nagelkerke R^2, only 4 to 6% of online success for online only students was explained by these three demographic variables. The most significant variable in this model was age, and based on the odds ratio being higher than one; as age increased online only students were 3 to 4% more likely to have an online GPA of 2.0 or higher (*Exp(B)* = 1.038, $p < .001$). Ethnicity was significant overall ($p < .001$), and Black students were over 47% less likely to earn an online GPA of 2.0 or higher (*Exp(B)* = .528, $p = .026$).

Table 52

Regression Coefficients for Demographic Characteristics of Online Only Students

	B	*Wald*	*df*	*p*	*Exp(B)*
Age	.037	24.631	1	.000	1.038
Gender	.155	1.221	1	.269	1.168
Ethnicity		21.275	8	.006	
White	.284	1.596	1	.206	1.328
Hispanic	.175	.423	1	.515	1.192
Black	-.639	4.945	1	.026	.528
American Indian	20.879	.000	1	.999	1167993762.0
Hawaiian	-21.357	.000	1	1.000	.000
Asian	.687	1.730	1	.188	1.987
2 or more races	.153	.085	1	.771	1.165
International	-1.119	.804	1	.370	.327
Constant	-.671	4.979	1	.026	.511

For research question four, logistic regression models were built between online GPA and three demographic student characteristics including age, ethnicity, and gender to ascertain which were significant predictors of online student success. The prediction models created for both online and online only students were a good fit, and they correctly classified about the same number or slightly more cases than the base models. Based on the prediction model created for online students, age and gender as well as ethnicity significantly predicted whether an online student would be more likely to earn an online GPA of 2.0 or higher. The prediction model for online only students showed only age and ethnicity were the significant predictors of whether students would be successful in online courses. For both models, older students and students of White and Asian ethnicities were more likely to have an online GPA of 2.0 or higher while Black online and online only students were much less likely to experience online student success. Although there were significant findings gathered from these prediction models, the data showed only a small portion of online student success could be explained by the demographic variables.

Research Question Five

Research question five focused on which academic factors of online and online only students were most significant in predicting a successful online GPA. These were the related hypotheses:

H_0: Cumulative GPA, enrollment status, semesters since last course, course withdrawals, cumulative credit hours, and total online courses completed do not predict a successful online GPA.

H_1: Cumulative GPA, enrollment status, time since last course, withdrawals, cumulative credit hours, and total online courses completed predict a successful online GPA.

First Regression Models

In order to answer research question five, binary logistic regression was conducted for online students and online only students to determine which independent academic student variables were predictors of a successful online GPA. Fall 2015 and spring 2016 data were combined and unduplicated for this analysis. The dependent variable online GPA was categorized as either under 2.0 (unsuccessful) and coded as "0" or 2.0 and higher (successful) and coded as "1." The independent variables were the following student academic characteristics: cumulative GPA, enrollment status, semester enrollment gap, total course withdrawals, cumulative credit hours, and total online courses. All academic variables were entered at the same time using the enter method.

Online students. For the logistic regression model generated for online students, the Hosmer and Lemeshow Test was significant ($p = .025$) which implied the prediction model did not fit significantly better to the data than the null model without predictors; however, the Omnibus Tests of model coefficients was significant ($p < .001$) indicating the model was a good

fit. Logistic regression results indicated the overall prediction model including all academic variables correctly classified 81.4% of the cases using the default cut off value of .500 to classify each outcome which higher than the base model (71.8%) that used no predictor variables so the null hypothesis was rejected. The regression coefficients are shown in Table 53.

Based on the Cox & Snell R^2 and Nagelkerke R^2, 29 to 42% of online success or having an online GPA of 2.0 or higher, was explained by the variables in the model. Based on the odds ratios higher than one of the significant variables, for every increase in cumulative GPA online students were eight times more likely to earn an online GPA of 2.0 or higher (*Exp(B)* = 8.08, $p < .001$). Also, online students with higher total credit hours earned were significantly more likely to earn an online GPA of 2.0 or higher.

Table 53
Regression Coefficients for Academic Characteristics of Online Students (First Model)

	B	*Wald*	*df*	*p*	*Exp(B)*
Cumulative GPA	2.089	190.127	1	.000	8.080
Enrollment Status	-.133	.715	1	.398	.875
Semester Gap	.012	.559	1	.455	1.012
Total Withdrawals	.011	.129	1	.719	1.011
Cumulative Credit	.010	7.443	1	.006	1.010
Total Online Courses	-.020	1.079	1	.299	.980
Constant	-5.014	140.128	1	.000	.007

Online only students. For the logistic regression model generated for online only students, the Hosmer and Lemeshow Test was not significant ($p = .089$) which implied the prediction model fit significantly better to the data than the null model without predictors; likewise, the Omnibus Tests of model coefficients was significant ($p < .001$) also indicating the model was a good fit. Logistic regression results indicated the overall prediction model including all academic variables correctly classified 75.3% of the cases using the default cut off value of

.500 to classify each outcome which much higher than the base model (57.3%) so the null hypothesis was rejected. The regression coefficients are shown in Table 54.

Based on the Cox & Snell R^2 and Nagelkerke R^2, between 29 to 40% of online success was explained by these six academic student characteristics. Based on the odds ratios higher than one for the significant variable, for every increase in cumulative GPA online only students were nearly ten times more likely to earn an online GPA of 2.0 or higher (*Exp(B)* = 9.942, $p < .001$).

Table 54
Regression Coefficients for Academic Characteristics of Online Only Students (First Model)

	B	*Wald*	*df*	*p*	*Exp(B)*
Cumulative GPA	2.297	70.535	1	.000	9.942
Enrollment Status	-.167	.185	1	.667	.846
Semester Gap	.022	1.197	1	.274	1.022
Total Withdrawals	.027	.393	1	.531	1.027
Cumulative Credit	-.002	.098	1	.755	.998
Total Online Courses	.000	.000	1	1.000	1.000
Constant	-6.182	57.274	1	.000	.002

Second Regression Models

Results from the first regression model for online students indicated the overall model fit of three predictors (enrollment status, semesters since last course, and total course withdrawals) were the least statistically reliable in determining online student success (see Table 53). These three variables were removed, and two new logistic regression models were created using the remaining three academic variables: cumulative GPA, cumulative credit, and total online courses.

Online students. For the second logistic regression model for online students, the Hosmer and Lemeshow Test was not significant ($p = .740$) which implied the prediction model fit significantly better to the data than the null model without predictors; similarly, the Omnibus

Tests of model coefficients was significant ($p < .001$) also indicating the model was a good fit. After removing the three insignificant academic predictor variables, 84.7% of the cases were accurately classified using the default cut off value of .500 to classify each outcome which was higher than null model (74.3%) as well as the first logistic regression prediction model for all six academic variables (81.4%) so the null hypothesis was rejected. The coefficients regression for the second model using academic characteristics is shown in Table 55.

Table 55
Regression Coefficients for Academic Characteristics of Online Students (Second Model)

	B	*Wald*	*df*	*p*	*Exp(B)*
Cumulative GPA	2.294	614.742	1	.000	9.913
Cumulative Credit	.006	8.567	1	.003	1.006
Total Online Courses	-.010	.440	1	.507	.990
Constant	-5.360	473.298	1	.000	.005

Similar to the first model, based on the odds ratio higher than one for the significant variables for every increase in cumulative GPA online students were about ten times more likely to earn an online GPA of 2.0 or higher (*Exp(B)* = 9.913, $p < .001$). Also, as total credit hours increased online students were significantly more likely to earn an online GPA of 2.0 or higher (*Exp(B)* = 1.006, $p = .003$). The Cox & Snell R^2 and Nagelkerke R^2 for the second model indicated about 35% to 52% of online student success was explained by the variables cumulative credit hours, cumulative GPA, and number of online courses.

Online only students. A second logistic regression model was built for online only students eliminating the same three insignificant academic predictor variables for comparison purposes to the online student group. The Hosmer and Lemeshow Test was not significant ($p = .316$) which implied the prediction model fit significantly better to the data than the null model without predictors; similarly, the Omnibus Tests of model coefficients was significant ($p < .001$)

also indicating the model was a good fit. After removing the three unimportant academic predictor variables, 80.2% of the cases were accurately classified using the default cut off value of .500 to classify each outcome which was higher than the null model (63.6%) as well as the first logistic regression prediction model for academic variables (75.3%) so the null hypothesis was rejected.

The Cox & Snell R^2 and Nagelkerke R^2 for the second model indicated about 39% to 54% of online student success was explained by the variables cumulative credit hours, cumulative GPA, and number of online courses for online only students. The regression coefficients for the second model using academic characteristics of online only students is shown in Table 56.

Table 56
Regression Coefficients for Academic Characteristics of Online Only Students (Second Model)

	B	*Wald*	*df*	*p*	*Exp(B)*
Cumulative GPA	2.548	228.687	1	.000	12.780
Cumulative Credit	-.001	.139	1	.709	.999
Total Online Courses	.007	.124	1	.725	1.007
Constant	-6.573	179.253	1	.000	.001

Similar to the first regression model for online only students, based on the odds ratio higher than one for the significant variable as cumulative GPA increased online only students were nearly thirteen times more likely to earn an online GPA of 2.0 (*Exp(B)* = 12.780, $p < .001$). Students who had a higher number of total online courses earned also had higher odds to earn an online GPA of 2.0 or higher, but this variable was not significant.

To answer research question five, logistic regression models were initially built for online students and online only students to determine which of the six academic student characteristics

including (a) cumulative GPA, (b) enrollment status, (c) semesters since last course, (d) total course withdrawals, (e) cumulative earned credit, and (f) total online courses were most predictive of a successful online GPA. Both models were a good fit, and the prediction models correctly classified more cases than the base models. Based on the first models generated for online GPA, several variables were not significant predictors so a second model was generated for each group of online students; the second models had an improved accuracy rate in predicting students who would earn an online GPA of 2.0 or higher. Within the second models enrollment status, semesters since last course, and total course withdrawals were removed from the analyses. In model two for online students, two variables significantly predicted that a student would be more likely to earn an online GPA of 2.0 or higher (cumulative GPA and total credit earned) while only one variable was a significant predictor for a successful GPA for online only students (cumulative GPA).

Research Question Six

The sixth research question for this study focused on how a combination of academic and demographic online student characteristics significantly predicted a successful online GPA. The following were the related hypotheses:

H_0: A combination of demographic characteristics and academic factors of online students does not predict a successful online GPA.

H_1: A combination of demographic characteristics and academic factors of online students predicts a successful online GPA.

In order to answer research question six, binary logistic regression was conducted. Fall 2015 and spring 2016 data were combined and unduplicated for this analysis. Prediction models were built based on previously generated models for online students and online only students to identify

which demographic and academic student characteristics were the best predictors of a successful online GPA. Online GPA was the dependent variable, and it was categorized as either under 2.0 and coded as "0" or 2.0 and higher and coded as "1." Based on results from the previous logistic regression models created separately for student demographic and academic characteristics, the independent demographic variables used in this regression model were age, gender, and ethnicity while the academic variables used were cumulative GPA, cumulative credit hours, and total online courses. For this model, these six independent variables were entered at the same time using the enter method.

Online Student Regression Model

The logistic regression model built for online students used the three demographic and three academic variables as previously described. The Hosmer and Lemeshow Test was not significant ($p = .612$) which implied the prediction model fit significantly better to the data than the null model without predictors. The Omnibus Tests of model coefficients was also significant ($p < .001$) indicating the model fit significantly better than the data from the null model without predictors. The regression coefficients from this logistic regression model are shown in Table 57. Logistic regression results indicated the overall model including a combination of all demographic and academic variables correctly classified 85.2% of the cases using the default cut off value of .500 to classify each outcome which was higher than the base model (74.3%), and had the highest accuracy of prediction for any model generated so the null hypothesis was rejected.

Based on the Cox & Snell R^2 and Nagelkerke R^2 about 35% to 52% of online success, or having an online GPA of 2.0 or higher, was explained by the variables in this model. In this model, two variables were significant in predicting that a student would earn an online GPA of

2.0 or higher: cumulative GPA and cumulative credit. Based on the odds ratio higher than one, as cumulative GPA increased online students were nearly ten times more likely to earn a successful GPA (*Exp(B)* = 9.874, $p < .001$). Also, as cumulative credit increased online GPA significantly increased (*Exp(B)* = 1.006, $p = .003$).

Table 57
Regression Coefficients for Demographic and Academic Characteristics of Online Students

	B	*Wald*	*df*	*p*	*Exp(B)*
Age	-.002	.061	1	.806	.998
Gender	-.165	2.418	1	.120	.848
Ethnicity		5.687	8	.682	
White	.131	.489	1	.484	1.140
Hispanic	.013	.313	1	.576	.914
Black	-.644	.014	1	.905	.971
American Indian	.038	.001	1	.974	1.039
Hawaiian	-23.516	.000	1	1.000	.000
Asian	.241	.360	1	.549	1.272
2 or more races	.694	2.427	1	.119	2.001
International	-.432	1.012	1	.315	.649
Cumulative GPA	2.290	598.034	1	.000	9.874
Cumulative Credit	.006	8.913	1	.003	1.006
Total Online Courses	-.014	.893	1	.345	.986
Constant	.394	4.315	1	.038	1.484

Online Only Student Regression Model

The logistic regression model generated for online only students used the same demographic and academic variables as for the overall online student group. The Hosmer and Lemeshow Test was not significant ($p = .073$) which implied the prediction model fit significantly better to the data than the null model without predictors; the Omnibus Tests of model coefficients was also significant ($p < .001$) indicating the model fit significantly better than the data from the null model without predictors. Results indicated the overall model

including a combination of demographic and academic variables correctly classified 80.2% of the cases using the default cut off value of .500 to classify each outcome which was higher than the base model (63.6%), and it was the highest accuracy of all prediction models created for online only students so the null hypothesis was rejected. The regression coefficients from this logistic regression model are shown in Table 58.

Based on the Cox & Snell R^2 and Nagelkerke R^2 about 40% to 55% of online success, or having an online GPA of 2.0 or higher, was explained by the variables in this model. In this model for online only students, cumulative GPA was the only variable that significantly predicted a student would earn an online GPA of 2.0 or higher. Based on the odds ratio, as cumulative GPA increased online only students were nearly thirteen times more likely to earn a successful GPA (*Exp(B)* =12.807, $p < .001$).

Table 58
Regression Coefficients for Demographic and Academic Characteristics of Online Only Students

	B	*Wald*	*df*	*p*	*Exp(B)*
Age	.011	1.147	1	.284	1.011
Gender	.162	.765	1	.382	1.175
Ethnicity		5.682	8	.683	
White	.107	.122	1	.726	1.113
Hispanic	.368	1.000	1	.317	1.445
Black	-.329	.695	1	.404	.719
American Indian	20.113	.000	1	.999	543020740.4
Hawaiian	-22.349	.000	1	1.000	.000
Asian	.444	.380	1	.537	1.558
2 or more races	.612	.697	1	.404	1.844
International	-1.332	.851	1	.356	.264
Cumulative GPA	2.550	211.195	1	.000	12.807
Cumulative Credit	-.002	.530	1	.467	.998
Total Online Courses	.011	.284	1	.594	1.011
Constant	.394	4.315	1	.038	.001

Using results gathered from the logistic regression models in research questions four and five, new logistic regression models were built between online GPA and a combination of both demographic student characteristics (age, ethnicity, and gender) and academic student characteristics (cumulative GPA, cumulative credit earned, and total online courses) to help answer research question six. Both final prediction models were a good fit; these models correctly classified more cases than the base models, and had the highest classification rates of any models generated. Based on the prediction model for online students, only two academic variables significantly predicted that an online student would be more likely to earn an online GPA of 2.0 or higher: cumulative GPA and cumulative credit. Only one academic variable in the online only student model significantly predicted online student success: cumulative GPA. None of the demographic variables were significant in these models which indicated demographic characteristics were less predictive of online student success than academic characteristics.

Summary

In order to answer the six research questions in this study, a variety of analyses including descriptive statistics, *t* tests, Pearson correlation coefficients, two-way contingency table analysis, and logistic regression were performed to identify which demographic and academic variables were significantly correlated to or predicted online student success for online and online only students. Results of research question one indicated there was no significant difference in online GPA for online or online only students based on distance from campus while online and online only students had a significantly higher mean online GPA if they had previously passed computer courses or took no remedial courses during the study. Also, while there was no significant difference in online GPA for online students based on their financial aid

award, there was a significant difference in online GPA for online only students based on financial aid award.

Results of research question two identified that age, ethnicity, and gender were significantly correlated to online GPA for online students while only age and ethnicity were significantly correlated to online success for online only students. The same significant relationships were identified between online GPA and the demographic characteristics for both online groups during the two-way contingency table analyses.

As part of research question three, significant correlations were observed between the online GPA for students taking online courses and their (a) cumulative GPA, (b) course withdrawals, (c) cumulative credit, and (d) total online courses. Significant correlations were also found between the online GPA for students taking only online courses and their (a) cumulative GPA, (b) enrollment status, and (c) cumulative credit. Using two-way contingency table analysis to examine the relationship between online GPA and academic student characteristics lead to slightly different results. For online students there was a significant relationship between successful online GPA and a semester gap in addition to cumulative GPA, course withdrawals, cumulative credit, and total online courses. For online only students, a significant relationship was found between a successful online GPA and cumulative GPA, but no significant relationship was identified based on enrollment status or cumulative credit.

Based on results from various logistic regression models that were created to answer research questions four, five, and six, academic student characteristics were more predictive of which students would earn a higher online GPA than demographic student characteristics. Although age, gender, and ethnicity were identified as significant predictors of online student success as part of research question four, as part of research question six these demographic

characteristics were not significant. As part of research question five and six, for online students cumulative GPA was the most significant predictor of which students were most likely to earn an online GPA of 2.0 or higher along with cumulative credit earned while for online only students cumulative GPA was the only significant academic predictor of earning an online GPA of 2.0 or higher. These research results, as well as conclusions and implications of the findings, are discussed in more detail in Chapter Five.

CHAPTER V: SUMMARY, CONCLUSIONS, IMPLICATIONS, LIMITATIONS, AND RECOMMENDATIONS

Introduction

This study targeted students taking online classes at a Midwestern community college to examine which demographic and academic factors led to online student success. This chapter begins with an overview and the purpose of the study as well as a reminder about the study population and the research design. It also provides a summary of findings obtained from this study that were explained in detail in the previous chapter along with guidance for using the results in higher education. In addition, this chapter will offer implications, limitations, recommendations for future research, and conclusions.

Overview and Purpose of Study

Within higher education the number of online classes and the enrollment in these classes has been increasing for over a decade (Allen & Seaman, 2017; Jost et al., 2012; McIntire, 2015; Parke et al., 2010; Wilson et al., 2015). This trend has been more pronounced at the community colleges where the largest number of online courses have typically been available (Ginder & Stearns, 2014; Illinois Community College Board, 2015). For students who complete online courses there is no significant difference in course outcomes when compared with student outcomes in face-to-face courses (WCET, 2010); however, although online course enrollments have continued to increase research has also shown online course success rates are lower than success rates for campus-based courses (Hachey et al., 2012; Hart, 2012; Jost et al., 2012; Lehman & Conceicao, 2014; Moore & Kearsley, 2012; Xu & Jaggars, 2011a, 2011b). There are many factors that impact online student success. Since many of the previous studies generated different or mixed findings about the factors that impact online student success, the purpose of

this study was to generate a conceptual model of online student success as a factor of students' demographic and academic characteristics. The study sought to examine existing online community college student data to define the critical elements that correlated to and predicted online student success. Significant findings from this study were compared to the findings from previous studies to identify similarities and differences as well as to offer recommendations for both practical use in higher education and needed future research.

Study Population

The research for this study focused on all degree and certificate seeking community college students at one institution who took at least one online, credit course during fall 2015 or spring 2016. The secondary data received from the college's IR department included information about both students who completed their online coursework successfully as well as those who were unsuccessful and withdrew from their online courses. The overall population of students taking online courses during these two semesters was a duplicated enrollment count of 4,903, or an unduplicated online enrollment count of 4,046. The majority (71%) of the online students were also taking classes on campus or in a hybrid format while others (29%) were taking only online courses. The duplicated enrollment count for students taking only online courses was 1,425, and the unduplicated online only enrollment was 1,186 students. The analysis and results for each of these online student groups were compared for each research question.

Research Design and Methodology

A correlational research methodology was used for this study, and secondary data from a large, Midwestern community college was examined. Descriptive statistics, *t* tests, Pearson correlation coefficients, two-way contingency table analysis, and logistic regression were performed to determine whether or not any of the demographic independent variables (age,

gender, and ethnicity) or academic independent variables (distance from campus, financial aid award, previous computer courses, remedial courses, cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses) significantly influenced success in online courses or the dependent variable which was operationalized as online GPA. The following six research questions guided this study:

1. What difference in online GPA exists based on an online student's distance from campus, financial aid award, previous computer courses passed, and remedial courses?
2. How do demographic characteristics of online students (age, ethnicity, and gender) correlate to online GPA?
3. How do academic factors of online students (cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses completed) correlate to online GPA?
4. Which demographic characteristics of online students most significantly predict a successful online GPA?
5. Which academic factors of online students most significantly predict a successful online GPA?
6. What combination of demographic characteristics and academic factors of online students most significantly predicts a successful online GPA?

By addressing all six research questions and the related 12 hypotheses, the goal was to identify significant correlates and predictors of online student success. In the next section, a summary of these research findings is provided.

Summary of Findings

This section summarizes the primary discoveries regarding online student success that resulted from this quantitative study. Results are reported for the overall group of students who took at least one online class as well as for those students who took only online courses. For a complete explanation of all data findings, please refer to Chapter Four.

General Study Outcomes

Total online student credit enrollment (N = 2,345) at this community college in fall 2015 was 15.6% of the total credit enrollment (N = 15,016) for the semester; about one in six students took at least one online course. Nationally, during the same semester, about 30% of higher education students were enrolled at least one online course (Allen & Seaman, 2017); this community college falls 50% below the national average for percentage of online student enrollment. In this study, about 29% of students at this community college took all of their courses online which is under 5% of the total fall 2015 credit enrollment. Nationally, in fall 2015, about one in seven students took all of their courses online (Allen & Seaman, 2017) which is nearly three times higher than figures for this community college. Despite a growing number of online course sections and increased online student enrollment over the last ten years at this community college, figures for fall 2015 online enrollment fell well below the national average.

Demographic characteristics for online students in this study show both similarities and differences to community college enrollment trends within Illinois and across the United States. Two-thirds (66.3%) of the online only students in this study were female while about 62% of online students overall were female. These percentages of female students were higher than the national community college trends identified by the 2016 National eLearning Report where 60% of online students were female (Lokken, 2017), and it is also higher than national figures

reported by the American Association of Community Colleges (2017) where 56% of all students were female. The percentage of females in this study is also higher than trends for Illinois community colleges where under 56% of all students were female (Illinois Community College Board, 2017). Nationally, as well as across Illinois including at this community college, the majority of community college students reported their ethnicity as White, followed by Hispanic, and then Black (American Association of Community Colleges, 2017; Illinois Community College Board, 2017). Most of the online students in this study lived near campus; more than 82% lived in-district, and about two-thirds lived 10 miles or less from campus. In fall 2016 across Illinois about 88% of all community college students lived in district (Illinois Community College Board, 2017). This high statistic for in-district students is not unusual because community colleges have a mission to mainly serve the people in their district.

At the community college in this study, the population of students taking online courses was younger than anticipated; over 67% were traditional aged. This is slightly younger than the rest of the state according to the Illinois Community College Board (2017) as they reported 65% of all students were nontraditional aged in fall 2016. In contrast, the online only students in this study were older overall, and more evenly split with about half traditional and half nontraditional. Students taking online classes were fairly evenly split between part-time (49.2%) and full-time (50.8 %) enrollment status, but students who were only taking online courses were 90% part-time. These figures are a little different than for all community college students nationally as reported by the American Association of Community Colleges (2017) where 62% of students were part-time as well as numbers reported within Illinois by the Illinois Community College Board (2017) where 64% of all students were part-time.

Online students in this study were taking an average of about three courses during a semester with a median and mode of four courses while online only students were taking fewer than two courses on average with a median and mode of just one course during the semester. Online only students also had a larger average enrollment gap of between three and four semesters between enrollments. This is a longer time between enrollments than for online students overall who averaged only two or three semesters off between enrollments.

Overall trends for gender, residency status, and ethnicity of online students within this study followed community college enrollment trends across Illinois and the United States. There were also some differences in trends identified for enrollment status and age for this community college when compared to the local and national enrollment trends. Demographic online student characteristics as well as various academic online student characteristics are further explored within the results from the six specific research questions.

Research Question One

What difference in online GPA exists based on an online student's distance from campus, financial aid award, previous computer courses passed, and remedial courses?

In order to address research question one, independent samples *t* tests were completed. As a result, several significant differences were identified. Significant mean differences in online GPA for both online student groups were identified based on remedial coursework and computer experience, and a significant mean difference was identified for online only students based on financial aid award. No significant difference in online GPA was identified based on distance. A summary of the *t* test results is found in Table 59; additional discussion will follow.

Distance. First, no significant difference in online GPA was found for either the overall online student group or the online only student group based on distance from campus (see Table

59). Few studies analyzed student success based on distance; however, Hawkins (2012) identified distance as a significant negative predictor of online student success. According to Hawkins (2012) students who lived further away from campus were significantly less successful. In this study, online only students who lived further from campus had a higher online GPA than those who lived closer while the students in the overall online student group who lived closer had a higher online GPA than those who lived further away; none of these differences were significant. Due to the mixed findings in this study along with very little other research available regarding how distance relates to online student success, additional research is needed.

Table 59
Summary of Significant Mean Difference in Online GPA by Type of Student

	Online GPA	
t test variables	Online Students	Online Only Students
Distance	not significant	not significant
Financial Aid	not significant	significant**
Computer Experience	significant**	significant*
Remedial Coursework	significant**	significant**

** $p < .001$. * $p = .003$.

Financial aid. Second, no significant difference in online GPA for the overall online student group was found based on whether or not the online student had received financial aid during the semester, but a significant difference in online GPA was identified for the online only student group (see Table 59). For online only students in this study, those who did not receive financial aid during the semester had a significantly higher online GPA than those who were awarded some financial aid although the effect size was small. A limited number of studies tested the relationship between online student success and financial aid. One study found a

positive relationship between financial aid and online student success (Bull, 2015) while a few studies, including this one, identified a significant, negative correlation between online student success and financial aid awards (Gregory, 2016; Rodriguez, 2011). Several other studies did not identify any significant findings related to financial aid and online student success (Aragon & Johnson, 2008; Berling, 2010; Foster, 2012; Gibson, 2015; Riordan, 2013). Within the studies that analyzed the impact of financial aid on online student success, the variable was defined in different ways. Some studies used only financial aid awards that were accepted by students when examining online student success (Berling, 2010; Foster, 2012; Gibson, 2015; Riordan, 2013), other studies used financial aid eligibility regardless of whether or not the awards were accepted (Aragon & Johnson, 2008; Gregory, 2016), and a few studies examined multiple variables for financial aid such as application, eligibility, and ability to pay (Bull, 2015; Rodriguez, 2011). The ability to pay for online courses and then complete the needed coursework to succeed is an important issue. Based on these varying results, and the fact that 58% of community college students use some type of financial aid (American Association of Community Colleges, 2017), additional research should be conducted to determine the impact of financial aid on online student success.

Computer experience. Next, when comparing the online GPA mean values, students in both the overall online group and the online only student group who had successfully passed at least one computer course had a significantly higher online GPA when compared to online students who had not taken or passed any computer courses, but the effect size was small (see Table 59). Previous research identified mixed findings related to online student success based on computer skills or experience with technology. Similar to this study, Dupin-Bryant (2004) also identified a significant, positive correlation between computer experience and online GPA while

Harrell and Bower (2011) identified a significant, negative correlation between computer experience and online student success. Several other studies identified no significance between computer experience and online student success (Akpom, 2013; Cummings, 2009; Muse, 2003; Riordan, 2013; Shaw et al., 2016).

Within these studies, computer experience was either determined through self-reported data collected from students using a survey (Akpom, 2013; Dupin-Bryant, 2004; Harrell & Bower, 2011; Muse, 2003; Shaw et al., 2016), or based on computer coursework students had completed (Cummings, 2009; Riordan, 2013) similar to this study. It is intuitive to think that students with better computer skills would perform better in online classes much like results from this study indicate, but research has not always shown that to be the case likely due to many other variables that impact online student success. With limited research existing and a mix of findings available, additional research is needed to better understand the relationship between computer experience and online student success.

Remedial coursework. Finally, students in both the overall online student group and the online only student group who took no remedial courses during the semester had a significantly higher mean online GPA than those students who were enrolled in one or more remedial courses; the effect size was medium to large (see Table 59). One previous study found no significant correlation between online student success for students who were underprepared for college-level work and needed remediation and those who entered directly into college-level work (Aragon & Johnson, 2008). Several other studies, in addition to this study, identified lower online student success for students who needed remedial work (Fisher, 2010; Hachey et al., 2012; Harrell & Bower, 2011; Jost, et al., 2012; Xu & Jaggars, 2011a, 2011b, 2013). It is important to advise students effectively in order to help them succeed. These results indicated

students taking remedial courses tended to have lower performance in online courses; colleges should make an effort to caution students taking remedial courses about also enrolling in online classes in which they are less likely to succeed.

The significant results from research question one indicated colleges should encourage online students to take a computer-related course or have a certain level of computer competency prior to enrolling in an online course. These computer skills may allow students to feel more comfortable in the online learning environment so they are able to better focus on the required coursework instead spending additional time navigating the online learning management system. Additionally, results from research question one also showed students with weaker academic skills or those who placed into remedial coursework tended to have more trouble succeeding in the online environment. Colleges should inform students who are registering for remedial courses to avoid taking them online or at the same time as online courses in order to have a better chance for online course success. Furthermore, results indicated students who took only online courses, who did not have any financial aid award, had a significantly higher online GPA. Finally, online and online only students were no more likely to succeed if they lived further from campus, and regardless of how far the students lived from campus many online students were still able to succeed. Since findings were mixed, online students should not be discouraged from taking online classes based on distance from campus or financial aid status.

Research Question Two

How do demographic characteristics of online students (age, ethnicity, and gender) correlate to online GPA?

In order answer research question two and identify which demographic characteristics were significantly related to online GPA for the overall online student group and the online only

student group, Pearson correlation coefficients were generated and two-way contingency table analyses were conducted. A summary of significant correlations between the dependent variable and the independent demographic variables is found in Table 60. Similarly, the summary of the significant Chi-Square findings from the two-way contingency table analysis is in Table 61.

Table 60
Correlation Summary for Online GPA and Demographic Characteristics by Type of Student

Demographic Characteristics	Online GPA	
	Online Students	Online Only Students
Age	Significant (+)**	Significant (+)**
Gender	Significant (+)**	Not significant
Ethnicity	Significant (-)*	Significant (-)*

** $p < .01$. * $p < .05$.

After creating Pearson correlation coefficients to examine the relationship between online GPA and demographic student characteristics (see Table 60), there were several significant findings. For the overall online student group, there was a significant, positive correlation between online GPA and age ($r = .126$, $p < .01$) as well as gender ($r = .081$, $p < .01$), and there was a significant, negative correlation between online GPA and ethnicity ($r = -.040$, $p < .05$); these were all small correlations. For online only students, online GPA and age were positively correlated ($r = .183$, $p < .01$) while online GPA and ethnicity were negatively correlated ($r = -.073$, $p < .05$); both of these correlations were significant and small.

Two-way contingency table analyses were generated for both the online student group and the online only student group to examine the relationship between online GPA and demographic characteristics. For online students a significant relationship was identified between online GPA and age, gender, and ethnicity (see Table 61); the effect of these variables on online GPA were very small or small. For online only students age and ethnicity were significantly

related to online GPA with a small effect, but gender was not significant. These relationships will be discussed in more depth for each independent variable.

Table 61
Chi-Square Summary for Online GPA and Demographic Characteristics by Type of Student

	Online GPA	
Demographic Characteristics	Online Students	Online Only Students
Age	Significant**	Significant*
Gender	Significant**	Not significant
Ethnicity	Significant**	Significant+

**$p < .001$. * $p = .003$. + $p = .005$.

Age. When examining the relationship between a successful online GPA and online student age the results were significant (see Tables 60 and 61). For the two-way contingency table analysis, age for each online student group was divided into two categories: traditional and nontraditional online students. Results indicated a higher percentage of traditional aged students in the overall online student group had an online GPA of 2.0 or higher while in the online only student group there was a higher percentage of nontraditional aged students who earned an online GPA of 2.0 or higher. Some research showed no significant relationship between online student success and age (Akpom, 2013; Aragon & Johnson, 2008; Foster, 2012; Gibson, 2015; Jost et al., 2012; Riordan, 2013); however, the majority of the previous studies identified a significant, positive correlation between age and online student success much like this study (Cummings, 2009; Doherty, 2006; Gregory, 2016; McPhaul-Moore, 2013; Moore et al., 2002; Muse, 2003; Porta-Merida, 2009; Riordan, 2013; Williams, 2008; Wladis et al., 2015; Wojciechowski & Palmer, 2005; Xu & Jaggars, 2013). Overall, older students in most studies performed better in their online courses than younger students. Some students who enroll in online classes may have a misperception about how to be successful in courses offered in an

online format. Results from this study indicated colleges should provide information to traditional students who are interested in taking all online courses so they are more prepared to face the differences in instructional methods, and know what to expect in the online course format so they are more likely to succeed.

Gender. When investigating the relationship between a successful online GPA and online student gender the results were significant only for the overall online student group, but not for the online only student group (see Tables 60 and 61). In the studies that indicated percentages, between two-thirds and three-quarters of the online course participants were female. Some research revealed a significant correlation between online student success and gender; female students performed better than males, and this was largely due to online course flexibility (Aragon & Johnson, 2008; Doherty, 2006; Porta-Merida, 2009; Wladis et al., 2015; Xu & Jaggars, 2013). Many other studies found no significant difference in online student success based on gender (Akpom, 2013; Berling, 2010; Bull, 2015; Cummings, 2009; Foster, 2012; Gibson, 2015; Gregory, 2016; Jost et al., 2012; Moore et al., 2002, Riordan, 2013; Wilson & Allen, 2011; Wojciechowski & Palmer, 2005). These studies did not all examine the same types of online courses, and most studies combined results from multiple online courses together which makes a comparison more difficult since each student will enroll in online courses in different disciplines based on their program of study and what classes are being offered online. Based on the mixed findings, it is unlikely gender alone predicts online success; however, institutions should be aware that studies have found lower online success for male online students. Colleges should find ways to assist all online students, but in particular male students who may be a risk for lower online success.

Ethnicity. When examining the correlation between a successful online GPA and online student ethnicity the results were significant for both online student groups (see Table 60). The two-way contingency table analysis results in this study also indicated a significant relationship between ethnicity and online GPA (see Table 61); overall, a higher percentage of non-minority students had an online GPA of 2.0 or higher. When looking at the online student groups, the highest percentage of students who earned an online GPA of 2.0 or higher reported their ethnicity as White, followed by Hispanic, and then Black. Previous research about the relationship between ethnicity and online student success are mixed with some ethnicities having higher online student success. Some previous studies found no significant difference in online student success based on ethnicity (Aragon & Johnson, 2008; Gibson, 2015; Jost et al., 2012; Wladis et al., 2015) while other studies found non-minority or White online students were more successful than other groups which is similar to this study (Berling, 2010; Bull, 2015; Moore et al., 2002; Palacios & Wood, 2016; Porta-Merida, 2009; Williams, 2008; Xu & Jaggars, 2013). The number of online students across different ethnicities in this study was not equal, and the online success rate for each ethnic category was different. There were only a few American Indian online and online only students, but they earned the highest percentage students with an online GPA of 2.0 or higher followed by Asian and then White students with Black online and online only students far below the other ethnic groups in successful online achievement.

Each higher education institution has a different student population based on online course and program offerings, location of the college, and type of the institution. The student population at a community college primarily reflects the communities included within its district boundaries. These differences in student populations across institutions likely contributed to the mixed findings for the online student success of various ethnicities in previous studies. Although

other studies had mixed findings, and the significant findings from this study are institution specific, the information can be used to help online students of certain identified ethnicities who are less likely to succeed by providing them with resources and information about online courses and strategies to help them be more successful.

Research Question Three

How do academic factors of online students (cumulative GPA, enrollment status, time since last course, course withdrawals, cumulative credit hours, and total online courses) correlate to online GPA?

To address research question three, Pearson correlation coefficients and two-way contingency table analyses were generated for the six academic student characteristics and online GPA; a variety of significant findings were identified for both online student groups. A summary of the significant correlations between the dependent variable and independent academic variables is located in Table 62. Similarly, a summary of the significant Chi-Square findings from the two- way contingency table analysis for the demographic variable and each academic variable in research question three can be found in Table 63.

Table 62
Correlation Summary for Online GPA and Academic Characteristics by Type of Student

	Online GPA	
Academic Characteristics	Online Students	Online Only Students
Cumulative GPA	Significant (+)**	Significant (+)**
Enrollment Status	Not significant	Significant (-)*
Semester Gap	Not significant	Not significant
Course Withdrawals	Significant (-)**	Not significant
Cumulative Credit	Significant (+)**	Significant (+)**
Online Courses	Significant (+)**	Not significant

** $p < .01$. * $p < .05$.

There were some differences in the academic characteristics that were significantly related to online GPA. For example, the semester gap or time students took off between semesters of enrollment was not significantly correlated to a successful online GPA for either online student group, but within the Chi-Square analysis these two variables were significantly related for the overall online student population. Also, for online only students there were fewer significant variables identified than for the overall online student group. These relationships will be further discussed.

Table 63
Chi-Square Summary for Online GPA and Academic Characteristics by Type of Student

	Online GPA	
Academic Characteristics	Online Students	Online Only Students
Cumulative GPA	Significant**	Significant**
Enrollment Status	Not significant	Not significant
Semester Gap	Significant*	Not significant
Course Withdrawals	Significant**	Not significant
Cumulative Credit	Significant**	Not significant
Online Courses	Significant+	Not significant

** $p < .001$. * $p = .008$. + $p = .030$.

Cumulative GPA. The most significant finding was a large, positive correlation between cumulative GPA and online GPA for the overall online student group ($r = .704$, $p < .01$) and for the online only student group ($r = .693$, $p < .01$). This finding was consistent with results from numerous previous studies; online students with a higher previous GPA were identified as more likely to succeed in online courses (Akpom, 2013; Aragon & Johnson, 2008; Berling, 2010; Bull, 2015; Cochran et al., 2014; Cummings, 2009; Dupin-Bryant, 2004; Foster, 2012; Gibson, 2015;

Harrell & Bower, 2011; Hawkins, 2012; Jost et al., 2012; McPhaul-Moore, 2013; Muse, 2003, Porta-Merida, 2009; Riordan, 2013; Rodriquez, 2011; Smith, 2005; Wilson & Allen, 2011; Wladis et al., 2015; Wojciechowski & Palmer, 2005; Xu & Jaggars, 2013). Since the correlation between cumulative GPA and online student success is such a strong, well-documented finding throughout the literature, colleges should consider implementing a minimum GPA standard for students taking online courses.

Cumulative credit. The second largest, significant correlation was identified between cumulative credit hours earned and online GPA for the overall online student group ($r = .292$, $p < .01$) and for the online only student group ($r = .166$, $p < .01$). There was one previous study that identified a significant, negative correlation between online student success and total credit hours earned (Rodriquez, 2011), but numerous previous studies identified a positive relationship meaning students who had a higher number of total credit hours earned had higher grades in online courses just as found in this study (Berling, 2010; Bull, 2015; Cochran et al., 2014; Cummings, 2009; Doherty, 2006; Dupin-Bryant, 2004; Foster, 2012; Gregory, 2016; Moore et al., 2002; Smith et al., 2012; Wilson & Allen, 2011; Wojciechowski & Palmer, 2005). This finding supports implementing a policy or encouraging students not to take online courses at the beginning of their program to increase their chance for online success.

Online courses. Another significant, positive correlation was found between online GPA and the number of online courses a student had taken. This relationship was not significant for the online only student group, but in the overall online student group as the number of online courses students had taken increased so did their online GPA ($r = .072$, $p < .01$). This same correlation was also identified in many previous studies (Dupin-Bryant, 2004; Hachey et al., 2013; Hachey et al., 2012; McPhaul-Moore, 2013; Moore et al., 2002; Porta-Merida, 2009;

Williams, 2008, Wladis et al., 2015; Wojciechowski & Palmer, 2005; Xu & Jaggars, 2011b). Apkom (2013) and Muse (2003) found no significant correlation between online GPA and the number of online courses a student had taken while Smith (2005) found a negative correlation between online GPA and number of online courses. Although the finding in this study was a small correlation, the majority of studies show that if students have previously taken online courses they tended to do better in future online courses. This finding is further support for suggesting or requiring some students take online courses later in their program to help increase their online success.

Course withdrawals. A significant, negative correlation was found in this study between the total number of course withdrawals and online GPA (r = -.111, p < .01) for the overall online student group although this finding was not significant for the online only student group. Not many previous studies examined course withdrawals in relation to online student success; however, a few other studies also found that a higher number of course withdrawals for online students led to lower online course success (Cochran et al., 2014; Wojciechowski & Palmer, 2005). This information can be helpful for academic advisors who speak with students prior to registration. If students have a history of frequent course withdrawals, the online course format may not be best option for them. Since little research is available about the impact of course withdrawals and online student success additional research should be pursued.

Enrollment status. No significant correlation was identified between enrollment status and online GPA for the overall online student group; however, for the online only student group enrollment status had a significant, small, negative correlation to online GPA (r = -.101, p < .05). In this study, nearly all (90%) of online only students were taking classes part-time which may explain why this finding was significant only for this population. Previous studies have mixed

findings when examining enrollment status with online student success. Some studies found no significant correlation between how many credit hours a student was taking and online student success (Akpom, 2013; Muse, 2003; Wladis et al., 2015; Wojciechowski & Palmer, 2005), and a few studies found a positive correlation between enrollment hours and online student success (Aragon & Johnson, 2008; Smith et al., 2012). The results of several other studies matched this study identifying a negative correlation between online student success and enrollment status; this means students who were taking fewer credit hours during the semester had higher online student success (Doherty, 2006; Gregory, 2016; Hawkins, 2012; Moore et al., 2002; Riordan, 2013; Rodriguez, 2011). Although the findings for enrollment status and online success were mixed, and additional research would be beneficial, the existing evidence can be used by academic advisors who might suggest that students take fewer courses overall when they enroll in online courses to increase their chances of online success.

Semester gap. When examining the time students took off between semesters of enrollment the findings were not significant for either online student group in this study. Only one other study that examined how an enrollment gap was related to online student success was identified. Muse (2003) found a significant positive relationship between online student success and time off between semesters of enrollment which would mean online students performed better after a longer time off between courses. This is contrary to what would normally be expected where students who are continuously enrolled would perform better. Since the research on this variable is limited, additional research should be performed to help better understand how the gap a student has between semesters of enrollment impacts online student success.

Two different analyses were conducted for both online student groups to identify which academic student characteristics significantly related to online GPA in order to answer research

question three. There were more significant correlations for the overall online student group than the online only group. Cumulative GPA had highest positive correlation to online GPA with a large effect followed by cumulative credit with a medium effect; these two characteristics were the only significant findings for both online student groups. In addition, for the overall online student group the number of course withdrawals had a small, negative correlation to online GPA, and the number of online courses taken had a small, positive correlation to online GPA. Enrollment status was negatively correlated to online GPA for the online only student group also with a small effect size. Furthermore, semester gap or time between enrollments was significantly related to online GPA in the Chi-Square analysis with a small effect for the overall online student group. Based on these significant findings, colleges should consider implementing policies that limit enrollment in online courses based on cumulative GPA and cumulative credit earned. This policy would allow students only to enroll in online courses after they have established a record of successful coursework which would increase their odds of online success.

Research Question Four

Which demographic characteristics of online students most significantly predict a successful online GPA?

In order to answer research question four, two logistic regression models were built to determine which demographic factors were the most significant predictors of a successful online GPA; one model was created for the overall online student group, and another model for the online only student group. A summary of significant predictors is in Table 64. The regression model for online students correctly classified 74.2% of all cases (same as base model), and the model for online only students was not as accurate correctly classifying 64.9% of all cases

(slightly higher than base model); both models had high classification rates between 94% and 100% for an online GPA of 2.0 or higher.

All three demographic factors were significant for the overall online student model: age, gender, and ethnicity ($p < .001$). The specific odds of earning an online GPA of 2.0 or higher were higher as the age of the online student increased (*Exp(B)* = 1.027, $p < .001$). Additionally, online students of two ethnicities had higher odds of earning an online GPA of 2.0 or higher: White (*Exp(B)* = .728, $p < .001$) and Asian (*Exp(B)* = 1.885, $p = .040$). Online students who were Black had lower odds of earning an online GPA of 2.0 or higher (*Exp(B)* = .525, $p < .001$). Furthermore, the odds of online success was lower for males than females for overall online student group (*Exp(B)* = .728, $p < .001$).

Table 64
Demographic Predictors of Online GPA by Type of Student

	Online GPA	
Demographic Characteristics	Online Students	Online Only Students
Age	Significant**	Significant**
Gender	Significant**	Not significant
Ethnicity	Significant**	Significant*

** $p < .001$. * $p = .006$.

Results of the logistic regression model built for the online only student group were similar to the model built for online students. Older students had increased odds for a higher online GPA (*Exp(B)* = 1.038, $p < .001$) while Black online students had lower odds of online success (*Exp(B)* = .528, $p = .026$); however, results for gender and other ethnicities were not significant in predicting a higher online GPA. These findings mirror results from research

question two as well as the other studies related to demographic characteristics as previously discussed.

Based on the logistic regression models built using demographic characteristics to answer research question four, there were more significant predictors of online student success identified for the overall online student group than for the online only student group. Age, gender, and ethnicity were significant predictors of whether online students overall would earn an online GPA of 2.0 or higher while only age and ethnicity were significant predictors of whether or not online only students would earn an online GPA of 2.0 or higher. Based on these significant results, additional support is needed for certain online students: younger, male, or Black.

Research Question Five

Which academic factors of online students most significantly predict a successful online GPA?

Four logistic regression models were built to identify which academic factors significantly predicted an online GPA of 2.0 or higher in order to respond to research question five; two models were built for the overall online student group along with two additional models for the online only student group. A summary of significant predictors from the first set of models is in Table 65, and a summary of significant predictors from the follow-up models are in Table 66. For the overall online student group, out of the six academic student factors examined in the first two models (cumulative GPA, enrollment status, semesters since last course, course withdrawals, cumulative credit hours, and total outline courses) only cumulative GPA (*Exp(B)* = 8.080, $p < .001$) and cumulative credit (*Exp(B)* = 1.010, $p = .006$) were significant predictors of whether or not online students would earn an online GPA of 2.0 or higher.

Table 65
Academic Predictors of Online GPA by Type of Student (First Models)

	Online GPA	
Academic Characteristics	Online Students	Online Only Students
Cumulative GPA	Significant**	Significant**
Enrollment Status	Not significant	Not significant
Semester Gap	Not significant	Not significant
Course Withdrawals	Not significant	Not significant
Total Credit	Significant*	Not significant
Online Courses	Not significant	Not significant

** $p < .001$. * $p = .006$.

For the online only student group only cumulative GPA was a significant predictor of earning an online GPA of 2.0 or higher (*Exp(B)* = 9.942, $p < .001$). The first set of regression models correctly classified 81.4% of cases for online students (higher than base model), and 75.3% of cases for online only students (higher than base model), and each model had high classification rates between 83% and 93% for predicting a student would earn an online GPA of 2.0 or higher.

Since enrollment status, semesters since last course, and total course withdrawals were the three least significant predictors in the first set of logistic regression models, these variable were removed and two additional models were generated using the three remaining academic factors: cumulative GPA, cumulative credit hours, and total online courses taken. For the overall online student group in the second model both cumulative GPA (*Exp(B)* = 9.913, $p < .001$) and cumulative credit (*Exp(B)* =1.006, $p = .003$) were significant predictors that a student would earn an online GPA of 2.0 or higher while total online courses was not a significant predictor of online student success (see Table 66).

Table 66
Academic Predictors of Online GPA by Type of Student (Second Models)

	Online GPA	
Academic Characteristics	Online Students	Online Only Students
Cumulative GPA	Significant**	Significant**
Total Credit	Significant*	Not significant
Online Courses	Not significant	Not significant

** $p < .001$. * $p = .003$.

For the online only student group cumulative GPA was identified as the only significant predictor of a higher online GPA (*Exp(B)* = 12.780, $p < .001$). These second regression models had higher classification rates generated: 84.7% correct classification for online students (higher than base model), and 80.2% correct classification rate for online only students (higher than base model) with between 88% and 95% correct classification rate for online students who would earn a GPA of 2.0 or higher. Numerous studies had similar findings especially for cumulative GPA and cumulative credit as discussed previously as part of research question three.

Logistic regression models were built to determine which demographic and academic characteristics were significant predictors of online student success. After eliminating variables that were not significant in the first set of models, there were two significant predictors of whether an online student would earn an online GPA of 2.0 or higher that emerged from the second set of models: cumulative GPA and cumulative credit. For the overall online student group, both of these variables were significant predictors while for online only students only cumulative GPA was a significant predictor of online student success. These significant findings are supported by the existing literature as discussed earlier, and strongly support implementing a policy for students to have proven their academic success prior to enrollment in online courses.

Research Question Six

What combination of demographic characteristics and academic factors of online students most significantly predicts a successful online GPA?

In order to address research question six, two logistic regression models were built using both academic and demographic characteristics to see if combining these factors led to a better prediction of which students would earn an online GPA of 2.0 or higher. A summary of significant predictors is in Table 67. These two models used all three demographic variables from research questions two and four (age, gender, and ethnicity) as well as only the three academic variables from the second logistic regression models in research question five (cumulative GPA, cumulative credit hours, and total online courses).

Table 67
Demographic and Academic Predictors of Online GPA by Type of Student

	Online GPA	
Academic Characteristics	Online Students	Online Only Students
Age	Not significant	Not significant
Gender	Not significant	Not significant
Ethnicity	Not significant	Not significant
Cumulative GPA	Significant**	Significant**
Total Credit	Significant*	Not significant
Online Courses	Not significant	Not significant

** $p < .001$. * $p = .003$.

For the overall online student group both cumulative GPA (*Exp(B)* = 9.874, $p < .001$) and cumulative credit (*Exp(B)* =1.006, $p = .003$) were significant predictors that a student would earn an online GPA of 2.0 or higher, but no other predictors were significant. These finding mirrors results of research question three. The model for the overall online student group correctly

classified 85.2% of cases overall and was highly successful in predicting those students who would earn an online GPA of 2.0 or higher with a 95% correct classification rate.

As seen in Table 67 for the logistic regression model built for the online only student group, the only significant predictor of online student success was cumulative GPA (*Exp(B)* = 12.807, $p < .001$). In this model for online only students, about 81% of cases were correctly classified overall with 89% success in predicting an online GPA of 2.0 or higher. The classification rates for an online GPA of 2.0 and higher in these last two regression models were the highest rates for any models generated in this study. As discussed in the significant findings for research question three, community colleges should consider recommendations or policies that encourage students to take online courses later in their program and discourage students with poor academic records to enroll in online courses.

Summary

After analysis for each research question was completed, the initial conceptual model of factors that impact online student success as shown in Figure 1 was modified based on the significant findings from each of the six research questions. As a result, two new online student success models were generated. The success model for the overall online student group is shown in Figure 2, and a success model based on results for students who took only online classes is located in Figure 3. Distance to campus was not a significant correlate or predictor of online student success in this study so it was removed from both online student models. The other factors from the original conceptual model that were not significant correlates or predictors of online GPA for either online student group were eliminated from each model.

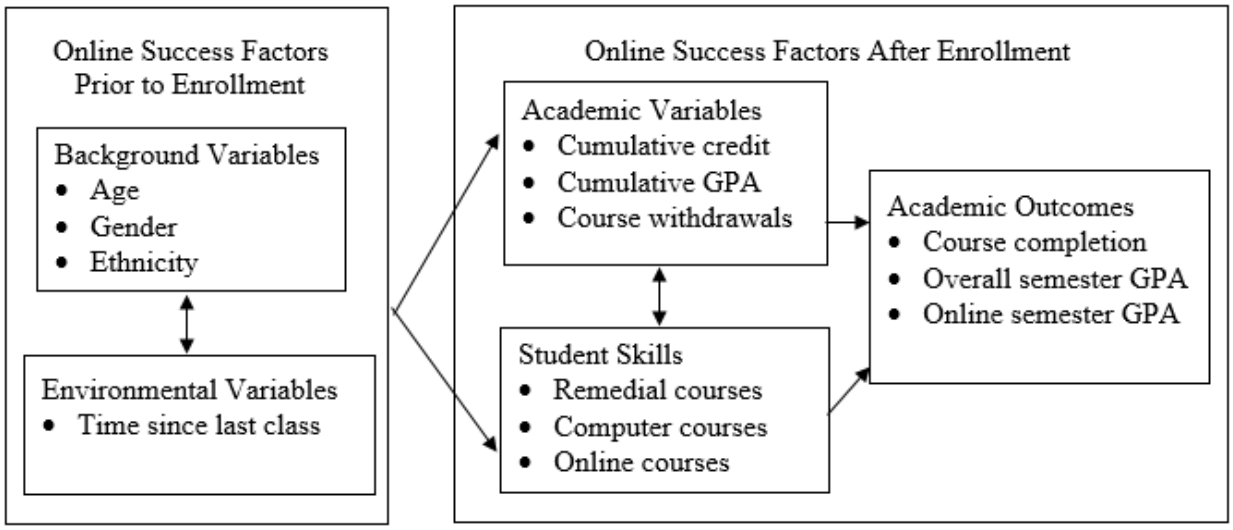

Figure 2. A Model of the Demographic and Academic Online Student Characteristics that Predict Online Student Success for the Overall Online Student Group.

There are both similarities and differences between the two online student success models to discuss. First, as shown in the figures, both models include the following variables that significantly impacted academic outcomes and online student success in this study: age, ethnicity, cumulative credit hours, cumulative GPA, remedial courses, and computer courses. No matter if the online students were also taking courses in other formats or if they were taking only online courses these were the factors that significantly impacted their online course success.

In addition to the parts of these two online student success models that are the same, there are also some differences between them. The success model for the overall online student group in Figure 2 includes gender, time since last course, course withdrawals, and online courses which were significant factors for this group; these factors are not found in Figure 3. There were two different significant factors for the online only student group so financial aid and enrollment status are listed just in Figure 3. The findings related to the significant demographic and academic characteristics prior to and after enrollment included in these online student success

summary models should be used by colleges to advise online students about what class format to register for during a semester, and to target interventions that will improve online student success for all online students. Based on significant results of this study, not all students are equally suited to succeed in online classes based on their demographic and academic characteristics. If colleges do not provide adequate information to online students before or after they enroll in an online course, it can negatively impact their success which, in turn, also impacts student retention and completion.

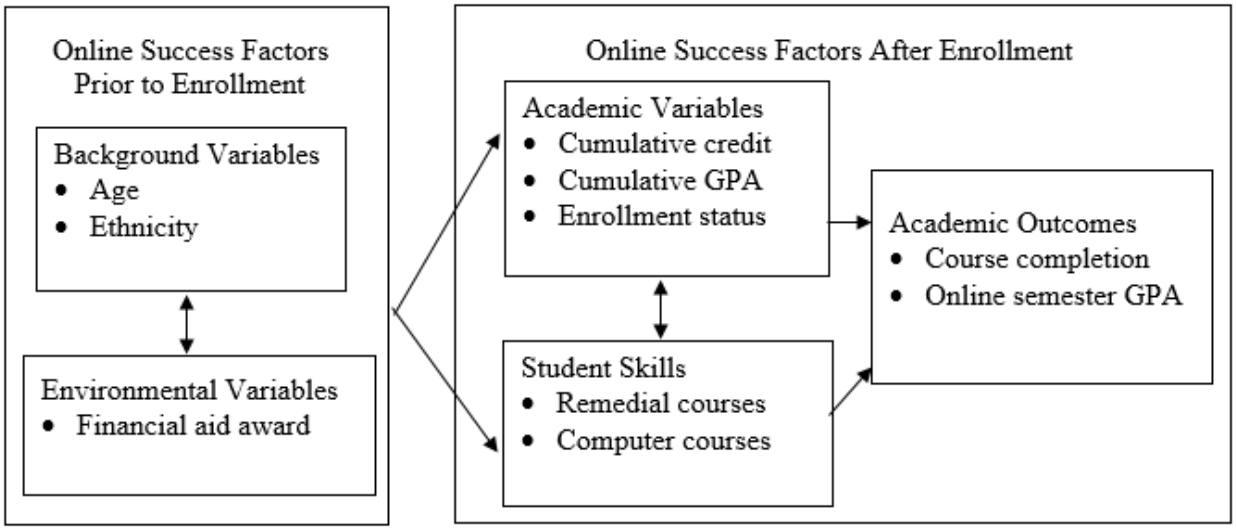

Figure 3. A Model of the Demographic and Academic Student Characteristics that Predict Online Student Success for the Online Only Student Group.

Implications

According to Lokken (2017), there are seven core challenges for distance education: student readiness, faculty training, quality course design, online course assessment, student completion, federal regulatory compliance, and increasing competition (p. 4). Research in this study was linked to two of these challenges: online student readiness and online student

completion. The purpose of this study was to identify which demographic and academic factors were significantly correlated to or predicted online success for community college students. Results of this study acknowledged particular demographic and academic student characteristics that played a significant role in online student success. When reviewing the findings generated by the six research questions in the study, each one had significant findings; some of these findings were also supported by the literature as previously described.

The trend to promote access to higher education has led to a growth in online courses; however, studies have shown success rates for online courses are consistently lower than on-campus course success rates, and they need to be improved so understanding what factors lead to online student success is especially important (Hachey et al., 2012; Lehman & Conceicao, 2014; Moore & Kearsley, 2012; Xu & Jaggars, 2011a, 2011b). Although the growth rate for distance education has slowed down, some higher education institutions are still planning expansion for online offerings. One current example is in California where the governor recently requested the community college system to develop a completely online college to further improve availability and affordability with more online courses and programs (Ashford, 2017). This proposed plan will likely serve more students and reach new audiences so the issue of online student success must be considered during the development phase. As colleges seek to increase online course and program offerings, the factors that have been identified as significant correlates and predictors of online student success through this study and other previous research should be examined so policies related to online enrollment along with systems of support for online students can be created and implemented at the time online courses and programs are launched.

As a growing number of college students take at least one online course, it is imperative for colleges to understand what factors lead to online student success, and to confirm online

students have clear expectations about what it takes to be successful in online courses. Colleges need to identify a variety of research-based strategies that lead students to succeed in online courses, and find ways to disseminate this information to online students so they know how online course requirements may be different from classes meeting on campus. As this study indicated, it is especially important to provide information and support for online students who are more likely to perform poorly in online courses such as those who have earned little or no previous college credit, are minorities, need remedial coursework, have never taken an online course, or have a low GPA. The results from this study can inform academic advisors who could suggest online students take fewer courses, avoid remedial courses, and complete a computer course prior to enrollment. Advisors could also recommend for students with a low cumulative GPA to avoid enrolling in online courses. Some of the challenges of online student success might also be counteracted by requiring students to complete an online learning orientation and readiness assessment prior to enrollment in their first online since some research identified these tactics had a positive effect on online student success (Cho, 2012; Fisher, 2010; Hall, 2011; Harrell, 2008; Jennings, 2013; Koehnke, 2013; Vaill, 2013).

Some of the differences noted in this study between students taking online courses along with courses in other formats and those students who are only taking online courses make perfect sense. Most (over 90%) of the online only students in this study were attending school part-time so they took fewer credit hours each semester and accumulated less credit each year as compared to online students taking a mix of course formats who were enrolled full-time. Online only students who attended part-time were also eligible for less financial aid as shown in the study. On the other hand, this study showed older students performed better in online courses, and online only students in this study were older than other online students taking a mix of course

formats, so it would have made sense for the online only students to have had a higher online GPA out of the two online students groups, but this was only the case for fall 2015 and not spring 2016. By the same token, when looking at the percentage of online and online only students who earned an online GPA of 2.0 or higher, it was anticipated online only students would have a higher percentage with an online GPA of 2.0 or higher, but instead the percentage was higher for online students overall instead of online only students for both semesters. Since this study had some inconsistent results about what specifically led online students in one group to succeed over another, more research should be conducted to further explore differences in online success between students taking online courses along with courses in other formats, and those taking courses only online. Additionally, more should be done to connect online students with online learning requirements before and during the semester in order to significantly impact online student success (Fisher, 2010; Hibbard, 2013; Lewis, 2010). It is very important for colleges to be able to serve online students completely at a distance to help them succeed; these students must have access to the same resources and services as available to on-campus students in order to ensure online student success.

Although this study confirmed that demographic characteristics of online students were less predictive of online student success than academic characteristics, these factors cannot be ignored. The average age of online students at the community college in this study decreased over the past ten years from an average of 26 years old to 25 years old. This trend is supported by the Lokken (2017) as part of the 2016 National eLearning Report that stated 53% of online community college students are between 18 and 25 years old. On the contrary, distance education was initially designed to serve older students who had a family and a job. Community college students, regardless of age, often have an adult lifestyle and are often working and

attending college part time and the flexibility of online courses are appealing (American Association of Community Colleges, 2017). Some research identified a significant difference between community college students who completed an online course and those who did not based on age; younger students were more at-risk for being less successful and they needed more support to succeed (Wladis et al., 2015; Xu & Jaggars, 2011b). Other studies found no significant differences between age and successful online course completion (Aragon & Johnson, 2008; Jost et al., 2012). Colleges need to track online enrollment trends regularly so as the demographic characteristics of online students shift they can ensure the online courses and programs offered are designed to meet and support the needs of all online learners who may enroll.

Not all significant research findings hold true in every situation or at all institutions. For example, as previously discussed, some research has shown higher online course success for older, female students who took fewer credit hours, and had previous college and online experience. Based on a qualitative study completed by Davidson (2016), success in the online course environment was possible at a community college for both traditional and nontraditional male and female online students even while they were working full- or part-time and taking 12 to 15 credit hours in a semester; these students were successful in their online classes regardless of their age, gender, enrollment status, previous college experience, or online course experience. Although this study identified a significantly higher percentage of females over males who were successful in online classes, the study also concluded that demographic characteristics were less predictive of online student success. Since academic characteristics in this study more conclusively predicted online success, colleges should use these data to create policies or procedures to better support online learners and promote online success.

The three main significant variables from this study to consider when implementing new policies or procedures related to enrollment in online courses include cumulative GPA, cumulative credit hours, and remedial courses. Based on extensive research about online student success conducted at community colleges and other types of higher education institutions, cumulative GPA has been a universal significant predictor of online student success. The research as previously described has shown students who have a higher cumulative GPA also have higher success in online courses. This study identified the majority of online and online only students who were successful had a cumulative GPA of 3.0 or higher. With this information, in increase online student success colleges should consider a recommended or required minimum GPA in order for students to register in online courses and remain in online programs. Another significant predictor of online student success was cumulative credit earned. As described earlier, students with a higher number of earned credit hours demonstrated higher online course success. Colleges should consider encouraging or requiring new college students to wait until their second semester or later to take online courses if they have no previous online experience to increase online student success. Finally, students who were taking remedial courses in this study had a significantly lower online GPA than those taking no remedial courses. Based on this finding, colleges should consider a policy of no concurrent online courses when students are registered in remedial courses to improve the odds of online student success.

In order to best serve online students it is important for students, instructors, and administrators to use existing research to identify more specifically what factors lead some students to succeed while others struggle in online courses. For community college students enrolled in online courses, some studies indicated it was critical to identify what was causing online students to struggle as early as possible so measures could be implemented to help online

students persist and succeed (Liu, Gomez, & Yen, 2009; Smith et al., 2012). This information will allow colleges to provide additional support and resources to help online students understand online course expectations prior to enrollment so they successfully complete online course materials. Using existing research findings, colleges can support online students before they enroll in an online course as well as throughout their online learning experiences, and implement policies and intervention strategies to have a positive impact on online student success.

Limitations

Although procedures were followed to make this study reliable, there were several limitations that should be discussed. First, these data were secondary and self-reported. Second, this college offers online courses, but it does not offer any degree or certificate completely online. Also, the format of online courses at this college permits instructors to require certain campus meetings. Finally, no analysis was completed specifically on the types of online courses taken, the extent of faculty training and experience, or the quality of these online courses in relationship to online student success. These limitations could be overcome through additional research.

The first limitation relates to the secondary data used for the study. These data were extracted by the college's IR department. Demographic data came from self-reported information gathered as part of the admission application and stored in the student record system. Although the application for admission had recently been converted to an electronic process, some applications were still submitted in paper form which required a manual data entry process from information received on the application. It is possible there were data entry errors or missing or inaccurate data based on answers the applicant did or did not provide as part of the application.

Another limitation was that the community college in this study did not offer completely online programs. This means online courses were just another course format option for students, and based on course availability students may have taken online courses even if it was not their preferred method of instruction. In addition, this college allows any student to enroll in online classes without understanding the nuances of taking courses in an online format. Furthermore, this community college also permits instructors to require students taking online courses to come to campus for an orientation session, or to take exams in the testing center during the semester. All of these factors can negatively impact students who enroll in an online class at this community college because students may not know what to expect when taking online courses, and believe they will be able to complete the online course entirely at a distance.

Lastly, and most importantly, this study did not examine the type of online courses taken, the quality of the online courses, or the experience and training of faculty members teaching in the online environment which are all critical factors for online student success. Online courses from different disciplines do not have the same level of difficulty, and they require different skills which also impacts online student success. The training and support for faculty teaching online classes varies from college to college. Some colleges have more robust faculty training opportunities, while other colleges have very little training available. This community college requires all faculty to take one specific training course to help them develop and teach their first online course; however, after that required online course development training no additional training courses are required for faculty to further enhance their online teaching skills prior to teaching additional online courses. The level of experience an online faculty member has teaching online will significantly impact the online student experience and ultimately the success of the online students. There is often no mandated consistency in structure between online course

sections so with hundreds of online course sections available and a wide variety of faculty, both full- and part-time, teaching these courses, online students do not all have the same quality of online experiences.

Despite the limitations of this study, valuable results were obtained for data that were currently available and had not been thoroughly investigated at this community college. Many of the significant findings from this study supported outcomes identified in previous research. Moreover, some of the variables used in the study had not been well researched yet which added value to the existing literature about online student success and gave more significance to the findings. The limitations of this study led to a variety of recommendations for the focus of future research projects related to online student success.

Recommendations for Future Research

This study examined two semesters of existing data for online students at one public Midwestern community college. Based on the limitations previously described, it is necessary to pursue additional research to build upon and validate these findings. First, this study should be repeated at different types of institutions including community colleges with completely online programs. Next, longitudinal studies should be conducted since much of the research involves only a semester or two of data. Additionally, qualitative research should be conducted to supplement these quantitative results. Furthermore, more research into the success of different online student populations should be completed. Finally, the types of online courses in which students succeed should be examined to help determine more about the quality of these courses. Gathering additional research related to online student success is necessary to help counteract low online student success rates identified in this study as well as in other studies.

It is important to repeat this study at other community colleges of different sizes and different locations along with four-year colleges and universities, both public and private, to confirm results can be generalized across populations. There are thousands of students who take at least one credit bearing online course each semester at this Midwestern community college. Most of the research examined in conjunction with this project were data analyzed over a short period of time.

Another recommendation would be to complete a longitudinal study by formally tracking online students and their success in online courses across semesters and from year to year to identify other patterns of online success. This tracking should start from the semester in which students take their first online course. Looking at student course taking patterns, online course success across semesters, and progress toward degree completion is a critical piece in online student success. It would be interesting to compare results of this study with research from community college students who were able to take their entire program online since students at this college do not have that option. With so many mixed findings and variations in students and institutions, research is still needed to pinpoint the factors the lead to online community college student success and ultimately to program completion.

Furthermore, this study involved a limited dataset and only quantitative data analysis so it would be important to gather qualitative data to help further explore and confirm the factors that impact online students and their success in online courses. Quantitative data analysis in this study provided solid background information and trends for the current state of online student success at this community college; however, a related follow-up qualitative study would allow additional insights to be collected directly from online students and online faculty about what leads to online community college success. These new insights would help validate the

quantitative findings, and develop a deeper understanding of these data from the perspective of user experiences. Goertzen (2017) noted the following significant limitation to quantitative research: "findings generated from quantitative research uncover behaviors and trends…it is important to note that they do not provide insight into why people think, feel, or act in certain ways" (p. 12). To help fill this observed data gap, interviews or focus groups with online students could help verify and elaborate on the findings from this quantitative study. In addition, speaking directly with online faculty members would be valuable because they can describe the design of the class, the types of assignments used, and the level of interaction and participation required for student success in their online classes.

This study examined two different online student populations while fewer other studies separated out online only students from online students who also took courses in other formats. More research is needed to compare these different online groups because there were some differences between online student groups identified in this study as well as previous research. Future research should also include studies that address essential areas related to online course quality and faculty training and experience because these factors also influence online student success.

It would also be beneficial to assess the types of online courses, and online course quality as they relate to online course success. This would involve gaining access to review related online course syllabi and online course sites for a variety of classes. This course audit would also include reviewing student engagement and interaction within the online learning environment. This examination would help verify the level of accuracy of the analysis completed in this current study, and draw additional conclusions about online student success based on the quality and content of online courses. Gathering specific information about the quality and type of

online courses students completed successfully would help better interpret and draw conclusions about students' online success overall.

Colleges continuously collect data for enrolled students related to their success, but these data are not always analyzed in depth for all student populations. Data related to online students that are readily available should be examined on a regular basis. First, quantitative analysis of existing data can been conducted to identify patterns and trends. Then, additional qualitative research can be completed to further support these findings. Finally, in depth review of online course content and quality along with faculty training and experience teaching in the online environment are also critical factors for online student success. It is important for colleges to examine existing online student data along with findings from related research as well as to generate new research that will identify ways to help promote and improve online student success on their campuses.

Conclusions

Overall, this study provided useful information about various demographic and academic factors that impact online community college student success. Online classes serve an important role at community colleges, but this role is often different than at other colleges and universities that offer programs completely online. Including online courses as options for community college students is imperative because it often allows some students to take additional classes or to remain enrolled within a program even as their situation or responsibilities change. Not all students come to college intending to take courses in an online format, but some find themselves enrolled in online courses based on course availability or changing circumstances related to family or work responsibilities (Davidson, 2016). Online courses require different skills for both the student and the instructor so adequate support is required to make them both successful. As

colleges continue to increase online course offerings special attention should be given to online student success rates.

The research conducted as part of this study added significance and support to the existing literature focusing on the performance of online students. Based on the study results, the initial conceptual model of online student success was modified to display significant predictors of online success for online students as well as online only students. Overall, this study revealed demographic characteristics were less predictive of online student success than academic characteristics. Although specific findings from this study cannot be generalized to all types and sizes of institutions, when this information is used in conjunction with previous research findings there are several academic online student characteristics that clearly have a significant impact online student success including cumulative GPA and cumulative credit hours. Online courses provide a great service to various populations of higher education students, but if online students are not successful this service is irrelevant. Colleges need to examine these identified predictors of online student success, and use this information to identify ways to help more online students succeed.

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APPENDIX A: FACTORS PRIOR TO ENROLLMENT THAT IMPACT

ONLINE STUDENT SUCCESS

Factors	Significant Correlate or Predictor of Student Success		No Significant Relationship Identified
	Positive	Negative	
Age	**Cummings, 2009**; **Davidson, 2017**; **Doherty, 2006**; **Gregory, 2016**; McPhaul-Moore, 2013; **Moore et al., 2002**; Muse, 2003; Porta-Merida, 2009; Riordan, 2013; Williams, 2008; **Wladis, Conway, & Hachey, 2015**; **Wojciechowski & Palmer, 2005**; **Xu & Jaggars, 2013**	n/a	Akpom, 2013; **Aragon & Johnson, 2008**; Foster, 2012; **Gibson, 2015**; **Jost, Rude-Parkins, & Githens, 2012**; Riordan, 2013
Distance from campus	n/a	**Hawkins, 2012**	**Davidson, 2017**
Ethnicity (non-minority)	Berling, 2010; Bull, 2015; **Davidson, 2017**; **Moore et al., 2002**; Palacios & Wood, 2016; Porta-Merida, 2009; **Rodriguez, 2011**; Williams, 2008; **Xu & Jaggars, 2013**	n/a	**Aragon & Johnson, 2008**; **Gibson, 2015**; **Jost, Rude-Parkins, & Githens, 2012**; **Wladis, Conway, & Hachey, 2015**
Financial Aid Award	Bull, 2015	**Davidson, 2017**; **Gregory, 2016**; **Rodriguez, 2011**	**Aragon & Johnson, 2008**; Berling, 2010; Foster, 2012, **Gibson, 2015**; Riordan, 2013
Gender (Female)	**Aragon & Johnson, 2008**; **Davidson, 2017; Doherty, 2006**; Porta-Merida, 2009; W**ladis, Conway, & Hachey, 2015**; **Xu & Jaggars, 2013**	n/a	**Akpom, 2013**; **Berling, 2010**; Bull, 2015; **Cummings, 2009**; Foster, 2012; **Gibson, 2015; Gregory, 2016**; **Jost, Rude-Parkins, & Githens, 2012**; **Moore et al., 2002**; Riordan, 2013; Wilson & Allen, 2011; **Wojciechowski & Palmer, 2005**
Marital Status (married)	**Gregory, 2016**	n/a	n/a
Time since last course	Muse, 2003	**Davidson, 2017**	n/a

Note: Studies in **bold** used existing community college data.

APPENDIX B: FACTORS AFTER ENROLLMENT THAT IMPACT ONLINE STUDENT SUCCESS

Factors	Significant Correlate or Predictor of Student Success		No Significant Relationship Identified
	Positive	Negative	
Cumulative GPA	**Akpom, 2013**; **Aragon & Johnson, 2008**; Berling, 2010; Bull, 2015; Cochran, Campbell, Baker, & Leeds, 2013; **Cummings, 2009**; **Davidson, 2017;** Dupin-Bryant, 2004; Foster, 2012; **Gibson, 2015**; Harrell & Bower, 2011; **Hawkins, 2012**; **Jost, Rude-Parkins, & Githens, 2012**; McPhaul-Moore, 2013; Muse, 2003; Porta-Merida, 2009; Riordan, 2013; **Rodriguez, 2011**; Smith, 2005; Wilson & Allen, 2011; **Wladis, Conway, & Hachey, 2015**; **Wojciechowski & Palmer, 2005**; **Xu & Jaggars, 2013**	n/a	n/a
Computer skills/ technology experience	**Davidson, 2017;** Dupin-Bryant, 2004	Harrell & Bower, 2011	Akpom, 2013; **Cummings, 2009**; Muse, 2003; Riordan, 2013; Shaw, Burrus & Ferguson, 2016
Course withdrawals	n/a	Cochran, Campbell, Baker, & Leeds, 2013; **Davidson, 2017**; **Wojciechowski & Palmer, 2005**	n/a
Cumulative credits	Berling, 2010; Bull, 2015; Cochran, Campbell, Baker, & Leeds, 2013, **Cummings, 2009**; **Davidson, 2017**; **Doherty, 2006**; Dupin-Bryant, 2004; Foster, 2012; **Gregory, 2016**; **Moore et al., 2002**; Smith, Lange, & Huston, 2012; Wilson & Allen, 2011; **Wojciechowski & Palmer, 2005**	**Rodriguez, 2011**	n/a
Enrollment status	**Aragon & Johnson, 2008**; **Smith, Lange & Huston, 2012**	**Davidson, 2017**; **Doherty, 2006**; **Gregory, 2016**; **Hawkins, 2012**; **Moore et al., 2002**; Riordan, 2013; **Rodriguez, 2011**	**Akpom, 2013**; Muse, 2003; **Wladis, Conway, & Hachey, 2015**; **Wojciechowski & Palmer, 2005**
Online course experience	**Davidson, 2017**; Dupin-Bryant, 2004; **Hachey, Conway, Wladis, 2013**; **Hachey, Wladis, & Conway, 2012**; McPhaul-Moore, 2013; **Moore et al., 2002**; Porta-Merida, 2009; Williams, 2008; **Wladis, Conway, & Hachey, 2015**; **Wojciechowski & Palmer, 2005**; **Xu & Jaggars, 2011b**	Smith, 2005	**Apkom, 2013**; Muse 2003
Remedial coursework	n/a	**Davidson, 2017**; Fisher, 2010; **Hachey, Wladis, & Conway, 2012**; Harrell & Bower, 2011; **Jost, Rude-Parkins, & Githens, 2012**; **Xu & Jaggars, 2011a, 2011b, 2013**	**Aragon & Johnson, 2008**

Note: Studies in **bold** used existing community college data.

APPENDIX C: RESEARCH USING EXISTING DATA TO EXAMINE

FACTORS OF ONLINE COURSE SUCCESS

Author(s)	Year	Source	Data Type
Apkom	2013	Dissertation	Community College
Aragon & Johnson	2008	Article	Community College
Berling	2010	Dissertation	Four-year college
Bull	2015	Dissertation	Four-year college
Cummings	2009	Dissertation	Community College
Davidson	2017	Dissertation	Community College
Doherty	2006	Article	Community College
Foster	2012	Dissertation	Four-year college
Gibson	2016	Dissertation	Community College
Gregory	2016	Dissertation	Community College
Hachey, Wladis, & Conway	2012	Article	Community College
Hawkins	2012	Dissertation	Community College
Jost, Rude-Parkins, & Githens	2012	Article	Community College
Moore, Bartkovich, Fetzner, & Ison	2002	Article	Community College
Rodriquez	2011	Dissertation	Community College
Smith, Lange, & Huston	2012	Article	Four-year college
Wladis, Conway, & Hachey	2015	Article	Community College
Wladis, Wladis, & Hachey	2014	Article	Community College
Wojciechowski & Palmer	2005	Article	Community College
Xu & Jaggars	2011	2 Articles	Community College
Xu & Jaggars	2013	Article	Community College

APPENDIX D: APPROVED INSTITUTIONAL REVIEW BOARD

RESEARCH PROPOSAL FORM

Date Submitted: 5/2/2017

[redacted] COMMUNITY COLLEGE
INSTITUTIONAL REVIEW BOARD
RESEARCH PROPOSAL FORM

I. Basic Information

Title of Research Project: *Student Demographic and Academic Characteristics that Predict Community College Student Success in Online Courses*

Principal Investigator/Project Director: *Jennifer Davidson* Department: *Academic Services*

Email Address: [redacted] Phone: [redacted]

Projected Start Date of Research: 5/15/2017

Projected Duration of Research: *6-9 months* Funding Source: *Not Applicable*

Co-Investigator (if applicable): Enter text. Co-Investigator Institution: Enter text.

Co-Investigator Department: Enter text. Co-Investigator Email Address: Enter text.

Other organizations and/or agencies, if any, involved in the study: *Illinois State University (this project is for my Ph.D. dissertation. My advisor is Dr. Mohamed Nur-Awaleh.)*

II. Summary Abstract

Please attach a summary abstract to this form that addresses the following questions:

A. Objectives/goals of the research (What are the goals of the research? What are the research questions?)
B. All subjects or participants in the research (Who will be the participants? How many participants?)
C. Recruitment of research subjects (What procedures will be used to recruit participants? Any incentives?)
D. Location(s) of the research (Where will research be conducted? Any location outside of [redacted]?)
E. Procedures to be used for data collection (What are various methods that will be used to collect data?)
F. Benefits/risks (What are the potential benefits and risks associated with your study?)
G. Confidentiality of Data (Describe procedures that will be used to ensure confidentiality and protection of data, where and how data will be stored, who will have access, and how it will be eventually destroyed)
H. Dissemination of Results (Describe any plans for publication, presentation, or dissemination of results)

III. Additional Information

Attach copies of all the protocol to be used in the research study (e.g. questionnaires, surveys, recruitment letters, flyers, focus group questions, etc.) and, if applicable, the Informed Consent Form(s).

IV. Signatures

I certify that the information provided in this application, and in all attachments, is complete and correct.

Jennifer Davidson 5-5-17

Investigator/Project Director Signature Date Co-Investigator (if applicable) Date

For Institutional Review Board Chair:

Signature of IRB Committee Chair:			Date: 5/16/17
IRB Chair: (Check 1 Box)	☑ Approved	☐ Approved w/ Conditions	☐ Not Approved
LEVEL: (Check 1 Box)	☑ 1, Exempt; Research Office Only	☐ 2, Subcommittee Review	☐ 3, Full Committee Review