

DIFFERENCES IN GRADE POINT AVERAGES AS A FUNCTION OF CREDIT
ATTAINMENT FOR STUDENTS AT A TEXAS 4-YEAR PUBLIC UNIVERSITY

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DEDICATION

I dedicate the completion of this dissertation first to my Lord and Savior, Jesus Christ. Without you, nothing is possible. To my wife, Sara, and two children Luke and Kate: You are everything to me, and the completion of this endeavor is a testament to strength and love you give me. Sara your easygoing and calming nature are the perfect antidote to my hardheaded stubborn persistence. I share this distinction with you, as you bring the best out of me and I could not have done it without your support and keeping the family going in my many absences. Lastly, I dedicate the completion of this dissertation to my parents. Growing up my parents instilled in my sister and me the importance of education. Mom and dad, you have supported me every step of the way from kindergarten to this point. I cannot express how much that has meant to me. I am forever in your debt. I share the completion of this dissertation with you as well.

ABSTRACT

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Purpose

The purpose of this study was multifaceted. One goal of this quantitative study was to determine if GPA differences exist for students as a function of their pathway of credit attainment (i.e., dual credit, transfer credits, or first-time undergraduate students who obtain all credits at one institution). The three pathways examined included earning dual credits in high school, attending a 2-year institution then transferring to a 4-year institution, and students earning all credits at a 4-year institution. Students' GPA averages were examined at the following levels: 30 credits earned, 60 credits earned, 90 credits earned, and degree completion from a Texas state funded institution for the 2005-2006 through the 2015-2016 academic years. This study expanded on what was known about the three pathways individually, but also built the foundation for what was not known about the three pathways comparatively. This study also provided students a blueprint for earning college credits and ultimately leading to the greatest overall academic performance (i.e., higher GPAs).

Method

To examine the research questions, a Multivariate Analysis of Variance (MANOVA) and General Linear Model (GLM) were used to investigate whether the independent variables predict the dependent variables of GPA at various points across credit attainment. Grade point averages at graduation revealed statistically significant results ($p < .001$) for all relationships. Utilizing a cross-sectional, non-experimental study combined with student

records from a 4-year public university in Texas, the researcher examined the change in variance for credit attainment pathways and GPAs at specific points in students' educational experience. Different credit attainment options served as the independent variables. Exploring differences in GPAs at 30 credit hours earned, 60 credit hours earned, 90 credit hours earned, and graduation represented the dependent variables.

Findings

In summary, statistically significant differences for each of the research question indicated variance was present for the three pathways comparatively at the four different GPA values. Students with dual credit experience graduated with a 3.31 GPA average. Community college transfer students graduated with the second highest average GPA of 3.20, followed by first-time undergraduate students graduating with a 3.12 average GPA. Students in each of the three pathways experienced GPA increases from 30 credit hours earned to graduation. Results, discussion, implications and recommendations for future research were discussed.

KEYWORDS: 4-year university, GPA, Community college, Dual credit, First-time undergraduate, Texas

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CHAPTER I

INTRODUCTION

Success in college is not achieved only by attending classes but, in part, by also completing degrees (Tinto, 2012). Worldwide, educated and younger populations produce the most competitive workforces (Texas Higher Education Coordinating Board, 2017b). However, decreasing enrollment trends for 4-year private universities and 2-year public institutions (National Student Clearinghouse Research Center, 2017) combined with competitive admissions standards, and test scores (Fauria & Fuller, 2015) make higher education success a concern for many students. Texas took bold steps in 2000 with its, *Closing the Gaps by 2015* statewide plan to bring higher education enrollment to the forefront of state concerns (THECB, 2015a). Increased enrollments and degrees awarded validated the program's success. Increases in the number of high school graduates enrolling in college immediately after high school completion were up 6% from 2000 to 2015 (U.S. Department of Education, 2017).

Texas nearly met the *Closing the Gaps by 2015* ambitious goal of increasing higher education enrollments by the fall of 2015. The goal of 630,000 additional students enrolled in higher education by fall of 2015 only fell short by 25,000 students (THECB, 2016a). Following the completion of the *Closing the Gaps by 2015* program, a newly established 15-year program for higher education in Texas began, titled the *60x30TX* plan. The *60x30TX* plan strives for 60% of 25- to 34-year old Texans to hold some type of degree or certificate by the year 2030 (THECB, 2015a). The *60x30TX* plan does not focus solely on academic success but also in student loan debt and identification of marketable skills for students. Along with the *60x30TX* plan, the Texas Legislature also

adopted initiatives affecting higher education. The Texas Legislature increased investments for financial aid in the amounts of \$62.7 million towards Texas Grants and \$12.2 million to Tuition Equalization Grants, thus making higher education possible for the financially needy (THECB, 2015d). In addition, the Texas Legislature directed the Texas Higher Education Coordinating Board (THECB) to develop defined pathways from high school to higher education for students (THECB, 2015d). Each of these efforts is in direct response to Texas' globally- and nationally- poor performance in the number and percentage of citizens with degrees (THECB, 2015a). Clearly, degree completion has become a priority for Texans, policy makers, and institutions of higher education.

Projections indicate Texas higher education enrollments could reach 732,000 students for public universities and 837,000 students for public two-year colleges by 2030 (THECB, 2017c). In 2015, nearly 30% of public universities in Texas had open admissions policies, accepting all applicants (U.S. Department of Education, 2016). Students entering Texas 4-year universities have different higher education experiences, including credits from community colleges, technical colleges, and dual credits earned in high school (THECB, 2017d). The THECB (2017d) identified nearly 73% of public 4-year university students as having credits from community colleges in 2016. Additionally, in 2016, less than one-quarter of students graduating earned all credits at a single institution. Enrollment at multiple institutions is not just a trend in Texas; it has become the norm.

Higher education affords students benefits including enhanced capacities for learning, increased earnings, and economic stability in years following higher education. Earning dramatically higher wages (U.S. Department of Education, 2016) and increased

earnings as workers age (Ma, Pender, & Welch, 2016), are some of the advantages of higher education for degree completers. First-year actual wage earnings increased with each awarded degree for 2014 graduates (THECB, 2017b). According to the Texas Higher Education Coordinating Board (2017b), individuals with a bachelor's degrees actual first-year earnings for 2014 was \$42,569, above the first-year actual earnings of 2014 associate's degrees graduates of only \$34,057. Additionally, master degree recipients' actual first-year earnings for 2014 graduates increased above the bachelor's degree recipients' to \$63,731, with doctoral degrees recipients' actual first-year earnings topping the list at \$75,559 (THECB, 2017b). Increased first-year actual earnings are only one aspect of college attendance and completion.

Though motivated, reaching degree completion is only one of the many challenges students face. The first year represents a volatile time for students and early academic failures can affect students' future successes. Academic support in the first year comes at a time when students are still receptive to the institution's involvement (Tinto, 2012). Additionally, students develop a sense of belonging to an institution based on the social entities encountered on and off campus (Tinto, 2012). Higher education institutions have an obligation to take care of students but also to ultimately get students to reach graduation (Tinto, 2012). Reaching Texas' *60x30TX* completion goals will require numerous strategies. Higher education institutions must provide support (i.e., academic and social) for students to increase retention and academic performance (Tinto, 2012). To attain institutional, state, and professional goals, student retention must remain at the forefront of institutional planning, policy, and practice.

Identifying predictors for student success plays a role in increasing retention for students through active programming and service provision. Grade point averages represent reliable and creditable depictions of student performance (Clark, 1964). Using cross-sectional data and large sample sizes allows for the detection of even small influences on grade point average [GPA] (Fuller, Wilson, & Tobin, 2011). Predicting student's GPA at graduation allows higher education institutions to focus on weaker performing students earlier on and provide academic support (Tekin, 2014). With over 850,000 students enrolled in Texas two-year institutions in 2016, Texas had over 60% of students in the Fall 2015 cohort report not being college ready (THECB, 2017b). During the same time, 17% of university students also reported not being college ready (THECB, 2017b). Additionally, tuition rates for the 2014-2015 academic year averaged \$7,870 at four-year universities (THECB, 2017b). High tuition rates and low levels of student college readiness necessitate academic pathways that realistically and effectively support student success.

Grade point average represents the foundation for achievement standards in higher education and degree completion. Factors, such as student's personality and motivation to study (Kappe & Flier, 2012) affect a student's GPA. Motivation to study represents a willingness to learn new knowledge or skills for individual development (Kappe & Flier, 2010). Determining what factors exert the strongest influence on GPA allow for guided pathways for students to best navigate through higher education institutions and ultimately reach degree completion. Though representing only a portion of students' academic experience, GPA represents an important aspect of academic experiences. As such, studies of GPA's influences student persistence and success may

prove beneficial to program and service providers, policy makers, and, ultimately, students.

Background of the Study

Meeting the lofty goal of the *60x30TX* plan for 60% of 25- to 34-year old Texans to hold some type of degree or certificate by the year 2030 will require comprehensive in-depth analyses of pathways to degree attainment. In 2015, the Texas Legislature passed HB 505. HB 505 lessened the restrictions Texas previously had only allowing eleventh- and twelfth-grade students to participate in dual credit (Miller et al., 2017), further expediting the need for students to make informed decisions about higher education opportunities early on. HB 505 allowed any high school student to have access to dual credit courses as long as students met the requirements. With dual credit serving as the one of the earliest pathways to higher education, it is imperative to determine if this route correlates to academic success (i.e. higher GPAs). House Bill (HB) 505's enabling of even younger students to participate in dual credit opportunities potentially encourages students to participate in the pathway of higher education perhaps leading to the highest academic successes (Miller et al., 2017). Dual credit participation, attending a community college and transferring to a 4-year institution, or attending and receiving all college credits from a single 4-year institution; all provide pathways for degree attainment and the possibility of graduation.

Dual credit is one pathway students can take to earn college credits. Dual credits enrollment increased 650% from the fall of 2000 to the fall of 2015 (THECB, 2016b). The cost of administering dual credit programs is determined at the local level. However, most community colleges waived all or part of the cost of dual credit for students

(THECB, 2016b). As for time to complete a 4-year degree, dual credit students took half an academic year less to complete a 4-year degree compared to students not participating in dual credit programs (Miller et al., 2017). Hispanic, White, and Black students at a community college district in Texas all had higher first semester GPAs compared to their respective ethnic peers who did not participate in dual credit (Behnke, Slate, and Young, 2017). Dual credit students had, at a minimum, .24 grade points higher than non-dual credit students of the same race. Even with the increased enrollments in dual credit, some students choose a different pathway for higher education.

Students enrolling at a community college after high school serves as another choice for students seeking a higher education degree. Wang (2012) noted, student's community college GPA is a strong predictor of academic performance at 4-year institutions. However, loss of course credits not transferring to a 4-year institution is a problem associated with attending a community college (Monaghan & Attewell, 2015). Students also have the option to forgo dual credit opportunities in high school or transferring from a community college into a 4-year institution by directly enrolling in a 4-year institution after high school completion with no dual credit hours. Students entering directly from high school to a university are more likely to be college ready (THECB, 2017b). Additionally, Andrews, Li, and Lovenheim (2014) identified students receiving all coursework at a single Texas institution graduated quicker compared to transfer students. One benefit for students entering directly into a 4-year university is a decreased time to graduation. Furthermore, students entering college at age 18 and graduating in four years can, in the first year after college graduation, expect to earn equivalent to the median high school graduate's salary by the age of 34 (Ma et al., 2016).

In summary, entering a 4-year university directly allows students to graduate faster and have potential future earnings surpassing non-college attendees in shorter time frames.

Access to higher education can involve several different pathways for students. Selecting the pathway best aiding student's chances of success is a goal of secondary and postsecondary institutions. Specific analyses of Texas' contexts are needed to determine how, if at all, each of the aforementioned pathways to degree completion realistically support student degree attainment. Armed with results from such analyses, high school, community college, and university advisers and staff can better guide students into pathways likely resulting in success. Moreover, identifying the educational pathway best suited for student success better enables Texas to meet the goals of the *60x30TX* plan.

Statement of the Problem

Projected enrollment increases in higher education (THECB, 2017c) and legislative funding for higher education (THECB, 2015d) look to shape higher education and the future workforce in Texas. National projections indicate individuals 55-years of age and older will occupy more of the labor force in 2060 compared to 2015 (Toossi, 2016), thus replacing this older workforce in the coming years is a necessity. Similarly, Hispanics are projected to occupy an increased percentage of the labor force from 2015 to 2060 (Toossi, 2016). Texas faces similar trends in workforce projections (THECB, 2017c). The *60x30TX* plan seeks to meet the needs of the labor force with focus on students acquiring marketable skills needed for the workforce in conjunction to achieving degree completion (THECB, 2015a).

Increasing degree completion in higher education is accomplished through multiple pathways for credit attainment. Students enrolling in dual credit in high school

have the ability to enter the labor force sooner than students who did not participate in dual credit (THECB, 2008). Community colleges allow for credit attainment at a fraction of the cost of 4-year universities, resulting in less debt accrued (Ma & Baum, 2016). However, first-time undergraduate students earning all credits at a single institution wave the risk of transfer shock (Hills, 1965). Earning higher education credits via dual credit, transferring from a community college, and acquiring all credits at a single institution, all allow students the ability to work towards graduation. However, comparisons have mainly focused on two of the three different pathways to degree attainment. While all three are viable options through which many students progress toward degree attainment, a clear comparison of these three pathways has not emerged. Sufficient data at the statewide level does not exist for comparisons of all three pathways collectively. Comparing the influence of these pathways on various academic indicators such as GPA will support enhanced services to college-going students, thereby supporting Texas' goals of increased student attainment.

Purpose of the Study

The purpose of this study was multifaceted. Different pathways enhance students' capacities to earn college credits. Students are able to earn credits via dual credit courses in high school, attending a 2-year or community college after graduation, or by becoming first-time undergraduate students who earn all credits at a single 4-year institution. Understanding how selection into one of these pathways enhances or hinders students' capacity to complete a degree is of critical importance to students, their families, and the State of Texas.

One goal of this quantitative study was to determine if GPA differences exist for students as a function of their pathway of credit attainment (i.e., dual credit, transfer credits, or first-time undergraduate students who obtain all credits at one institution). Grade point average is not a sole indicator of academic performance. However, Tinto's model (1975) regarding student acclimation into an institution and the subsequent effect on attrition, illustrates the importance of student academic achievement. For Tinto, academic achievement is achieved, partially, in the form of degree completion and higher GPAs. This study expanded on what was known about the three pathways individually, but also built the foundation for what was not known about the three pathways comparatively. If any differences existed regarding the three different pathways, it allowed students and advisers to make informed decisions regarding students' academic futures. In an age when degree tracks and information is more readily available online to both students and the public, better analysis comparing the major pathways to earn college credits is needed to provide transparent data for both students and the public.

Students finding a pathway best suited for their academic success also enables the State of Texas to meet lofty goals laid out in the *60x30TX* plan. Students focus on the single goal of college completion and the State is pushing for 60% of 25- to 34-year old Texans to hold some type of degree or certificate by the year 2030 (THECB, 2015a). These two goals are intertwined. Allowing students to make better-informed decisions, thus resulting in better academic performance and eventual degree completion, benefits both the State of Texas and students.

Informed decisions for students allows for the possibility of better academic performance but this could also lead to less college debt for students. In 2015, students

receiving a bachelor's degree in Texas in 2015 graduated with over \$30,000 in student debt (THECB, 2017b). Of those graduating students, over 60% had some sort of loan debt (THECB, 2017b). One of the additional goals of the *60x30TX* plan is to keep the number of students graduating in Texas with loan debt under 60% (THECB, 2015a). Keeping loan debt down for students is not just a concern then for students and families but rather the state as well. This study also provided students a blueprint for earning college credits and ultimately leading to the greatest overall academic performance (i.e., higher GPAs). Identifying the pathway best suited for students to prosper correlates with a potential decrease in the number of courses dropped and thus retaken multiple times. Furthermore, better academic success allows for more integration into the institution and higher likelihood for degree completion (Tinto, 1975). All of this combined means students can look at earning college credits in the most efficient means possible in order to reduce overall costs and time to degree completion. Though academic performance for this study is only measuring GPA differences, these differences enable students to reduce loan debt by potentially taking less courses because of their academic successes. For students' academic successes, it is imperative to determine what pathway of earning college credits correlates with increased academic performance and thus higher GPA averages. It is important for 4-year institutions to be able to determine what credit attainment pathway will have higher GPA averages, therefore performing better academically. Students can determine what pathway of credit attainment leads to better academic performance, hence allowing a more prescribed educational track to follow.

Assuming community college students perform academically better compared to their non-community college counterparts, community colleges benefit from comparing

students to other non-community college educated students. Secondary school administrators can also benefit from analyses of these data. Data regarding dual credits participants' academic performance compared to other credit attainment pathways (i.e., transferring credits from community college, or first-time undergraduate students who obtain all credits at one institution) gives statistical evidence to support the keeping or disregarding of dual credit programs. Extensive research exist on each subject individually as well as comparing two of the three pathways; however, research is limited in a comparison of all three pathways. Determining the pathway where academic performance is maximized (i.e., higher GPAs), allows students to make informed choices as it pertains to acquiring academic credits.

To reiterate, the purpose of this study was multifaceted. This study helped to differentiate between distinct pathways for students, helps students and advisers make informed educational decisions, and potentially reduces student's loan debt. These purposes related to student's persistence in college and degree completion, both of which are affected and indicated, in part, by a student's GPA. Using Tinto's model (1975) as a Conceptual Framework (explained in detail later) this study informed policy makers, students, and institutional leaders about differences between the different pathways (i.e., dual credit, transfer credits, or first-time undergraduate students who obtain all credits at one institution) to better inform students.

Significance of the Study

Earning college credits has numerous pathways for students, including participating in dual credit courses prior to college enrollment, enrolling at community colleges, or acquiring all credits at a 4-year institution. Students need to make informed

decisions as to the pathway best suited for their respective goals. One benefit to making the best decision is cost savings for students. Students on average in 2015 spend just under \$2,000 on average tuition and fees at public 2-year institutions and nearly \$8,000 on average tuition and fees at public 4-year institutions (THECB, 2017b). Nationally, a 2014 report identified students earning 2-year associate's degrees incurred over \$15,000 a year in tuition rates and \$35,000 in lost wages for being enrolled in school and not working for the year (Complete College America, 2014). Students earning a 4-year bachelor's degree incurred similar rates with over \$20,000 a year in tuition rates and over \$45,000 in lost wages (Complete College America, 2014). Texas students represented nearly exactly the same rates at the national average (Complete College America, 2014). This same report identified all total nationally students, both 2- and 4-year, lose over 19 billion dollars a year total from tuition and public investments (Complete College America, 2014). The longer students are in school, the higher the likelihood students incur more tuition costs and lost wages. This study aided students by informing them about the strengths and opportunities associated with varying pathways to degree completion.

Students failing to perform academically could result in enrollment in additional courses. Each additional course potentially adds to the total money spent in college and time it takes a student to get out of debt following college. Growing student debt has caught the attention of the state with specific goals of the *60x30TX* plan to address managing student's loan debt (THECB, 2015a). Students, faculty, administrators, and even parents all see firsthand the effect loans and debt have on students. This study

provided framework to begin to maximize efficiency for students earning college credits by demonstrating the pathway best suited for students' academic success.

A second benefit to having better knowledge of pathways is a decrease in time to graduation and wasted credits. Nationally, data from a 2014 study indicated students earning an associate's degree accumulated 81 credits compared to the only 60 credits needed to graduate. Similarly, students earning a bachelor's degree accumulated 134 credits compared to the typical 120 credits needed for graduation (Complete College America, 2014). Acquiring credits not counting toward degree completion contributed to wasted expenses for students and contributes to additional semesters in which a student could depart from college prior to degree completion.

Lastly, students' time to graduation is affected by a lack of knowledge about degree pathways. Nationally, only 14.7% of students earning an associate's degree from 2-year public institutions between July 2014 and June 2015 did so in two years. Furthermore, over 30% of those same students took over six years to earn an associate's degree (National Student Clearinghouse Research Center, 2016). As for students during the same timeframe earning a bachelor's degree from 4-year public institutions, 37.5% earned the degree in 4 years. Over 14% took more than eight years to earn the same bachelor's degree (National Student Clearinghouse Research Center, 2016). Sustaining enrollment in higher education for such lengthy periods of time can be costly and draining for students. Providing research on pathways toward degree completion can aid in this issue.

As for enrollment rates, it took students earning an associate's degree from 2-year public institutions between July 2014 and June 2015, 3.4 years to graduate and their 4-

year respective counterparts 5.2 years to graduate (National Student Clearinghouse Research Center, 2016). Additionally, of the students attending 2-year institutions over 25% attended more than one institution; whereas, over 55% of students attending 4-year institutions attended more than one institution (National Student Clearinghouse Research Center, 2016). Informed decision regarding the different pathways allows students to better navigate college, thus reducing lost credits, wasted tuition and college costs, and a decreased time to graduation. Each of these benefits to informed pathways of student completion can enhance students' experiences in higher education and improve Texas' attempts to graduate more students in a timely fashion.

Research Questions

In this study, the following research questions were addressed: (a) What is difference in mean GPA at graduation as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university?; (b) What is the difference in mean GPA as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university for students with at least 30 credit hours earned?; (c) What is the difference in mean GPA as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university for students with at least 60 credit hours earned?; and (d) What is the difference in mean GPA as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university for students with at least 90 credit hours earned?

The decision to examine data for student bringing in 30, 60, 90 credits earned was made to inform students, faculty, staff, and policy makers regarding any differences in academic performance (i.e., GPA differences) for the three different student pathways at standard points in their college experience. Examining data only the completion of the first semester of 4-year university experience is not truly comparing the three different pathways equally since transfer students may enter the 4-year university after students in other pathways. Students entering the 4-year university with dual credit experience often earn in excess of 24 credits. Similarly, students transferring from a community college potentially earn at least 60 credits if an associate's degree was earned. Furthermore, first-time undergraduate students who enter the 4-year university directly from high school potentially do not earn any credits. Comparing at common points in earned credits for the three different pathways seeks to provide a more viable comparison for how the three pathways affect academic performance (i.e., GPA differences).

Moreover, the ability to examine data at the 30, 60, 90 credit hour, and fully completed levels will allow the researcher to discriminate between points at which any differences in GPA may emerge for students in various pathways. Institutions have devoted resources to students in specific years of their collegiate experience, often focusing on the first year and to a lesser extent the transfer year experience (Kuh et al., 2008). Devoting these resources to different years without examining the pathways from which students enter college may make for an inefficient use of institutional resources. At minimum, the ability to examine GPA differences for different pathways into and throughout students' entire college experience allows for fairly refined examinations of the topic at hand.

Null Hypothesis

The study addressed four null hypotheses pertaining to the three credit attainment pathways at differing levels of credit attainment. The first null hypothesis was that there is no mean difference in GPA at the point of graduation for the three different credit attainment pathways. Stated differently, each research question was first examined to determine if a relationship between final GPA and credit pathway exists before potentially examining the nature and effect of that difference. The second null hypothesis for the study was be that there is no mean difference in GPA for students with at least 30 credit hours earned across the various credit attainment pathways. The third null hypothesis was there is no mean difference in GPA for students with at least 60 credit hours earned across the different credit attainment pathways. The final null hypothesis was there is no mean GPA difference for students with at least 90 credit hours earned across the different credit attainment pathways. Failing to accept the null hypothesis suggests the three different degree pathways (i.e., dual credit, transfer credits, or first-time undergraduate students who obtain all credits at one institution) have an effect on students' GPA at the different credit hours earned levels for this study. Failing to reject the null hypothesis indicates that credit attainment pathways have no effect on students' GPA at these various points in credit accumulation.

Alternative Hypothesis

The study examined alternative hypotheses should the null hypotheses fail to be accepted. The first alternate hypothesis was be that a mean difference of final GPAs for the various credit attainment pathways is present. The second alternate hypothesis was a mean difference of GPAs for students with at least 30 credit hours earned is present

across the credit attainment pathways is present. The third alternate hypothesis was a mean difference of GPAs for students with at least 60 credit hours earned across the credit attainment pathways is present. The final alternate hypothesis was a mean difference in GPAs for students with at least 90 credit hours earned across the credit attainment pathways will be present. Accepting the alternative hypotheses would have indicate relationships exist between credit attainment pathways and students' GPA at varying levels of credit accumulation (i.e. 30 hours, 60 hours, 90 hours earned, and graduation). Alternate hypotheses would be examined after null hypotheses are rejected or failure to reject them is confirmed. Following examination of alternate hypotheses, results would be offered to inform the extent to which credit pathways have changing variance on of GPAs.

Plan for the Study

Students can earn college credits via multiple pathways. For this study, three pathways examined include earning dual credits in high school, attending a 2-year institution then transferring to a 4-year institution, and students earning all credits at a 4-year institution. Students' GPA averages were examined at the following levels: 30 credits earned, 60 credits earned, 90 credits earned, and degree completion from a Texas state funded institution for the 2005-2006 through the 2015-2016 academic years. Comparing over multiple academic years provides more data points to analyze for a macro trend for the different pathways across the most recent decade of available data. At each credit-earned level, student GPAs will be compared amongst the different credit attainment pathways. The different pathways included students enrolling in dual credit in high school and then transferring to a 4-year institution, students attending a 2-year

institution and then transferring to a 4-year institution and students earning all college credits at a 4-year institution. Analyzing data from multiple academic years determined if any differences are present between the different credit attainment areas.

Definition of Terms

Terms for this study focused on different credit attainment pathways students can choose. Despite general state definitions for some terms, institutions use a variety of terms to define pathways. For that reason, the following terms were used for the duration of the study.

Credit Hour

This term refers to unit of measurement representing an hour (i.e. 50 minutes of instruction) for a 15-week period for semester systems. Credit hours also define measurement for 10-week periods in quarter systems. Credit hours apply towards the total number of hours required for a degree, certificate, or other award (THECB, 2012a).

Community College

This term was defined as a two-year state supported college offering an associate's degree (Merriam-Webster Online Dictionary, 2017). *Junior colleges* are community colleges serving to provide students university equivalent programs and other programs of interest in the local community (Texas Educational Code, §130.005). Junior colleges are two-year institutions serving local areas with open admission policies offering vocational, technical, and academic courses for certificates or associate's degrees (Texas Educational Code, §130.0011). For the purpose of this study, the terms *junior colleges* and *two-year institutions* will be used synonymously with the term *community college*.

Dual credit

In practice, this term was interchangeable with terms like *concurrent course credit* or *dual enrollment*. (THECB, 2012a). The THECB (2012a) defined dual credit as a process where high school students enroll in a college course but receive academic credits from both the college and high school administering the course. Dual credit students take classes counting as credits for both high school and postsecondary education while in high school. Typically, qualified high school or college instructors administer these college credit courses at the participating high schools, or students travel to college campuses to take classes. Synonyms for dual credit include *Concurrent Courses Initiative* or *dual enrollment*.

First-time undergraduate student

This term referred to students who have never attended college prior to high school graduation (THECB, 2012a). First-time undergraduate distinction will apply to students who began at a 4-year university and acquired all college credits there. These students do not move credits from one institution to another and have not accumulated credits through dual credit programs, but rather acquire all credits at one institution. For the purpose of this study, students with dual credit or transfer credits before starting at a 4-year university cannot have the distinction of first-time undergraduate. By the definitions established for this study and the State of Texas (THECB, 2012a; 2017d; 2017e) *first-time undergraduate students*, *dual credit students*, and *transfer students* are mutually exclusive terms.

In practice, many terms have been used synonymously for first-time undergraduate students. For example, *native students* and *traditional students* are two

terms often used synonymously with *first-time undergraduate student*. Each term references, in various ways, students who have completed all coursework at a single institution and have remained at that institution for the entire duration of their postsecondary experience. However, specific limitations with each of these terms favors the *first-time undergraduate nomenclature*. These synonymous terms were only used in the review of literature for this study. All other references to students who accumulated all credits at one institution were defined as *first-time undergraduate students*.

Grade point average

This term was defined as a four-point scale with the letter grade “A” equating to four quality points, the letter grade “B” equating to 3 quality points, “C” equating to 2 quality points, “D” equating to one quality point, and “F” equating to zero quality points. Letter grades of “D” and “F” indicate a student failed a course. As these grades were also included in a student’s GPA calculation, they were examined in the proposed study. Students receiving a letter grade of “W” indicated a student withdrew from a course. Students receiving a “W” for a course will not be factored in for the purpose of this study. The GPA represents the average points earned for each course taken (U.S. Department of Education, 2011). For this study, GPAs were be calculated by “dividing the quality points earned by the total GPA hours attempted toward the degree” (Sam Houston State University, 2017d, para. 11). Quality points earned are determined by “multiplying the number of hours assigned to the course by the number assigned to the grade for that course” (Sam Houston State University, 2017d, para. 12).

High School

This term referred to a school focused on education of grades nine through 12 or grades 10 through 12 (Merriam-Webster Online Dictionary, 2017). In the contexts of this study, high schools were eligible to engage in dual credit instruction, typically through partnerships with a community college or university.

Transfer student

This term described any student who enters any institution having previously attended a separate institution (THECB, 2012a). The transfer student distinction does not apply to students proceeding to a graduate degree from an undergraduate degree. Additionally, any credits transferred in from another postsecondary institution constitutes a transfer student. Over 70% of students in 2016 enrolled in community colleges after high school and transferred to a Texas public university. In addition, these students, on average, completed 43 or more credits at the community college (THECB, 2017d).

Transfer students typically will transfer credits from a community college institution to a 4-year institution. However, students engage in increasingly complex patterns of transfer throughout their higher education experience. Swirling is a term describing students taking courses at many institutions (THECB, 2017d). Baccalaureate graduates in 2016 when tracked back six years, identified over 75% of students attended more than one institution. (THECB, 2017d). For the purpose of this study, transfer students were considered anyone who accumulates credits at any institution(s) of higher education and brings those credits with them to a 4-year university, regardless of the pattern with which they accumulate the credits.

University

This term referred to an institution of higher learning offering academic degrees at the baccalaureate level or higher. Universities are made up of undergraduate divisions awarding bachelor's degrees and graduate divisions awarding post baccalaureate degrees (Merriam-Webster Online Dictionary, 2017). For the purposes of this study, terms such as *4-year institution* or *4-year college* were synonymous with *university*.

Theoretical Framework

Tinto's (1975, 1993) work the effects of student integration and departure/dropout factors in higher education will constitute the theoretical framework for this study. Tinto's (1975) student integration model distinguishes between the social and academic components students encountered within the higher educational system. Using Durkheim's Theory of Suicide, Tinto (1975) made the comparison between Durkheim's observation of suicides occurring more often with individuals not integrated into society and students dropping out of higher education institutions. Tinto (1975) asserted the attributes and experiences of incoming students influences students' academic performance. Tinto's (1975) Student Integration Model focuses on factors such as family background, individual attributes, students' commitment levels, academic systems, social systems, and integration into systems all as factors leading to a student's persistence and success in college. Tinto's (1975) model also included the economics of education, and the costs and benefits of individual decisions associated with alternative educational activities. An individual's commitment to education and expectations of higher education affect his/her persistence in higher education. Tinto (1975) added the educational expectations of students predispose a student to attend certain colleges.

Of the characteristics associated with students not succeeding, past educational experiences were identified to be one of the most important (Tinto, 1975). Overcoming the factors obstructing student success is a goal of all institutions. Furthermore, grades represent one form of integration for students in an institution where as intellectual development represents another, prior academic standard related to a student's prior experiences and integration (Tinto, 1975). Thus, institutions can actively work to support students' integration into the academic community and high expectation levels for faculty, staff, and students to precipitate desired student retention and persistence levels (Tinto, 2012). Students bring unique experiences into higher education institutions; thus, this study uses Tinto's model as a lens to examine how these different educational experiences (i.e. credit attainment pathways) affect student success (i.e. higher GPAs).

Various methods of degree attainment provide higher education institutions with students of diverse educational backgrounds. Students entering 4-year universities with dual credit or transfer credits have different educational backgrounds compared to first-time undergraduate students. Tinto commented, "the higher the degree of integration of the individual into the college systems, the greater will be his commitment to the specific institution and to the goal of college completion" (p. 96). In this quantitative study, Tinto's (1975, 1993) student integration model provides the lens to examine the effect credit attainment (i.e., dual credit in high school, transfer from community college, or first-time undergraduate student earning all credits at a single institution) has on academic performance (i.e., higher GPAs). Credit attainment pathways constituted an initial factor of students' lives and GPA was viewed as an indicator of a student's integration into the academic community of an institution.

Delimitations

This quantitative cross-sectional study was delimited to students from a single Texas university. Using a cross-sectional design allows for data to be collected on many different subjects in a short amount of time (Johnson & Christensen, 2014). Student's records will be explored at specific times in the student's career in higher education. Specifically, student's GPAs were explored at up to 30 credits earned, up to 60 credits earned, up to 90 credits earned, and graduation for students in the three different credit attainment pathways. Comparing at these four common points eliminated the issue of evaluating students at the completion of a semester when the three different pathways could potentially all have earned different college credits. Data in the 2005-2006 through the 2015-2016 academic years were used for this cross-sectional study. Data available for the most recent 10-year span allowed for examination of a macro trend in the three different pathways.

The institution implemented a new data management system during the middle of the timeframe for this study. Prior to the implementation of this new data management system, data on students' dual credit enrollment was not recorded. Therefore, the timeframe under consideration in this study was truncated to 2011 to 2016. Even with this decision, data examined represent a significant period and a collective over 11,000 student record data points. Given this, results from this study should be interpreted with a degree of caution.

Grade point average differences at 30 credit hours earned, 60 credit hours earned, 90 credit hours earned, and graduation were investigated. Grade point average differences were compared for students with dual credits earned, students earning credits

at a community college and transferring those credits to a 4-year university, and first-time undergraduate students who acquire all higher education credits at a 4-year university. Grade point average differences were limited to students with up to 30 credits earned, up to 60 credits earned, up to 90 credits earned, and then degree completion.

How data were received for this study also inhibited the ability to obtain a GPA for community college student at 30 credit hours earned. Data did not allow for a breakdown of GPAs of community college transfer students at the needed GPA points. For the purpose of this study, community college students accumulating less than the required hours needed for the 60 credit hours earned (i.e. credit totals under 46 hours earned) were not considered. Therefore, all community college students in the study represented students accumulating a total close to 60 credit hours at the community college, the same amount of hours needed for a community college student to earn an associate's degree. Delimiting data to this point omitted all community college transfer students who only attended one semester and transferred to the 4-year institution with 12 to 15 hours. Community college students in the study represent students who incurred the true impact of attending a community college and transferring to a 4-year university. Therefore, all data at 30 credit hours earned will only reflect dual credit and first-time undergraduate students' GPAs.

Grade point average differences at graduation by credit attainment (i.e., dual credit, transfer credits, or first-time undergraduate students who obtain all credits at one institution) for all graduates will be examined. Additionally, GPA differences at 30 credits earned, 60 credits earned, and 90 credits earned by credit attainment area were investigated. Grade point average served as the representation of academic performance

for the study. To create a standard to compare all three credit attainment pathways (i.e., dual credit, transfer credits, or first-time undergraduate students who obtain all credits at one institution), only four common GPA points (i.e., 30 credits earned, 60 credits earned, 90 credits earned, and graduation) were compared. Yue and Fu (2017) identified the number of earned credits has a stronger influence on graduation, and cumulative GPA is important early on but loses effectiveness on graduation after the tenth semester. Despite the importance of earned credits noted by Yue and Fu (2017), this study focused on GPA differences throughout the student's time in post-secondary education.

Lastly, students meeting the requirements for multiple forms of credit attainment, such as students who earned dual credits in high school and subsequently transferred to a community college prior to transferring to a 4-year university, were excluded from the study. Removal of student records meeting multiple pathway criteria reduces inaccuracies in results. Additional analyses focusing on students engaging in multiple pathways to degree attainment may prove beneficial. However, examinations of the extent to which students engage in multiple pathways or how multiple pathways influence GPA are outside of the scope of the present study. Moreover, students included in the study must have a GPA at 30 hours of credit accumulation, 60 hours of credit accumulation, and 90 hours of credit accumulation, and at graduation. Stated differently, students who do not persist to graduation or a specific, latter point along their progression toward a degree were excluded from the present analyses. This certainly limited the researcher's ability to discuss why students depart from college prior to graduation. However, this decision allowed for improved focus on students completing a college degree, which is aligned with the research questions under consideration. Furthermore,

differences exist for dropout rates and student retention with public and private institutions as well as 2- and 4-year institutions (Tinto, 1975). This study focused not on the student demographics such as socioeconomic status, race, or sex but rather focused on the specific educational pathways for students of all demographic backgrounds.

Additionally, this study was delimited to only credits earned by students, thus excluding credits students tested out of. Students entering public intuitions in Texas are required to be assessed in the areas of reading, writing, and mathematics unless exempt from an initial assessment process known as the Texas Success Initiative [TSI] (THECB, 2017f). Students not meeting Texas Success Initiative minimum standards are required to take developmental courses to help students achieve college readiness (THECB, 2017f). Testing out of credits through the TSI is outside of the scope of this study, thus concentration will be on earned credits with no focus on whether credits were tested out of or not.

Therefore, there were three credit attainment pathways under primary consideration for this study. The first pathway included students enrolling in dual credit in high school and then transferring to a 4-year university. The second pathway was represented by students taking no dual credit courses in high school, but rather attend a community college and then transferring to a 4-year university. Lastly, first-time undergraduate students not participating in dual credit or attending a community college and enrolling directly into a 4-year university following high school graduation were analyzed.

Limitations

In every study, there is an opportunity for variables other than the variables under consideration to influence results (Johnson & Christensen, 2014). Thus, certain limitations existed within this study. For this study, data were comprised of records from a single university in Texas. Records limited this quantitative study to the GPA differences for dual credit, transfer students, and first-time undergraduates earning all credits at a single university. Moreover, the timeframe under consideration spans nine academic years; therefore, generalizing results outside of the set timeframe and beyond the study institution was limited though some examples for practice may emerge. A single university limited data to only a small percentage of all students in the state and prevents generalization to other areas as well.

Utilizing GPA as a measurement for results also comes with limitations. Grade point average reliability is comprised of the number of course grades, the average reliability of grades, and the credit-hour weights (Etaugh, Etaugh, & Hurd, 1972). Furthermore, GPA as an outcome has limitations such as the manner students are assigned grades, potential for grade inflation, and other considerations (Fuller, Wilson, & Tobin, 2011). Therefore, utilizing GPA as the dependent variable for this study came with caution. In addition, grades reported to the Office of Institutional Effectiveness (IE) were presumed to be valid reflections of student's academic performance for the specific timeframe.

Data were comprised of student's higher education credits earned and GPAs. The focus of the study was GPA differences across different pathways of degree completion. Removing all covariates from data potentially nullified any differences emerging between

the different pathways. Strict standards for participating in dual credit potentially correlate with certain student demographics, such as SES and ethnicity. Furthermore, the open admission aspect of community colleges also correlate with certain student demographics. In order to ascertain differences between the pathways, gender, age of participants, socioeconomic status (SES), and ethnicity serve as confounding variables not controlled for in the present study. However, data allowed for the age of admittance of students at the 4-year institution in this study, be analyzed as a separate analysis.

Assumptions

Data utilized for this examination were collected by the university's Office of Institutional Effectiveness (IE) for the 2005-2006 through the 2015-2016 academic years. It was assumed the GPA data and data for dual credit, transfer, and first-time undergraduate students are accurate. Student records meeting the requirements for multiple credit attainment pathways were assumed to be reported correctly. Furthermore, it was assumed any inaccuracies in the dataset are not explicit to any specific credit attainment pathway. It was assumed any potential errors in the dataset are not relegated to one pathway over another and are randomly dispersed throughout the dataset. Moreover, it was assumed, as a function of definitions, the pathways currently being studied are mutually exclusive. Those students with multiple pathways to completion were not considered in the present study.

Summary of Remaining Chapters

The proposed investigation was to examine any potential differences in students' GPA at a public 4-year university according to their chosen pathway to degree completion. The first research question addressed GPA differences for the 2005-2006

through the 2015-2016 academic years as a function of credit attainment (i.e., dual credit, transfer credits, or first-time undergraduate students who obtain all credits at one institution) at graduation. The second, third, and fourth research questions addressed GPA differences for the 2005-2006 through the 2015-2016 academic years as a function of credit attainment at 30 credits earned, 60 credits earned, and 90 credits earned, respectively.

The proposed study was divided into five chapters. Chapter I included the background of the study, statement of the problem, purpose of the study, significance of the study, definition of terms, theoretical framework, delimitations, limitations, assumptions, and lastly the summary of remaining chapters. Chapter II offered a thorough review of the literature related to the history of higher education, dual credit programs, community colleges, and first-time undergraduates at four-year universities. In Chapter III, the methods of analysis and statistical assumptions for the chosen analyses for the study were addressed. Chapter III included the introduction, purpose, research questions, research design, selection of participants, instruments, procedures, data analysis, and a summary. Chapter IV included the results of the analyses. Lastly, Chapter V included the discussion and recommendations from the study stemming from the results obtained in prior chapters.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Higher education affords individuals a variety of pathways to obtain college credits. Students can earn college credits while still in high school via dual credit or attend a community college prior to enrolling at a 4-year university. Students can also bypass dual credit and community college opportunities and enroll directly at a 4-year university. The following review of literature focused on the history and characteristics associated with the many pathways of higher education credit attainment.

Higher Education History and Community College Emergence

In 1636, higher education began in the United States of America when the Massachusetts General Court passed an act leading to the creation of Harvard College (Rudolph, 1990). The first colleges in the United States of America were chartered to train clergy and spread the Christian ideology (Beach, 2010). Years later, many Harvard students and clergy felt the religious ideals Harvard stood for had taken a liberal turn. With the help of Elihu Yale's estate, the creation of Yale College continued on the religious path and obligations Harvard had once considered so invaluable (Rudolph, 1990). The early ideas Puritans brought over did not readily align with the needs of the New World. The New World challenged individuals with practical ideas needed for survival and not book knowledge learned in the classroom. The new needs for practical knowledge solidified a change in education and movement away from colleges serving only the privileged few. This early subject matter the first colleges contained was not something a practical man desired and most importantly was not something they needed

(Rudolph, 1990). Subsequently, only 5% of young adults (i.e., 19 to 22 years of age) enrolled in higher education institutions in 1910 (Beach, 2010).

Low enrollments combined with burgeoning ideals of higher education serving only the privileged, began to change higher education. A new population of individuals was needed to sustain the growing system of the higher education. To incorporate new populations of students into higher education, a change in the curriculum and who had access to it was needed. One move towards correcting these conditions was high schools became more prevalent in the United States of America, thus creating a new, steady stream of higher education applicants (Witt, Wattenbarger, Gollattscheck, & Suppiger, 1994). Many higher education professors viewed the first two years of college as extension of high school. These years focused on the basic concepts within subjects but not on the thought provoking research of higher-level courses. Thus, the first two years of managing these students learning had no place at these prestigious research institutions (Witt et al., 1994).

The Morrill Act of 1862 evolved higher education again with the creation of land grant colleges. These colleges paved the way for students and subjects historically excluded from higher education (Vaughan, 1985). The University of Chicago board took further steps in 1899, with the passing of several motions allowing students to earn college credits in high school and remain in high school two additional years to earn these credits (Witt et al., 1994). The adding of two additional college years to the high school curriculum formed Joliet Junior College in 1901, arguably the first public community college in the United States of America (Vaughan, 1985). Less than 125 years after the end of the U.S. Revolutionary War, the American higher education system

had established a number of institutional types, representing diversified pathways for citizens to obtain unique career and life goals.

Though community colleges originally served as open admissions colleges for students seeking courses for arts degrees, the mission and goal evolved and broadened. Presently, community colleges are two-year institutions serving local taxing districts with academic course for transfer and career or technical courses for the workforce. In addition, community colleges in Texas provide (a) arts and sciences courses for freshman and sophomores, (b) continued adult educational programs, (c) career and technical programs, and (d) compensatory educational programs enabling admission for disadvantaged students (THECB, 2010).

Community colleges spread into Texas in 1897. Reorganizations of the Baptist colleges in Texas lead to the removal of upper level coursework from Decatur Baptist College, Howard Payne College, and Rusk Baptist College. These events resulted in the creation of Decatur Baptist College—later renamed Dallas Baptist University—as the first two-year college in Texas and arguably the United States (Matthews, 2018). The first publicly supported college in Texas came in 1922 in Wichita Falls. These early community college districts were bound to the existing independent school district's boundaries. Furthermore, these community colleges typically shared the same physical space as the independent schools and offered classes at the end of the high school's normal day (Texas State Historical Association, 2010). Despite the creation of community colleges, enrollments throughout the 1920's were low with most community colleges focusing on liberal arts programs. Beginning in the 1930s community colleges began job training to help the immense unemployment brought on by the Great

Depression (Kasper, 2002). Since community colleges shared the same physical space as independent schools and coordinated schedules with them, the Texas legislature authorized the Texas Education Agency to serve as the supervisory agency for junior colleges in 1941. This authority would last until 1965, when, in partial response to the federal Higher Education Act, Texas established a separate state Coordinating Board for all institutions of higher education, including junior colleges.

Changing the types of courses offered by community colleges led to increases in enrollment from one million students in 1965 to over two million students in 1970 (Kasper, 2002). The primary force behind these increases was the passing of the Higher Education Act (HEA) of 1965, which provided resources to colleges and financial assistance to students (Office of the Legislative Counsel, 2017). These changes helped increase enrollments and transform US higher education to grow its capacity to serve many more students. Enrollment increases continued with nearly 6.5 million students enrolled in community colleges in the 2015 academic year for the United States of America (U.S. Department of Education, 2017). In Texas, community college enrollments reached over 700,000 students in 2014 with projections indicating by 2025 public community college enrollments could reach nearly 820,000 students (THECB, 2015c). Amongst the large increases in community college enrollments was the increase in Hispanic students enrolling in Texas community colleges. Enrollments increased to 210,476 Hispanic students in 2008 up from the 189,706 Hispanic students in 2007 (THECB, 2010). In 2008, the Hispanic population enrolled in public community colleges represented the second largest ethnic group at 14.4% of the total students enrolled in public community colleges (THECB, 2010).

Additional increases included a 25% increase in the number of applications of first-time-in-college undergraduates between the fall of 2009 and the fall of 2014, and a 22% increase in the number of first-time-in-college undergraduates actually enrolling during the same time. Transfer students during the same period encountered smaller increases with only a 10% increase in the number of transfer applications and 12% increase in the number of transfer students actually enrolling (THECB, 2015b).

Concerning graduation rates for transfer students, 66% of Texas transfer students who began college in the fall of 2010 graduated with a bachelor's degree within four years (THECB, 2015b). Nationally, 22% of students entering a public community college in 2012 graduated with an associate's degree within three years (U.S. Department of Education, 2017). Furthermore, transfer students who began college in the fall of 2010 needed on average 11.4 semesters and 143.9 semester credit hours to reach a bachelor's degree (THECB, 2015b).

History of Dual Credit

Dual credit enrollment allows students to attain college credits and high school credits simultaneously for the same course while enrolled in high school (THECB, 2012a). Historically higher education served the elite few; however, change happened with the Servicemen's Readjustment Act of 1944 (a.k.a. the GI Bill) and World War II. This change continued into the 1960's when equality in higher education was reconsidered in the Civil Rights Movement (Greenberg, 1989). Early programs attempting to fill the gaps (i.e. differences in attainment levels) differed in designs, such as length of courses and requirement to take end-of-course tests (Greenberg, 1989). Unique to dual credit programs are the abilities for states to shape their respective

policies and dual credit programs use nearly identical course materials as colleges offering the course. In addition, dual credit students receive college transcripts in conjunction to a high school transcript, allowing college credits to be awarded towards a degree once enrolled in college (U.S. Department of Education, 2007). The THECB (2008) noted benefits of dual credit programs also include (a) increased likelihood to completing high school and persisting in college, (b) decreased college cost, (c) entering the workforce sooner, and (d) an accelerated degree attainment timeframe.

The first state to capitalize on the positive benefits of dual credit programs and enact policy was California in 1976. The rate other states enacted policy lagged, seeing less than 30 states total with policy in place 20 years after California's inaugural policy (Mokher & McLendon, 2009). Texas did not implement any dual credit legislature until 1995 with the passage of House Bill (HB) 1336, allowing local high school students to earn simultaneous high school and college credits (Texas Legislative Council, 1995). Following the initial legislation, in 2015, the 84th legislative session passed HB 505. HB 505 eliminated the restriction of dual credit to only Grade 11 and Grade 12 students (Miller, et al., 2017). Therefore, HB 505 prohibited the THECB from setting rules limiting the number of courses or the grade levels in which students could enroll in dual credit courses (Texas Legislature Online, 2017). Supporters of the HB 505 argued removing the limits on the number of courses taken allowed students to earn a higher education degree in a shorter amount of time combined with the lower tuition costs of dual credit (Texas Legislature Online, 2017). Students also encounter savings with the waiving of tuition by the post-secondary institutions or the secondary institution paying the cost for students. These changes further aided educational leaders in Texas to ensure

all students had an opportunity to achieve a high quality collegiate education and had pathways to create a seamless transition into higher education (Texas Education Agency & Shapley Research Associates, 2011).

New legislation led to steady increases in dual credit participation. Comparing enrollments from the 2000 to the 2015 academic years, participation increased over 600% (THECB, 2016b). Miller et al. (2017) noted not only did enrollments change but also in the fall of 2014 for the first time in Texas, Latino students made up the largest percentage (42%) of students participating in dual credit. Changing demographics in higher education participation coincide with Texas's initiative *Closing the Gaps by 2015*. The goal of the *Closing the Gaps by 2015* was to increase student participation and completion in higher education as well as increase the number of nationally recognized programs and research funding at Texas colleges and universities (THECB, 2017a). Benefits of dual credit programs ultimately has and will play a vital role in Texas education.

The success of dual credit programs was evident throughout Texas in the years following the HB 505. Comparing students' completion of dual credit courses, 47% of Texas students who completed at least one dual credit course achieved a Bachelor's degree with in six years, compared to only 30% of non-dual credit students (Struhl & Vargas, 2012). Texas students who completed at least one dual credit course were also more likely to enroll in college and persist from the first to second semester (Struhl & Vargas, 2012). Texas dual credit students also completed a Bachelor's degree in half an academic year less than non-dual credit students (Miller et al., 2017). Additionally, grades for Texas dual credit participants were better comparably to their non-dual credit

counterparts (Miller et al., 2017). For the 2012 through 2015 academic years, over 70% of grades for dual credit students were “B” or higher, whereas non-dual credit students had under 60% of grades of “B” or higher. However, comparisons between dual credit students’, transfer students’, and first-time undergraduate students’ grades have not been made, underscoring the importance of the proposed study.

In respect to who enrolls in dual credit, Young, Slate, Moore, and Barnes (2013b) compared dual enrollment by gender and ethnicity. Data included over 150,000 Texas community college student records from the 2005-2006 through the 2011-2012 academic years. Women enrolled in dual credit more often than men for each of the academic years. The 2011-2012 academic year included the highest percentage of women (20.8%) enrolled at the community college who also enrolled in dual credit in high school, compared to only 17.9% of men enrolled at the community college who also enrolled in dual credit in high school for the same academic year (Young et al., 2013b). This percentage was a representation of men and women enrolled at the community college who also enrolled in dual credit in high school compared to the total number of women enrolled at the community college.

With respect to ethnicity of Texas’ dual credit students, Black students reported the lowest enrollment numbers in all but one academic years. Conversely, Asian students represented the largest percentage of students in dual credit in most of academic years since 2005 (Young et al., 2013b). White students reported high percentages of enrollment in dual credit with a peak in the 2011-2012 academic year; 25.3% of the total White population at community colleges in 2011-2012 enrolled in dual credit in high school. Similarly, Hispanic students also reached a dual credit enrollment peak in the

2011-2012 academic year of 17.4% of the total Hispanic population at the community college having enrolled in dual credit in high school (Young et al., 2013b).

Students participating in dual credit typically benefited from higher annual incomes earned and number of courses transferred to colleges (Phelps & Chan, 2016). An examination of students enrolling in a technical college from 2009 through 2012 identified females in the different Wisconsin dual credit pathways (i.e., youth options program, transcribed program, or advanced standing program), had a 20.1% higher chance to transfer any kind of dual credit to the technical college compared to males. Additionally, two of the three types of dual credits (i.e., transcribed program and advanced standing program) overserved in Wisconsin correlated with modestly higher annual incomes in 2013. Phelps and Chan noted future studies examining the perspectives of students and instructor's dual credit experiences were needed.

Persistence and College Readiness of Dual Credit Students

To ascertain if dual credits and college credits affected college performance, students were studied from Ohio, Texas, Florida and Oregon whom graduated from high school between the 1995 and 1997 academic years. College credit hours indicated a positive relationship with student's college readiness for reading and writing; whereas, the presence of dual credit indicated a positive relationship for college readiness in mathematics (Kim & Bragg, 2008). Additionally, college readiness for reading, writing, and mathematics increased as rigor and quality of courses taken increased (Kim & Bragg, 2008).

Student persistence was related to location of dual credit course offerings, and the type of dual credit course offered (D'Amico, Morgan, Robertson, and Rivers, 2013). To

examine the extent persistence rates of dual credit students are related to the location of dual credit courses offered and the course type, D'Amico et al. (2013) studied students who enrolled in dual credit between the 2005 through 2008 academic years and attended South Carolina Technical College after high school. Specifically, students taking dual credit courses at a technical college were 1.255 times more likely to persist to the second year of college compared to students acquiring dual credits at high school locations (D'Amico et al., 2013). The authors recommended colleges to implement additional dual credit courses on college campuses to integrate students into the college environment.

Dual credit participation along with the location of dual credit course offerings affected student's educational aspirations (Smith, 2007). Of the 304 high school seniors in the Allen County Community College service area, 83.3% students participating in dual credit aspired to earn a 4-year degree compared to only 39.1% of students not participating in dual credit programs. Additionally, participation in dual credit was a better predictor of educational aspirations compared to grades and parents' highest level of education (Smith, 2007). Along with the benefit of higher degree aspirations, students earning dual credits on college campuses had higher educational aspirations compared to students earning dual credits at the high school setting (Smith, 2007).

California's dual credit program, *Concurrent Courses Initiative*, affected college level outcomes for seniors in the 2008-2009 and 2009-2010 academic years (Rodriguez, Hughes, & Belfield, 2012). Graduates in the 2009 class had 15% of the dual credit students enroll in a 4-year college compared to only 6% of the students not participating in dual credit enrolling in a 4-year college. Graduates in the 2010 class encountered similar results to the graduate in the 2009 class, 17% to 9% respectively (Rodriguez et al.,

2012). As it pertained to the number of credits earned, dual credit students earned 1.2 and 1.3 more credits after one semester than students not participating in dual credit. After two years of college, dual credit participants increased the number of accumulated credits to 4.6 additional credits earned, thus enrolling in California's dual credit program, enabled students to earn more credits in the first two years of college compared to students not enrolled in the program. Increasing the number of credits earned each semester potentially allows students to reach graduation in a shorter amount of time and thus incur greater lifetime earnings.

Academic Performance of Dual Credit Students

Postsecondary academic performance of students participating in dual credit in high school has been examined by a number of scholars, though these examinations typically focus on populations in specific regions, states, or institutional types. Students participating in dual credit typically hold higher GPAs than students forgoing participation in dual credit programs (An, 2015). An examination of data from the Wabash National Study of Liberal Arts Education in 2008 (n=3,779 first-time college students) revealed dual credit participants' GPA were 0.14 points higher compared to non-dual credit counterparts when ethnicity, gender, family background, and ACT scores were controlled (An, 2015). Additionally, dual credit participants benefited students at no matter the selectivity of the universities. Overall, dual credit student's GPA was 0.16-0.17 points higher compared to students not participating in dual credit regardless of the college's selectivity. An's (2015) study was limited to a sample of liberal arts colleges. Thus, a college selection bias—wherein participants in An's (2015) study were already high-performing students who matriculated to the cross-section of liberal arts

institutions—may limit the applicability of An's (2015) to broader studies of dual credit systems. Still, An's (2015) work suggested dual credit students perform better than their colleagues not participating in dual credit.

Dual credit's effect on GPA and academic success has been well documented for colleges in New York City (Allen & Dadgar, 2012). Examining data from the New York City Department of Education, students completing one or more dual credit courses had GPAs 0.16 points higher compared to non-participants (Allen & Dadgar, 2012). Thus, completing dual credit courses had a positive impact on student's GPA. Along with increased student GPAs, Allen and Dadgar (2012) suggested dual credit programs could lessen the time to degree attainment, a finding similar to Miller et al. (2017) in Texas institutions.

Florida's students also benefited from participation in dual credit programs as it pertains to not only high school graduation but also college enrollment first-semester GPA, and college retention (Karp, Calcagno, Hughes, Jeong, & Bailey, 2008). Dual credit enrollment in Florida lead to more students earning a high school diploma, enrolling full-time in a postsecondary institution, and higher cumulative GPAs compared to students with no dual credit experience (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007, p. 5). Specifically, students in Florida who participated in dual credit were more likely (4.3% more likely) to earn a diploma than students who did not participate in dual credit (Karp et al., 2008, p. 4). Additionally, students who participated in dual credit had higher college GPAs (ranging from 0.21 to 0.26) one year after graduation from high school. As for cumulative GPAs, students who participated in one dual credit course had higher cumulative GPAs (0.158 points higher) than non-dual credit enrollee; whereas,

students with five or more dual credit courses has GPAs 0.27 points higher (Karp et al., 2007, p. 5). Earning diplomas and higher first year GPAs were only some of the benefits dual credit affords students. College persistence was also positively related to Florida student's participation in dual credit with students who participated in dual credit being 5.4% more likely to remain in college two years following high school graduation (Karp et al., 2008, p. 5). Hence, many benefits accompany students who participated in dual credit in Florida.

Positive benefits were also observed when comparing dual credit participation and first-year full-time college students' GPA and persistence rates at the community college level and research university. Community college students who participated in dual credit had higher cumulative college GPAs (i.e., .26 points higher) compared to students with no participation in dual enrollment at the community college (Jones, 2014). Additionally, students' dual credit participation had higher persistence rates than those students without dual credit hours for the first semester and first year at both the community college and research university level, further demonstrating some of the benefits of dual credit participation.

Research on students in North Carolina demonstrated similar positive benefits to enrollment in dual credit and Huskins Bill courses (Ganzert, 2014). Huskins Bill courses are similar to dual credit course however are designed for transfer or for vocational studies. Examining students from North Carolina Community Colleges ($n = 15,527$) between the spring of 2003 through 2008 revealed first-year GPAs were highest amongst dual credit students ($\mu_{\text{Dual credit}}=2.18$), followed by Huskins Bill students ($\mu_{\text{Huskins Bill}}=1.93$), and the lowest GPA ($\mu_{\text{Non-dual credit}}=1.63$) from students not enrolled in either

program (Ganzert, 2014). Benefits of the two program was not limited to GPA. Graduation rates for students enrolled in dual credit and Huskins Bill course were 33.7% and 28.3% respectively, both higher than the 22.5% graduation rate of students with no experience in either program. The number of courses also affected students' GPA in North Carolina. Taking six or more dual credit or Huskins Bill courses led to the highest average postsecondary first-year GPA of a 2.19, compared to students with no dual credit or Huskins Bill experience having the lowest average first-year GPA of a 1.63 (Ganzert, 2014). Courses such as dual credit and Huskins Bill accelerated learning at the postsecondary level and better prepared students for skillsets the modern workforce needs (Ganzert, 2014).

When controlling for gender, differences emerged in first-year GPAs for students with dual credit participation. For North Carolina Community College students who graduated high school in the spring or summer of 2003 and then enrolled in a community college in the fall of 2003, female students enrolled in dual credit had higher average first-year GPAs compared to males enrolled in dual credit, 2.21 compared to 2.1, respectively (Ganzert, 2012). Additionally, males and females enrolled in dual credit had higher average first-year postsecondary GPAs compared to males and females not enrolled in dual credit. For each gender, participating in dual credit resulted in a 0.50 point increase in the average first-semester postsecondary GPA (Ganzert, 2012). Participation in dual credit benefited female students; however, Ganzert (2012) implored future studies to focus on the many variables associated with dual credit and the effectiveness of similar programs.

When examining Texas students, dual credit participation benefited students' academic achievement. Students at a Southwest Texas community college for the 2006 through 2008 academic years exhibited differences in the first term postsecondary GPAs of students with respect to dual credit participation. Students who completed dual credit courses in high school outperformed non-dual credit students as it pertained to first term postsecondary GPAs, 2.52 to 2.23 respectively. Despite the first term differences, cumulative GPAs for dual and non-dual credit students did not indicate a significant difference (Young, Joyner, & Slate, 2013a). One possible suggestion for the lack of significant findings for cumulative GPA was successful students (i.e. students with higher GPAs) transferred to 4-year institutions quicker than less successful students, thereby reducing variability in the dataset. Additionally, the relatively small sample size of Young et al.'s study (2013a) could have prevented refined examinations of dual credit students' performance.

Similarly, utilizing the Beginning Postsecondary Students Longitudinal Study and 2009 Postsecondary Education Transcript Study, An (2013b) utilized propensity score matching to compare dual credit and non-dual credit students across the nation. Students enrolled in dual credit in high school earned 0.11 first year, postsecondary GPA points higher than students not enrolled in dual credit (An, 2013b, p. 418). Thus, participation in dual credit correlated with better academic performance. The lack of data on the number of dual credit courses taken for individual students within An's (2013b) study, limited more in-depth analysis of the number or *dosage effect* of dual credit courses taken. Villarreal (2017) defined a dosage effect as the tendency of the benefits of dual credit participation to plateau or level off after the accumulation of a particular number of

credits. In Texas, graduation rates, course performance, and postsecondary GPAs levels off for all dual credit participants accumulating 9 or more dual credits in high school (Villarreal, 2017, p. 3). Further analysis of the influence of the number of credit hours on postsecondary performance is warranted.

In review, dual credit students in many states, regions, and institutional types exhibited higher GPAs, persistence rates, retention rates, and shorter time toward degree completion. Though a few researchers (Jones, 2014) have found no statistically significant relationships between dual credit and non-dual credit students' GPA and other academic performance indicators, most research have documented the positive influence dual credit enrollment has on GPA, academic performance, persistence, retention, and time to degree completion. Additional studies have examined differences in dual credit students' performance in specific classes, demographic differences in who is completing dual credit courses.

Dual Credit Students' Performance in Specific College Classes

Researchers comparing Iowa dual credit students to traditional students with no dual credit experience, dual credit students outperformed traditional students in most subjects (Crouse & Allen, 2013). Examining dual credit students from 14 community colleges in Iowa for academic years 2002 through 2007, dual credit students outperformed non-dual credit students with Art courses having the greatest GPA difference of 0.48. These results occurred when controlling for ACT composite score, high school GPA, gender, and income (Crouse & Allen, 2013). Additionally, dual credit students were more likely to enroll at 4-year institutions compared to students with no

dual credit experience. However, available data did not allow for analysis of degree completion (Crouse & Allen, 2013).

Community college students in Virginia also revealed positive benefits from participation in dual credit programs (Arnold, Knight, & Flora, 2017). Examining data from over 3,600 dual credit students and 706 academically comparable non-dual credit students the greatest mean difference between the two groups was in the Math 163: Pre-Calculus I course. Dual credit students scored final letter grades 1.25 times higher than academically comparable students. English, biology, and history courses also saw dual credit students outperform their counterparts with grade increases of, 0.89, 0.83, and 0.86 respectively (Arnold, Knight, & Flora, 2017). Locations for course offerings also affected academic performance with students in the English 111 and Math 163 taking the courses in the high school setting outperformed students who completed the courses administered on college campuses. With the focus of the study on community colleges, Arnold, Knight, and Flora (2017) encouraged future research to expand the research to 2-year and 4-year colleges to determine if results are consistent at different college levels.

Dual Credit and Degree Attainment

Along with the typical positive GPA increases from participation in dual credit programs, dual credit students were also more likely to graduate in a timely manner compared to students not enrolled in dual credit (Grubb, Scott, & Good, 2017).

Comparing students from a northeast Tennessee state community college, dual credit students were 26% more likely to finish college in two years compared to students who did not participate in dual credit (Grubb et al., 2017). Grubb et al. (2017) examined first time, full-time traditional freshman who entered college the fall semester following

graduation from high school, thereby focusing on a specific population of traditional, college-aged students. Moreover, dual credit participants were 9% less likely to require remediation compared to students who did not participate in dual credit (Grubb et al., 2017). Similar to Grubb et al. (2017) Tennessee study, Oregon's dual credit programs produced positive effects for students' high school graduation rates and college performance (Pierson, Hodara, & Luke, 2017). Utilizing data from the Oregon Department of Education for the 2005-2006 through 2012-2013 academic years, students participating in dual credit graduated high school at a rate of 92.4% compared to only 59.4% of students not participating in dual credit over the eight studied academic years. Furthermore, 47.9% of dual credit students persisted from the first to the second term of college compared to only 24% of their counterparts (Pierson et al., 2017). Thus, positive results for dual credit participation can be present in secondary as well as post-secondary institutions.

Participation in dual credit and other accelerated programs afford students benefits such as increased likelihood to reach graduation compared to students not participation in dual credit or other accelerated programs (Morrison, 2008). Data from Iowa community college student records across 1996 to 2006 were analyzed to examine the influence of dual credit and other accelerated programs. Students who participated in accelerated programs, such as dual credit, were 1.61 times more likely to graduate from college compared to students who did not participate in accelerated program (Morrison, 2008). Along with the increased likelihood to graduate from college, Morrison's (2008) study identified first term GPA has the greatest effect on predicting postsecondary graduation. With the noted benefits of dual credit or accelerated programs, providing

incentives to high schools and colleges to implement accelerated programs more widespread in secondary and postsecondary institutions could benefit additional students (Morrison, 2008).

Continuing with the benefits of dual credit and graduation rates, An (2013a) investigated if dual credit participation influenced college degree attainment for students. With a sample size of over 8,000 students who participated in the National Education Longitudinal Study of 1988 (NELS:88), students who enrolled in dual credit increased their chance of obtaining a bachelor's degree by seven percentage points (An, 2013a). Additionally, a threshold in academic benefit with respect to students' number of dual credits earned emerged. Dual credit students earning only three dual credits were equivalent to students not enrolled in dual credit in relation to degree attainment. In contrast, students who earned six college credits through dual enrollment (e.g., two courses) are 12 percentage points more likely to attain a B.A. degree than non-dual credit students (An, 2013a, p. 62). However, the benefit achieved in taking six dual credits leveled off; taking more than six dual credit courses in high school does not offer significant benefits beyond six dual credit hours (An, 2013a).

Differences exist in degree attainment for dual enrollment students attending community colleges and 4-year universities. To ascertain the extent to which these differences existed, a data set comprised of students from the Virginia Community College System who completed at least one dual credit course and graduated from high school in the spring of 2004 was examined. Over 77% of dual credit students entering directly into a 4-year university earned a bachelor's degree, compared to only 53% of students beginning at a community college and then transferring into a 4-year university

(Pretlow, 2014). Further analysis indicated students beginning directly at a 4-year university were 200% more likely to earn a four-year degree compared to students beginning at a community college. Comparing 4-year and community college outcomes for students enrolled in dual credit highlighted diverse relationships existing between academic performance, graduation, and different credit attainment pathways.

Enrolling in dual credit programs benefits students in relation to degree attainment; however, students enrolled in dual credit programs also benefited in college enrollment (Taylor, 2015). Illinois students who graduated high school in the spring of 2003 and immediately enrolled in college were examined to determine if dual credit participation had an influence on college enrollment and completion rate. Dual credit students were 22% more likely to attain a bachelors degree compared to non-dual credit participants. Similarly, low-income dual credit students were 16% more likely and dual credit students of color were 14% more likely to reach degree attainment compared to respective non-dual credit counterparts (Taylor, 2015). With respect to enrollment trends, students who participated in dual credit programs were 34% more likely to enroll in college compared to non-dual credit students. Demonstrating the effectiveness of dual credit programs for low-income and students of color, Taylor (2015) advised policy makers to enhance policy to develop programs to increase participation of low-income and students of color in high school.

Students enrolling in Washington state's Running Start program (i.e., the state's version of dual credit) experienced unique results compared to most dual credit programs (Cowan & Goldhaber, 2015). Records from the Education Research and Data Center warehouse contained students who were enrolled in ninth grade during the 2006-2007

academic year and had the option to enroll in the Running Start dual credit program for the 2008-2009 and 2009-2010 academic years. Students participating in the Running Start program were 2.3 percentage points less likely to earn a credit-based diploma and 9.1 percentage points less likely to attend a 4-year university full time compared to students not participating in the program (Cowan & Goldhaber, 2015). Despite the correlation of dual credit programs and the Running Start program, Cowan and Goldhaber (2015) noted one big difference included the Running Start program's not requiring approval for students by high school officials. This unique context could explain some of the differences in results when comparing traditional dual credit programs (i.e., programs requiring high school administration approval) and the less restricted Running Start Program.

Another unique accelerated program is Early College High Schools (i.e., schools enabling students the ability to seek a high school diploma and earn college credits often leading to an Associates Degree). These programs demonstrated similar results to the Running Start Program noted in Cowan and Goldhaber's study (2015). Restricting data to only students enrolled in Early College High Schools reduced the study to 10 schools and approximately 2,400 students. Comparing the difference in postsecondary degree attainment for the 2012-2013 academic year, 24% students admitted to Early College High Schools earned degrees compared to only 4.7% of students not admitted (Haxton et al., 2016). Furthermore, 22.7% of students admitted to Early College High Schools earned an associate's degree and only 2.4% of students not admitted (Haxton et al., 2016). Moreover, earning college credits earlier on in students' educational career sets students up to potentially receive greater lifetime earnings (Haxton et al., 2016).

Identifying studies with similar participant populations provided context to the results obtained from this study. Giani, Alexander, and Reyes (2014) performed a similar study investigating the affect dual credit participation had on academic performance, particularly persistence and degree attainment. Utilizing a sample of 55,885 ninth grade high school students (2000-2001) drawn from data with the Texas Education Research Center, Giani, Alexander, and Reyes (2014), demonstrated dual credit participation increased Texas students' access to and persistence in postsecondary institutions. Additionally, dual credit benefits continued to accrue with the completion of additional courses, reaffirming a possible dosage effect for students enrolled in multiple dual credit courses.

Community Colleges

Community college enrollment provided students an option to obtain college credits prior to transferring into a 4-year university. One advantage to attending a community college is transfer students benefited from earning an associate's degree. Students attaining an associate's degree earn nearly \$10,000 more on average a year than individuals with only a high school diploma (Ma et al., 2016). Additionally, students earning an associate's degree make \$2,000,000 over a lifetime compared to \$1,600,000 for students with only a high school diploma (THECB, 2015a). Along with increased earnings, community college students pay less in tuition compared to 4-year universities. The average net price to attend a public 4-year institution was \$13,200 for the 2014 academic year compared to only \$7,100 for public community college students for the same academic year (U.S. Department of Education, 2017). Clearly, attendance at a community college prior to a 4-year institution has many benefited many students.

However, one could argue performance at a community college is a product of lowered expectations and diverted educational aspirations (Clark, 1960). Open admission policies for community colleges allows for a multitude of students with diverse social and academic backgrounds to engage in the same college curriculum. Students who are not academically prepared for higher education often face disappointment. As a result of the wide range of students' social and academic abilities, many community colleges differentiate instruction and expectations for community college students. These expectations often include the need to revisit students' own aspirations given their academic ability and many community colleges employ counselors and advisers to aid in this discussion. Community college advisers often provide a vital *cooling out function* (Clark, 1960, p. 19) by helping students redesign goals more realistic given their abilities or to help them augment work and study patterns to achieve current goals. Considering this cooling-out function of community colleges is a realistic concern when evaluating students' success in the community college system.

Community College Enrollment and Academic Performance

To better understand students who choose to attend a community college and then transfer to a 4-year university, Berger and Malaney (2003) investigated pre- and post-transfer experiences effect on community college students who transferred to the University of Massachusetts. Based off data related to students' experiences, 86% of students reported being satisfied or very satisfied in respect to their academic progress, but only 68% of students were satisfied or very satisfied with the academic support of the University of Massachusetts. With respect to community college attendance and GPA, Gerhardt and Masakure (2016) noted transfer community college transfer credits

positively affected university-level GPAs but only up to six credits earned. Fauria and Fuller (2015) added prompt feedback and encouraged dialog between students and faculty in class positively affected a transfer student's GPA.

In a different study, Spangler and Slate (2015) inspected the affect ethnicity has on Texas community college graduation and persistence rates. Data were comprised of community college students enrolled in Texas for the 2000 and 2004-2010 academic years. Asian students exhibited the largest increase in graduation and persistence rates from 37.29% in 2000 to 48.89% to 2010 (Spangler & Slate, 2015). Additionally, White, Black, and Hispanics also exhibited graduation and persistence rate increases between 2000 through 2010 academic years, albeit smaller than the increased exhibited by Asian students. Spangler and Slate (2015) encouraged the THECB to set goals and targets specifically designated for community colleges success.

Attending college typically equates to increased earnings; however, differences in earnings existed between students who attend 2-year colleges first and students who do not attend a 2-year college (Reynolds, 2012). Investigating the affect attending a 2-year college prior to entering a 4-year university has on future earnings and degree attainment, Reynolds (2012) focused on participants from the National Education Longitudinal Study of 1988. Men and women who attended a 2-year college first saw bachelor's degree attainment rates decrease by 31.5% and 42.7% respectively, when compared to men and women entering a 4-year directly (Reynolds, 2012). Similarly, future earnings for men and women who attended a 2-year college first fell by 7.7% and 10.3% respectively. Loss of future earnings for students who attended a 2-year college was a real concern for students choosing the 2-year college pathway (Reynolds, 2012).

Academic performance was also predicated on issues such as transfer shock (Cejda & Kaylor, 2010). Community college students who completed a minimum of 24 semester hours at a community college and then enrolled at one of two liberal arts universities saw a mean GPA decrease of 0.09; 53% of students studied reported university-level GPA decreases (Cejda & Kaylor, 2010). Thus, attending a community college and then transferring to a liberal arts college could result in negative academic performance outcomes. Based off Cejda and Kaylor's (2010) study, additional research was needed to further examine GPA declines of transfer students at different universities.

In a similar study, the relationship between background characteristics of transfer students and college persistence and degree attainment at a private liberal arts college have also been examined (Cejda, Rewey, & Kaylor, 2006). Cejda, Rewey, and Kaylor (2006) examined full-time community college students who completed an Associate of Arts degree and transferred to a 4-year institution between the 1990 and 1995. Transfer students to the 4-year university with GPAs between 3.5-4.0 and 3.0-3.49 encountered mean GPA decreases of 0.3122 and 0.544 correspondingly (Cejda et al., 2006). However, transfer students completing an Associate of Arts degree along with a community college GPA of 3.0 or higher, graduate and persist at rate comparable to first-time undergraduate students (Cejda et al., 2006). These findings are consistent with other research suggesting community college transfer students generally possess lower GPAs at 4-year universities than students who begin college at a 4-year institution but bright, academically-prepared community college students complete 4-year degrees at rates similar to their first-time undergraduate peers.

Expanding on the differences between first-time undergraduate students and transfer students, personal, environment, and behavioral factors predicted academic achievement have been explored (Heller & Cassady, 2017). Data were comprised of online surveys administered to 317 students at a 4-year university and 411 students at a nearby 2-year community college. An examination of data identified the location of credits obtained influenced cumulative GPA, resulting in 4-year university students earning an average GPA of 3.21, significantly higher than the average GPA of 2.28 for community college students (Heller & Cassady, 2017). However, the difference in academic performance for transfer students were predicted by environmental and social factors included in Heller and Cassady's (2017) model; additional studies and attention were needed to focus on factors affecting 4-year university students.

Despite studies related to lower academic performance for transfer students in the United States (e.g., Heller & Cassady, 2017; Cejda et al., 2006), transfer students in Canada revealed different results (Stewart & Martinello, 2012). Transfer and non-transfer students' academic success and persistence at a 4-year university in Canada who were enrolled in 2008-2009 exhibited similar final grades and persistence rates (Stewart & Martinello, 2012). However, students who transferred from another university received final course grades two points higher compared to non-transfer students. Continued focus on comparing community college GPA averages brought into a university for all first-year university students could illustrate the effect transfer shock has on transfer students (Stewart & Martinello, 2012).

Tinto (1975) noted prior experiences to higher education shape students' expectations and academic performance. Using prior experiences, Hilmer (2000)

examined how university quality (i.e., mean SAT score for entering freshman) affects post-graduation earnings. In an examination of data from the Higher Education General Information Survey in 1980, Hilmer (2000) identified students graduating from universities with mean average SAT scores of 1,200-1,400, earn nearly 40% more than students graduating from universities with mean average SAT scores of 500-800. The longer a transfer student spent at the initial institution negatively affected earnings after graduation.

Comparing Academic Performance for Transfer Students

Earning college credits at a 2-year college provided certain benefits to students compared to their counterparts at a 4-year university (Grimes, Rezek, & Campbell, 2013). Grimes et al. (2013) compared transfer and first-time undergraduate students' academic success at Mississippi State University (MSU) in economics. Students of equal academic ability received higher grades at the 2-year college compared to students taking the same two economics courses at MSU (Grimes et al., 2013). Thus, transferring credits from a 2-year college held economic opportunities, raised cumulative GPA, and subsequently increased the likelihood of graduation for the students in Grime et al.'s (2013) study.

Expanding on the differences of first-time undergraduate and transfer students, Carlan and Byxbe (2000) investigated if first-time undergraduate students are better academically equipped to handle upper level coursework compared to transfer students. Participants included 487 undergraduate transfer students and 230 first-time undergraduate students at a university from 1989 through 1991. Transfer students recorded upper level coursework GPAs of 2.83, down from a lower level coursework GPA of 3.07. Similarly, first-time undergraduate students' upper level coursework GPA

dropped to 2.80 from a lower level coursework GPA of 2.85 (Carlan & Byxbe, 2000). Based off the study, no GPA differences existed between transfer and first-time undergraduate students when investigating upper level coursework.

Continuing to evaluate the differences between transfer and first-time undergraduate students, Lorentz and Benedict (1996) evaluated academic performance differences between the two groups. Sixty student business majors, thirty transfer students and thirty entering freshman students beginning at Morehead State University 1989 comprised the participants for Lorentz and Benedict's (1996) study. Though dated, transfer students had a higher cumulative mean GPA of 2.905 compared to the 2.635 cumulative mean GPA of students who entered the university as freshman (Lorentz & Benedict, 1996). However, students entering Morehead State University as freshman graduated on average in 4.57 years compared to the 5 years transfer students needed. With data for the study limited to only business majors, future studies on additional majors were called for to examine any additional differences between first-time undergraduate and transfer students' academic performance (Lorentz & Benedict, 1996).

With respect to accounting courses, Domingo and Nouri (2016) compared the academic performance of transfer and first-time undergraduate students in an accounting program at a 4-year university. Participants included graduating transfer ($n=29$) and first-time undergraduate ($n=206$) students for the 2011 through 2014 academic years. First-time undergraduate students' GPAs for three of the accounting courses were statistically better than transfer students when students were matched. Subsequently, first-time undergraduate student's GPAs for all upper-level accounting courses was 0.29 points better compared to transfer students (Domingo & Nouri, 2016). Domingo and Nouri

(2016) further identified transfer shock for transfer students in the first semester at a university as a possible reason for GPA differences between the two groups.

Focusing not just on GPA differences, Woosley and Callahan (2011) examined how the location students acquired prerequisites effected academic performance. Data were comprised of 827 undergraduate students completing two 300-level business courses (a management and a marketing course) during in the fall of 2008 or spring of 2009 semesters at a single university. Students completing Accounting I, Accounting II, business math, business statistics, information systems, microeconomics, and macroeconomics as first-time undergraduate students at the university had higher GPAs for the management and marketing courses compared to students not completing these courses at the studied university. For example, first-time undergraduate students completing the business mathematics course recorded a 3.30 GPA in the management course compared to a 3.03 GPA for students who transferred the business mathematics course into the university (Woosley & Callahan, 2011). Much like Tinto's (1975) model, prior experiences and integration into higher education systems, such as where credits were earned, may affect academic performance.

Comparing Degree Attainment Rates for Transfer Students

Graduation rates could be predicated on where students earn college credits. When comparing transfer students and first-time undergraduate students at a public university, no difference was observed for transfer student's GPA entering the university and the first-time undergraduate students ending sophomore GPA (i.e., a common point in each students' college career) for both the 1996 and 1997 academic years (Glass & Harrington, 2002). However, transfer students graduating in the spring of 1999 reported

higher graduating GPAs ($\mu_{\text{Transfer}}=3.60$) compared to first-time undergraduate students ($\mu_{\text{First-time UG}}=3.31$). One note from the study was transfer shock affected transfer students in their first semester GPAs, but their GPAs did ultimately recover (Glass & Harrington, 2002).

Results from Glass and Harrington's (2002) study were similar to findings in a study of first-time undergraduate and transfer students' academic success (i.e., graduating GPA) at a university in California between 1992 and 2003. No difference in graduating GPAs for transfer and first-time undergraduate students was observed. Furthermore, a possible explanation for the similarities between the transfer and first-time undergraduate students' graduating GPA was small class sizes and the remote location of the studied university which forced students to socialize with peers and interact more with the campus environment, thus reducing transfer shock (Johnson, 2005).

Melguizo, Kienzl, and Alfonso (2011) also examined to what extent transfer students and first-time undergraduate students (i.e. students only attending and receiving credits at a single institution) differ in respect to academic performance. Data from the NELS:88 was restricted to only include students who graduated on time from high school, enrolled in higher education institutions, and met junior status at a 4-year institution by only enrolling at a 4-year institution or transferring credits into the 4-year institution. Examining data revealed no difference in terms of baccalaureate attainment between transfer and first-time undergraduate students with all other variables constant (Melguizo et al., 2011).

In contrast, graduation rates for students in Ohio indicated a difference between transfer and first-time undergraduate students (Long & Kurlaender, 2009). When

comparing graduation rates of students in the Ohio public higher education system who enrolled in higher education in the fall of 1998 differences emerged. Specifically, students entering a community college prior to a 4-year university were 47% less likely to complete a bachelor's degree within six years compared to students entering a selective university during the same time. Furthermore, 2-year transfer students were 14.5% less likely to earn a bachelor's degree in nine years compared to students entering 4-year universities (Long & Kurlaender, 2009).

Continuing to focus on educational completion, Alfonso (2006) examined the differences in bachelor's degree attainment for community college and 4-year university students. Using data from the NELS:88, the U.S. Department of Education, and U.S. Labor's Bureau of Labor Statistics, Alfonso (2006) found community college students were 26.3% less likely to earn a bachelor's degree compared to students attending a 4-year university. Furthermore, students entering higher education via community colleges perceive their probability of obtaining a bachelor's degree decrease anywhere from 21% and 33%, considerably lower than first-time undergraduate students (Alfonso, 2006). These findings suggest community college is a pathway for degree attainment fraught with some peril for a considerable number of students. Continuing to develop articulation agreements between community colleges and 4-year universities could possibly reduce the deficit for obtaining a degree as students transition between the two different higher education pathways.

First-time undergraduate students at Eastern Michigan University graduated at a faster rate compared to students transferring from a community college (Torres Zeno & Hansen, 2000). Specifically the researchers found first-time undergraduate health

administration students took on average 5.7 years to graduate compared to the 5.6 years health administration transfer students took; however, the 5.6 years it took transfer students to graduate did count the years these students spent at a community college (Torres Zeno & Hansen, 2000). Thus when added together it took longer overall for transfer students to graduate compared to first-time undergraduate students.

Additionally, 19% of transfer and first-time undergraduate students took between eight and 20 years to graduate, far beyond the average of 5.7 years it took first-time undergraduate students to graduate.

Expanding on the relationship between different credit attainment pathways and academic performance, Melguizo and Dowd (2009) compared transfer students and first-time undergraduate students' baccalaureate attainment rates. Over 1,000 high school senior students from the NELS: 92 were compared. Eighty-three percent of first-time undergraduates and only 53% of transfer students earned a bachelor's degree within 8.5 years (Melguizo & Dowd, 2009). However, once data were controlled for variables such as socioeconomic status and selectivity of college, no significant differences were identified. One explanation for this finding was prior studies overestimated the negative effect community college transfer has on degree attainment and underestimate the effects of institutional selectivity on bachelor's degree attainment (Melguizo & Dowd, 2009).

With Melguizo and Dowd (2009) finding differences between transfer students and first-time undergraduates' degree attainment, delineating differences between ethnicity can provide additional understandings of student performance and credit attainment pathways. Combined Hispanic students from the 1982 High School and Beyond Sophomore study and the NELS:88/2000 totaled 360 students for the study. The

percentage of Hispanic student transfers increased from nearly 10% to over 45% during the 10-year span (Melguizo, 2009, p. 106). Transfer Hispanic students' degree completion rates remained around 50% during the decade. However, first-time undergraduate Hispanic students during the same period reported degree attainment decreases from 85.43% in 1982 to 66.67% in 1992 (Melguizo, 2009). Despite the lower degree attainment rates for Hispanic transfer students, Melguizo (2009) encouraged community colleges to implement programs to support Hispanic student's academic outcomes and success.

Viewing historical differences in transfer and first-time undergraduate students, Lee, Mackie-Lewis, and Marks (1993) performed an early study on the differences in degree attainment for transfer and first-time undergraduate students. Transfer and first-time undergraduate students from the High School and Beyond study when controlled for background and institutional characteristics, indicated no disadvantage for students who transferred to a 4-year university (Lee et al., 1993). Similar results were reported for the effect community college attendance has on students and enrollment into graduate school. Lee et al. (1993) concluded persistence to degree completion is not controlled by community college attendance but rather with community college's inability to facilitate transfer of students with academic shortcomings and past poor academic performance (Lee et al., 1993).

Utilizing the similar data to Lee et al. (1993), Christie and Hutcheson (2003) set out to examine the extent to which institutional type (i.e. pathways to degree attainment) influenced baccalaureate degree attainment. Focusing on traditional, first-time undergraduates, Christie and Hutcheson (2003) identified 200 transfer students and 1,377

students who immediately entered a 4-year university following high school (n=1,577). Controlling for specific indicators such as age and immediate matriculation into college, matriculation at a two-year college as opposed to a four-year college resulted in a 10.3% reduction in the probability of attaining a baccalaureate degree, a statistic often underestimated in existing literature (Christie & Hutcheson, 2003, para. 28). Another important finding was first-year GPA, socioeconomic status, on-campus employment and high school GPA were more influential in degree attainment than institutional type. Also, Christie and Hutcheson's (2003) research may indicate a shift in the influence of institutional type on students' degree attainment pathways since Lee et al.'s (1993) study in the preceding decade. Additional explorations are needed to inform more recent developments in students' degree attainment pathways.

Students in Illinois exhibited small differences in respect to academic performance and different credit attainment pathways (Dietrich & Lichtenberger, 2015). Dietrich and Lichtenberger (2015) used data from the National Student Clearinghouse to examine transfer and first-year undergraduates' degree attainment in Illinois high school graduates who entered college in the fall of 2013. Ninety percent of first-time undergraduates and 84% of community college transfer students attained a bachelor's degree (Dietrich & Lichtenberger, 2015). However, Dietrich and Lichtenberger (2015) also advocated for propensity score matching as a useful tool in educational research to examine and document the influence of the community college pathway on baccalaureate degree attainment. Propensity score matching allowed Dietrich and Lichtenberger (2015) to identify a group of first-time undergraduate students with a comparable distribution of observable characteristics similar to those of community college students to develop

comparable contrasts. When propensity score matching was utilized by Dietrich and Lichtenberger (2015), the gap between transfer and first-time undergraduates' bachelor's degree attainment decreased to 88% of first-time undergraduates and 85% of transfer students attaining a degree. Furthermore, controlling for institutional selectivity resulted in a difference of just one percent between the groups, suggesting no negative degree attainment effects for the community college pathway. Recommendations for future research included calls for continued use of propensity score matching in comparative educational research and additional examinations of factors influencing time to degree completion. Dietrich and Lichtenberg (2015) also advocated for the a refocusing on research on the entire pathway to degree completion rather than the moment of degree completion itself (Dietrich & Lichtenberger, 2015).

Following their prior recommendations, Lichtenberger and Dietrich (2017) examined the length of time it takes transfer students and first-time undergraduate to achieve degrees specifically for Illinois high school graduates in 2003. The greatest difference in transfer and first-time undergraduates' degree attainment rates was noted 4 years after beginning college. Less than 30% of transfer students and 48% of first-time undergraduates earned a bachelor's degree at this point (Lichtenberger & Dietrich, 2017). The eighteen-percentage point difference decreased by the conclusion of the fifth year of college, with approximately a six-percentage point difference holding between the two groups. Based off the results, the penalty for community college transfer students existed between three and five years following students beginning college but subsided afterwards (Lichtenberger & Dietrich, 2017). This finding suggests the community

college pathway penalizes many students who transfer to 4-year colleges by delaying degree attainment among many other outcomes.

Data from the NELS:88 were used to further indicate differences between academic performance and different credit attainment pathways. By the year 2000, over 55% of students entering college at a 4-year university obtained a bachelor's degree compared to only 25.68% of students beginning at a community college (Vance, 2010). Students were matched according to six variables [i.e. (1) gender, (2) ethnicity, (3) mother's highest level of education, (4) father's highest level of education, (5) total family income during the student's eighth grade year, and (6) the student's own predictions of how far he or she will go in post-secondary education, made while a senior in high school] allowing for meaningful comparisons. As for full-time enrollment, over 60% of students entering college at a 4-year university enrolled for more than two years compared to only 32% of students beginning at a community college. The results from Vance's (2010) study further reiterated the differences emerging between the different credit attainment pathways.

Though graduation is an ultimate goal for most students, one limitation students encounter is the number of credits 4-year universities allow students to transfer in. Transfer credit barriers emerged when transfer students and first-time undergraduate students at a 4-year university were compared using the Beginning Postsecondary Students study (Monaghan & Attewell, 2015). The study was restricted to students who began college in 2004 and were interviewed at the end of their first year of college and again three and six years after postsecondary entry. Initially, differences were observed with only 25% of transfer students earning a bachelor's degree within six years compared

to 46% of students who entered a 4-year university directly earning a comparable degree (Monaghan & Attewell, 2015). Furthermore, only 60% of transfer students who indicated aspirations to transfer and acquired 60 or more credits at a community college actually transferred to a 4-year university. Additionally, 14% of transfer students encountered 4-year universities only accepting less than 10% of their acquired community college credits, representing tremendous financial, time, and emotional barriers for transfer students. Restriction of credits accepted at 4-year universities demonstrated a need for more research and policy analysis focusing on barriers community college transfer students experience (Monaghan & Attewell, 2015).

First-time Undergraduate Students

As previously mentioned, over 70% of students attending public 4-year institutions in 2016 earned community college credits (THECB, 2017d). Additionally, participation in dual credit is up 600% in 2015 compared to 2000 (THECB, 2016b), thus finding students with no dual credits earned or attendance at a community college may prove problematic. This shrinking student population has resulted in limited studies focusing on students entering and completing all coursework at a single university with no dual credits earned in high school or transfer hours from a community college. In an age when students' enrollment patterns are described as complex, swirling enigmas (Fauria & Fuller, 2015; THECB, 2017b), the traditional college-going experience of obtaining all of one's education at a single, 4-year institution is increasingly scarce. The prevalence of this phenomena and factors hastening it have been documented in several studies (Fauria & Fuller, 2015; Spangler & Slate, 2015; Young et al., 2013a). Many of the researchers who examined the aspects of dual credit and community college

participation, did so using the traditional route of acquiring all credits at a single institution as the control group for their individual studies. To ascertain the benefits or shortcomings of first-time undergraduate students, look no further than the inverse of the results from the previous studies.

In one study related to first-time undergraduate students, Davidson and Holbrook (2014) predicted factors affecting persistence for adult first-time undergraduate students (i.e. students 21 years of age or older). The authors observed 285 first-time adult students who had not completed any postsecondary work and entered a 4-year public institution in Kentucky for the 2005 academic year. When these students only completed between 1% and 50% of the first fall semester credits, no degree was obtained. Thus, success in the first semester of their university experience is imperative for adult students' academic success. Additionally, males had higher persistence rates the first year compared to females, but females were more likely to reach degree completion (Davidson & Holbrook, 2014), suggesting male student experiences latter difficulties than their female counterparts. The authors noted the need for future research tracking degree completion for adult, first-time undergraduate populations.

Enrolling directly into a 4-year university, rather than choosing to earn college credits at a community college, enables students to benefit in persistence rates and graduation rates. Specifically, male students who choose to enter a community college have a 15% decrease in persistence rates for the second year of college and over a 30% decrease in bachelor's degree attainment (Reynolds, 2012). Additionally, female students encountered similar results with a 21% decrease in persistence rates for the second year of college and a 40% decrease in bachelor's degree attainments (Reynolds,

2012). A student choosing to enter a 4-year college directly avoids these potential pitfalls associated with earning college credits at a community college prior to transferring to a 4-year university.

No matter the pathway for earning credits, many students' main goals include acquiring credits and graduating. Students in the University of North Carolina system who entered college in the fall of 1996 and fall of 1997 illustrated similarities in academic performance between students entering directly into a 4-year university and those beginning at a community college before transferring to a 4-year university (Glass & Harrington, 2002). For students still enrolled in the spring of 1999, graduation rates were similar with nearly 50% of both the transfer and first-time undergraduates having graduated by the same time. Thus, pathways to degree completion appear to have a reduced effect on those students taking longer to complete a degree. Students graduating high school in 2003 in Illinois indicated a small percentage increase for first-time undergraduate students compared to community college transfer students. With all control groups considered, first-time undergraduates obtained bachelor's degrees at only one percentage point higher (i.e., 86% to 85%) than transfer students (Dietrich & Lichtenberger, 2015).

Despite the numerous examples of first-time undergraduates, dual credit students, and transfer students performing similarly, some researchers (Haxton et al., 2016; Melguizo & Dowd, 2009) identified differences for choosing the first-time undergraduate pathway of credit attainment. One large difference between first-time undergraduates and transfer students emerged when comparing the bachelor's degree attainment percentages at 8.5 years following high school graduation. First-time undergraduate

students had over 80% of students in the study earn a bachelor's degree compared to only 53% of transfer students for the 8.5-year graduation benchmark (Melguizo & Dowd, 2009). In a recent study, Haxton et. al. (2016) observed 80% of students enrolling in dual credit courses enrolled in college following high school graduation. First-time undergraduate students enrolled at nearly the same rate, with over 72% enrolling in college after graduation. Students choosing to enter a 4-year university first may not have any disadvantages compared to students entering into a community college following high school graduation.

As for GPAs, transfer students in the spring of 1999 had the exact same 3.03 GPA as their first-time undergraduate counterparts at a major research institution in the University of North Carolina System of universities (Glass & Harrington, 2002). When controlling for background and institutional characteristics, transfer and first-time undergraduate students from the High School and Beyond: 1984 study held average GPAs of 2.97 and 2.88, respectively; relatively similar GPAs are noted between first-time undergraduates and transfer students (Lee et al., 1993). Students at a major university in the southern United States, enrolling between 1989 through 1991, identified no statistical differences between upper division GPAs of transfer and first-time undergraduates. Specifically, transfer students' upper division GPA was only .03 points higher compared to first-time undergraduate students (Carlan & Byxbe, 2000). No matter the pathway, credit attainment is a goal of all students. Each pathway presents advantages, challenges, benefits, and obstacles. Students must identify the pathway best suited for academic success.

Theoretical Framework

As mentioned in Chapter I, this proposed study is supported by Tinto's (1975) Theory of Student Departure. Identifying the relationships existing between students and academic intuitions is the primary focus of Tinto's (1975) work. Tinto's model (1975) focused on numerous factors within and outside of institutions affecting attrition rates for students. The study focused on students' academic performance in college based on internal and external factors. Research modeled after Tinto's (1975) work has allowed for the exploration of different credit attainment pathways and their influence on degree attainment, academic performance, persistence, salary earnings, and satisfaction with college experiences to name a few.

Tinto (1975) noted the more students were engaged in an institution, the less likely they were to depart from the institution prior to attaining a college degree. Reaching the goal of completion requires early successes along the way, support, and challenges are met. Specifically, one of the ways to gage a student's level of academic commitment and success are grades. Grades symbolize a student's abilities and reflect a degree of integration between the student and the academic environment and expectations of the institution (Tinto, 1975).

Based on Tinto's model (1975) the three different pathways (i.e., dual credit in high school, transfer from community college, or first-time undergraduate student earning all credits at a single institution) for students to earn college credits, could affect the student's ability to acclimate and thus succeed at the institution. The literature review has identified many relationships existing between the different pathways. These pathways, in Tinto's nomenclature serve as academic support structures since they are

programs or patterns employed by higher education professionals to reduce students' likelihood of premature departure from higher education. The previously reviewed studies offer many perspectives on how different credit attainment pathways might enhance or hinder students' academic success. Many of these studies (e.g., Christie & Hutcheson, 2003; Lee et al., 1993; Melguizo, 2009; Rodriguez et al., 2012) cite Tinto's work directly and even more rely on the assumptions associated with Tinto's work. Guided by Tinto's work, the study connected with many of these studies and contributed to the larger discussion on student success factors in higher education.

Summary

The three different credit attainment pathways provide students a multitude of choices when it comes to earning college credits before or during a college experience. Each of the pathways has positive aspects as well as negative. For students enrolled in dual credit, academic success is evident with better GPAs and a shorter time to graduation. This shorter time to reach the goal of graduation also enables students to potentially receive greater future earnings, with the increased time in the work force compared to students choosing one of the other two credit attainment pathways. Students enrolling in a community college following high school and then transferring to a university see the benefit of an open admission process, thus this process allows all students a chance at earning college credits. However, community colleges have the ability to alter students' educational goals and subconsciously force them into more realistic, potentially less challenging career paths given their respective academic talents. Altering these goals is a necessity for some students due to community college students requiring longer times to graduation, lost college credits due to them not transferring to a

university, and even lower GPAs. The aforementioned research also seems to suggest community college attendance may be a hindrance to overall graduation, persistence, and grades. Lastly, dual credit programs' popularity combined with community colleges' open admission policy, have reduced the number of first-time undergraduate students choosing to earn all credits at a single institution to an all-time low. The creation of dual credit programs and the community college system have benefits attracting students to them respectfully. Despite all the benefits of these two pathways, first-time undergraduate students still can earn college credits on a traditional timeframe and not encounter issues such as transfer shock or the cooling-out effect of community colleges.

Conclusion

In conclusion, numerous studies have documented relationships, both positive and negative, as it pertains to the three different pathways (i.e., dual credit in high school, transfer from community college, or first-time undergraduate student earning all credits at a single institution); however, no definitive studies regarding comparisons between all three pathways was identified. This study compared all three pathways for students at a comprehensive institution and determine if GPA differences are present for students in each pathway. Dual credit's popularity and community college's open admission practices highlight just some of the positive and unique attributes credit attainment pathways contain. Furthermore, there are shrinking numbers of students going directly and solely to a 4-year institution (i.e., first-time undergraduates). This study built on the prior literature in an attempt to examine the merits of the three different pathways. The study further enhanced higher education literature by disseminating findings related to the pathway producing the highest and lowest levels of academic performance based on

student GPAs. Finally, this study suggested evidence-based practices and policy implications for the institutions of higher education, secondary schools, advisers, families, and educational policymakers to name a few.

CHAPTER III

METHODS

Introduction

In the study, Chapter III include the research design, procedures, data analysis plan, and characteristics of qualifying participants. Procedures to be utilized in conjunction to instrumentation will be outlined. Lastly, data analysis procedures will be documented to better understand how results will be generated. The purpose of this study was to examine the extent to which differences, if any, exist between dual credit, transfer, and first-time undergraduate students as a function of academic performance. Grade point average differences serve as the basis for academic performance. Four different credit attainment points in the dual credit, transfer, and first-time undergraduate students' college careers represented a cross-sectional examination of GPA differences. Chapter III includes the following sections: (a) introduction, (b) research questions, (c) research design, (d) selection of participants, (e) instrumentation, (f) procedures, (g) data analysis, and (h) summary.

Research Questions

In this study, the following research questions were addressed: (a) What is difference in mean GPA at graduation as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university?; (b) What is the difference in mean GPA as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university for students with at least 30 credit hours earned?; (c) What is the difference in mean GPA as a function of credit attainment (i.e., dual credit, transfer, or

first-time undergraduate) for all students enrolled at a Texas 4-year public university for students with at least 60 credit hours earned?; and (d) What is the difference in mean GPA as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university for students with at least 90 credit hours earned?

Null Hypothesis

The study addressed four null hypotheses pertaining to the three credit attainment pathways at differing levels of credit attainment. The first null hypothesis was that there is no mean difference in GPA at the point of graduation for the three different credit attainment pathways. Stated differently, each research question was first examined to determine if a relationship between final GPA and credit pathway exists before potentially examining the nature and effect of that difference. The second null hypothesis for the study was be that there is no mean difference in GPA for students with at least 30 credit hours earned across the various credit attainment pathways. The third null hypothesis was be that there is no mean difference in GPA for students with at least 60 credit hours earned across the different credit attainment pathways. The final null hypothesis was be that there is no mean GPA difference for students with at least 90 credit hours earned across the different credit attainment pathways. Rejecting the null hypothesis suggests the three different degree pathways (i.e., dual credit, transfer credits, or first-time undergraduate students who obtain all credits at one institution) have an effect on students' GPA at the different credit hours earned levels for this study. Failing to reject the null hypothesis indicates that credit attainment pathways have no effect on students' GPA at these various points in credit accumulation.

Alternative Hypothesis

The study examined alternative hypotheses should the null hypotheses fail to be accepted. The first alternate hypothesis was be that a mean difference of final GPAs for the various credit attainment pathways is present. The second alternate hypothesis was be that a mean difference of GPAs for students with at least 30 credit hours earned is present across the credit attainment pathways is present. The third alternate hypothesis was be that a mean difference of GPAs for students with at least 60 credit hours earned across the credit attainment pathways is present. The final alternate hypothesis was be that a mean difference in GPAs for students with at least 90 credit hours earned across the credit attainment pathways will be present.. Accepting the alternative hypotheses would have indicate relationships exist between credit attainment pathways and students' GPA at varying levels of credit accumulation (i.e. 30 hours, 60 hours, 90 hours earned, and graduation). Alternate hypotheses would be examined after null hypotheses are rejected or failure to reject them is confirmed. Following examination of alternate hypotheses, results would be offered to inform the extent to which credit pathways have changing variance on of GPAs.

Research Design

The purpose of this cross-sectional, nonexperimental study was to determine what differences existed in different higher education credit attainment pathways at specific points in students' educational career. A non-experimental approach is appropriate because there was no manipulation of the independent variables and only observations and inferences as to the relationship between independent and dependent variables were made (Johnson & Christensen, 2014). The independent variables were credit attainment

pathways (i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university) and the hours of credits obtained for students in each pathway. The dependent variables were GPA at 30 credit hours earned, 60 credit hours earned, 90 credit hours earned, and graduation.

The survey was cross-sectional in design with examinations of student's academic performance (i.e., GPA) occurring at common points over the student's postsecondary career. A cross-sectional study does not track participants' perspectives across a span of time and instead focused on a single point in time (Johnson & Christensen, 2014). The cross-section of time examined in this study was 2005-2016, representing a decade of data. For this study, multiple points in time for students on the three different academic pathways were explored by splitting the data file and examining students' GPAs at 30, 60, and 90 credit hours earned, as well as graduation. The decision to examine data for student bringing in 30, 60, 90 credits earned was made in order to inform students as to the differences in the form of academic performance (i.e., GPA differences) for the three different pathways students can earn college credits in. Comparing students in a single class or at the completion of semesters at a 4-year university presents bias due to the differences in the potential number of credits each student has earned prior to each class or semester. Students entering the 4-year university with dual credit experience potentially bring in over 24 credits. Students transferring from a community college potentially have earned 42 credits if core complete and up to 60 credits if an associate's degree was earned. Furthermore, first-time undergraduate students who enter the 4-year university directly from high school potentially do not bring any earned credits. Comparing at common points in earned credits for the three different pathways sought to

provide a more viable comparison for how the three pathways affect academic performance (i.e., GPA differences).

This was the appropriate design with the comparing GPAs at four specific points in the collegiate experience for three credit attainment pathways. Experimental research offers greater depth and capacity for inferring causal relationships between variables. Caution should be exercised in examining causal relationships in non-experimental research designs. However, educational studies depend on non-experimental designs due to the lack of abilities to manipulate educational variables or reproduce in a lab situation (Johnson & Christensen, 2014). Great care was taken to not overstate or imply causal implications between the degree attainment pathways and GPAs observed.

Selection of Participants

Participants include students who attended a public 4-year university in Texas for the 2005-2006 through the 2015-2016 academic years. Participants were separated out into three groups based on prior educational experiences including: (a) students who earned dual credit hours in high school and then transferred into the studied public 4-year university, (b) students who attended a community college or 2-year college and transferred credits into the studied public 4-year university, and (c) students who entered the studied public 4-year university with no dual or transfer credits earned previously. For the purpose of this study, students meeting criteria for multiple pathways (e.g., earning dual credits and transferring community college hours into a 4-year institution) were omitted. This decision was made to allow for greater capacity to examine the phenomena under consideration in the study.

In this study, the public 4-year institution had a fall 2015 enrollment of over 20,000 students making it the twelfth largest university in the state (Sam Houston State University, 2017a). Data on a substantial period of historic enrollments combined with the cross-sectional design allow for thousands of participants to be included into the study. Additionally, in the fall 2016 academic year the undergraduate student population included: (a) 62% women, (b) 38% male, (c) 1.8% Asian students, (d) 18.2% Black or African American students, (e) 21.9% Hispanic or Latino students, and (f) 51.3% White students (Sam Houston State University, 2016.). In contrast, state-wide 56% of students enrolled in higher education for 2016 were female, roughly 36% were Hispanic, over 36% were White, and over 13% were African American (THECB, 2017b). Though some similarities between the statewide averages and the student characteristics for the public 4-year institution in this study make generalizations to other colleges within the state possible. However, caution should be exercised with data for this study still only representing a single public 4-year university.

Instrumentation

In this non-experimental, cross-sectional study, archival data were used to determine the extent to which differences, if any, exist between the credit attainment pathways (i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university) and dependent variables (i.e., GPA at 30 credit hours earned at 60 credit hours earned, 90 credit hours earned, and graduation). Archival data is appropriate for cross-sectional studies with data being stored over time and used to explore policy implications at a moment in time (Johnson & Christensen, 2014). The archival data employed in the study included

academic performance records kept by the public 4-year institutions Institutional Effectiveness Office. The Institutional Effectiveness Office gathers, evaluates, and reports data for the university (Sam Houston State University, 2017b). Student transcripts and records contain past academic performance (i.e., cumulative and semester GPAs) needed to determine differences in the three different degree attainment pathways as well as at different points in students' college-going experience.

The Institutional Effectiveness Office aggregates and stores data from state reports and institutional data containing end of term GPAs (Sam Houston State University, 2017c). For this study, it was assumed all records were accurately reported and certified. Additionally, one threat to validity in this study was possible maturation of students, a common concern when studies span a considerable length of time. Physical changes, mental changes, and emotional changes can occur for participants (Onwuegbuzie, 2003). However, maturation threat was not expected to be a considerable concern for the study since maturation is an expectation of college and should be partially indicated in GPAs.

Procedures

Prior to performing any statistical analyses, approval was sought and obtained from the public 4-year university's Institutional Review Board (IRB). Data were downloaded in Microsoft Excel and password protected for security purposes. Data were stored on a physical drive maintained by the researcher. Data were entered into IBM SAS, for statistical analysis. A flat data file—wherein each students' GPA at 30, 60, and 90 credit hours, as well as graduation—was developed and did include with an indicator for each students' dual credit, community college transfer hours, or hours accumulated at

the 4-year institution studied. Standard data cleaning procedures were employed, particularly to remove any students with credits in multiple pathways. Next, missing data were examined. However, since institutional archival data are being used and since data will only be examined for graduating students, missing data were expected to be limited. Any missing data were addressed by determining if participants with missing data meet the criteria for inclusion in the study or through multiple imputation procedures.

Data Analysis Plan

Following generally accepted data preparation procedures, descriptive statistics were conducted. These included mean, median, mode, range, skewness, kurtosis, standard deviations, and standard error of means for all independent and dependent variables. Skewness and kurtosis statistics were checked against generally accepted conventions (i.e., +/- 3, Onwuegbuzie & Daniel, 2002). A correlation matrix was produced for all independent variables and dependent variables and reported in Chapter IV along with standard descriptive statistics.

To examine the research questions, a Multivariate Analysis of Variance (MANOVA) and General Linear Model (GLM) were used to investigate whether the independent variables predict the dependent variables of GPA at various points across credit attainment. An initial MANOVA was conducted to examine the null and alternate hypothesis. Next, a GLM was constructed and examined to determine the nature and degree of any effects noted in the model. MANOVA is an appropriate analysis to use when examining the extent to which a relationship exists between an interval/ratio predictor variables and an interval/ratio criterion variables with multiple layers or groupings of participants across the sample. Since dual credit hours, transfer hours, and

first-time undergraduate hours earned are interval/ratio data as are GPAs, MANOVA will be employed.

The development of a GLM allows for more detailed examination of any effects or interactions of groupings of individuals according to relationships in interval/ratio predictor variables and an interval/ratio criterion variables (Huberty & Olejnik, 2006). This will allow for any statistically significant effects to be discussed in greater detail. While the initial MANOVA were used to examine the null hypotheses, the GLM will be used to typify any effects within groups or across the degree attainment pathways. No other covariates were controlled for since the researcher is interested in examining the construct under consideration in the proposed study. Controlling for other covariates such as gender, ethnicity, and socioeconomic status, could potentially constrict the variability, thereby masking the effects of the pathways on GPA. Thus, the decision was made to only examine variables in the study to illustrate any and all academic performance differences existing strictly between the three academic pathways.

Statistical Assumptions of MANOVA and GLM

Statistical assumptions of MANOVA and GLM are similar and include: (a) evidence of linear relationship between variables, (b) residuals are normally distributed, (c) variance across residuals are equally distributed, (d) the fixed, independent variables are measured without error, and (d) little to no evidence of autocorrelation or multicollinearity (Huberty & Olejnik, 2006). Evidence of linearity is often visual confirmed through the use of scatter plots or Q-Q plots (Field, 2009). To ascertain the normality of the data, standardized skewness coefficients and standardized kurtosis coefficients were calculated. Standardized skewness coefficients are the skewness values

divided by the standard error of skewness for each coefficient; whereas, the standardized kurtosis coefficients are the kurtosis values divided by the standard error of kurtosis for each coefficient. The values of these coefficients indicate if data were within the range of normality (i.e., ± 3 , Onwuegbuzie & Daniel, 2002). Q-Q Plots, the Kolmogorov-Smirnov test, and the Shapir-Wilk test were also produced to aid in determining if a multivariate normal distribution of data is present, particularly in the dependent variables.

Multicollinearity occurs when multiple independent variables (i.e., dual credit, transfer from a community college, and native students earning all credits at a single 4-year university) and a strong correlation between them, thus meaning the predictor variables are not independent of each other (Field, 2009). If independent variables exhibit perfect collinearity, the variables could be interchangeable, making the effect of one collinear variable indistinguishable from another (Field, 2009). To examine collinearity in greater detail, the correlation matrix was examined. Independent variables with a Pearson correlation coefficient less than one are assumed to have little or no collinearity (Field, 2009). Since students were assigned to one of the three mutually exclusive pathways, collinearity in the independent variables is anticipated to be non-existent or limited. Provided all assumptions were met, MANOVA and GLM proceeded according to guidance offered by Huberty and Olejnik (2006). After completing the analyses for student GPAs predicted at 30 hours of university credits accumulated, the analyses were repeated at 60 and 90 credit hour accumulation points as well as graduation by entering each level of attainment into sequential blocks of the GLM. At each point, the researcher examined the statistical significance of any mean differences, the nature of these differences, and their effect sizes. Effect sizes allows for determination of the

strength between variables (Field, 2009). Following Cohen's (1988) advice, labels for effect sizes were determined with: (a) values between 2% and 12.99% will be suggestive of small effect sizes, (b) values between 13% and 25.99% will be suggestive of moderate effect sizes, and (c) values over 26% will be suggestive of large effect sizes.

Additionally, for all values to be considered statistically significant, a p-value of 0.05 was used. A statistically significant level of .05 is the conventional level used in educational research (Creswell, 2009).

For this cross-sectional study, the independent or predictor variables were three different pathways of credit attainment. Students entering higher education have several options to acquire credits. The three types of credit attainment pathways and independent variables in the study included: (a) student participation in dual credit in high school and then transferring into the 4-year public university in this study, (b) student attendance at a community college and then transferring into the 4-year public university in this study, and (c) student attendance at the 4-year university in this study with no dual credits earned and no community college transfer credits.

Summary

Utilizing a cross-sectional, non-experimental study combined with student records from a 4-year public university in Texas, the researcher examined the change in variance for credit attainment pathways and GPAs at specific points in students' educational experience. Different credit attainment options (i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university) served as the independent variables. Exploring differences in GPAs at 30 credit hours earned, 60 credit hours earned, 90 credit hours earned, and graduation

represented the dependent variables. MANOVA and a GLM allowed for exploration of the differences the independent variables have on the dependent variables across the various groups. By examining these pathways through GLM, differential and overall effects for each point along students' educational experience were reported. These results served as the findings for this study and inform implications for practice and research offered in Chapter IV and V, respectively.

CHAPTER IV

RESULTS

Introduction

To examine GPA differences in credit attainment pathways (i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university), a Multivariate Analysis of Variance (MANOVA) statistical analysis was utilized. Prior to conducting any statistical analysis, data were compiled from the institution's Institutional Effectiveness office. Data selected for this study included institutional records for students from a single public 4-year institution in Texas from the 2011 through 2016 academic years. This collection of students included individuals from all three pathways and subsequently allowed for a GPA comparison at common points. The 2011 through 2016 academic years all contained students in each of the three pathways whereas previous years did not contain data for dual credit students, as the institution did not record these elements prior to 2011. For this reason, data were limited to the 2011-2016 timeframe in this exploratory study. Data were collected and loaded into Excel to organize and filter in order to prepare all data for statistical procedures prior to importing data into SAS for MANOVA and GLM analyses.

Research Questions

In this study, the following research questions were addressed: (a) What is difference in mean GPA at graduation as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university?; (b) What is the difference in mean GPA as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas

4-year public university for students with at least 30 credit hours earned?; (c) What is the difference in mean GPA as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university for students with at least 60 credit hours earned?; and (d) What is the difference in mean GPA as a function of credit attainment (i.e., dual credit, transfer, or first-time undergraduate) for all students enrolled at a Texas 4-year public university for students with at least 90 credit hours earned?

Preparation of Data

The institution implemented a new data management system during the middle of the timeframe for this study. Prior to the implementation of this new data management system, data on students' dual credit enrollment was not recorded. Therefore, the timeframe under consideration in this study was truncated to 2011 to 2016. Even with this decision, data examined represent a significant period of time and a collective over 11,000 student record data points. Given this, results from this study should be interpreted with a degree of caution.

Data received from the institution's Institutional Effectiveness office were broken into two files, one prior to the implementation of the new data management system and one after in the implementation. Looking at data issues arose with identification of students with dual credit experience. All data in the prior to new data management system implementation collection failed to identify students who earned dual credits in high school; however, after the implementation of the new data management system a column labeling students who earned dual credits in high school existed. Due to this limitation, the choice was made to further limit the academic years proposed for this

study to only include the years following the implementation of the new data management system. Data prior to the new data management system allowed for assumptions to be made regarding if a student earned dual credits in high school, but to maintain a high level of validity for the study all data points prior to the new data management system's implementation were excluded.

The remaining data points were organized initially in Excel as separate tabs for each academic semester. Each tab was copied and then combined into one list of all individuals from the remaining years, thus leaving over 150,000 student data points from 2011 through 2016. Once all academic semesters were combined, columns were double checked to ensure all data were organized in the same way for each combined semester. Once organized all duplicate entries were removed. Duplicate entries existed as student record contained lines of data for each academic year singularly, but the first academic year was continuously added to as students progressed through their degree. The first academic year then represented all the collected data for the student holistically, whereas the other entries would only have individual years or collections of some years but not the entirety of the student record. For example, a single student could have over 10 separate entries since each entry represented a fall or spring semester for each academic year in which they were enrolled. However, for the purpose of this study the researcher only included the single entries containing every year's GPA as data in the analyses to offer a holistic view of students' experiences. Data were first sorted according to academic year and then semester (i.e., fall or spring). Sorting in this manner allowed duplicate entries to have the earliest student entry to be at the top. The student's unique

ID number determined duplicate student entries. Once all duplicate entries were removed the total data points was decreased from over 150,000 to 52,594.

The remaining data provided certain limitations as to how to delineate the exact GPA for the 4 different GPA points (i.e., GPA at 30 credit hours earned at 60 credit hours earned, 90 credit hours earned, and graduation) needed for the study. This limitation came in the form of how the data were provided for this study. Data were broken down to individual semesters for student's first two years but then data changed to yearly credits earned and respective GPAs i given a data collection practice change at the institution under consideration. To address this concern, an accompanying column containing the number of hours earned each semester was added next to each students' GPA for that semester. Lastly, a column containing the total number of hours earned for each student based off previous semesters' earned credit totals was included. By subtracting these earned and accumulating hours from each other, a final column for current hours earned was obtained. Separately a column existed with the total number of hours students transferred into the institution, if applicable. In order for additional functions to be used to collect the needed data, additional columns were created next to each existing credit hours earned. This column allowed for the combining of the earned semester hours and transfer credit hours transferred in, if applicable. Adding these columns allowed for an accurate cumulative total of hours earned to be calculated.

Because data were reported for individual semesters for the first two years, it was difficult to determine the correct GPA for the needed credit hour total. Students had the ability to earn credits during the first two years and subsequently had multiple GPAs within the acceptable credit hour range for a single measuring point. To accommodate

this potential issue, additional columns were created with “if” commands to consistently select students’ GPA at the corresponding points of interest. The four GPA points (i.e., GPA at 30 credit hours earned at 60 credit hours earned, 90 credit hours earned, and graduation) were included in these “if” commands. The “if” function for the lowest GPA point (i.e., 30 credit hours earned) selected the GPA for students who earned between 15 and 45 hours earned. The function selected the highest hours earned GPA within each range. The “if” function for the second GPA point (i.e., 60 credit hours earned) selected the GPA for students who earned between 46 and 75 hours earned. The “if” function for the third GPA point (i.e., 90 credit hours earned) was used to select the GPA for students who earned between 76 and 119 total hours. Lastly, the final GPA point (i.e., graduation) was a column given from the institutions Institutional Effectiveness office, so no “if” function was needed.

In addition, how data were received for this study also inhibited the ability to obtain a GPA for community college student at 30 credit hours earned. Data did not allow for a breakdown of GPAs of community college transfer students at the needed GPA points. For the purpose of this study, community college students accumulating less than the required hours needed for the 60 credit hours earned (i.e. credit totals under 46 hours earned) were not considered. Therefore, all community college students in the study represented students accumulating credit hours near 60 credits, the same amount of hours needed for a community college student to earn an associate’s degree. Delimiting data to this point omitted all community college transfer students who only attended one semester and transferred to the 4-year institution with 12 to 15 hours. Community

college students in the study represented students who incurred the true impact of attending a community college and transferring to a 4-year university.

Lastly, all data points with a final GPA of zero or had a blank or no final GPA were deleted. A GPA of zero indicated an error in the data, so these entries were removed to avoid skewing the results. After confirming with the Institutional Effectiveness Office staff, it was learned that a small number of student records with a zero final GPA did have some accumulated hours. The institution's data system may have used a default of zero for a variety of reasons, such as non-payment, non-academic dismissal, or other concerns. As these cases represented less than one one-hundredth of the entire sample size, they were removed from the present analyses to ensure an appropriate focus on students in the pathways under consideration. Additionally, any data points with no pathway distinction (i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university) were deleted to ensure all remaining data had a pathway (i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university) labeled. Following these conditions, the remaining data points were reduced down even further to 11,582 student records. Prepared data were loaded into SAS for statistical analysis.

Results

Assumptions of Multivariate Analysis of Variance are crucial to analyses though MANOVA and GLM are robust analyses capable of proceeding with minor violations of these assumptions (Huberty & Olejnik, 2006). Confirmations were taken to confirm the assumptions of MANOVA were met. Assumptions of MANOVA require normality of

all variables independently, as well as, normality jointly between the variables (Bray & Maxwell, 1985). After visually inspecting histograms and Q-Q plots, the Kolmogorov-Smirnov Test was run to examine the normal distribution of data. The Kolmogorov-Smirnov test was not statistically significant for the 60 hour, 90 hour, and graduation levels. This suggested that GPA at these credit attainment levels were normally distributed. The 30 hour credit level was statistically significant, suggesting the GPAs were not normally distributed. To further confirm the assumption of normality, the Shapiro-Wilk test was conducted for all independent and dependent variables. All of the Shapiro-Wilk test results were not statistically significant at any credit attainment level, suggesting data were normally distributed. Often, GPA data are not expected to be normally distributed as students hope and work to earn the highest grade possible. Grade inflation and other challenges may influence the distribution of data as well (Fuller, Wilson, & Tobin, 2011). Nonetheless, MANOVA and GLM are robust statistical methods and the dependent variables were normally distributed as confirmed through these two tests for a normal distribution.

Additionally, the assumption of homogeneity of the variance and covariance matrices must be confirmed. These assumptions were determined with a Box's M test (Tabachnick & Fidell, 2007). Box's M statistic was significant at $p < .01$, suggesting no heterogeneity of the variance-covariance matrix. The Box's M test revealed equal variance across the cells and eliminated the need for a Pillai's Trace to be performed. The standardized skewness and kurtosis coefficients for GPA differences within the three pathways data were checked for normality. Standardized skewness coefficients are the skewness values divided by the standard error of skewness for each coefficient; whereas,

the standardized kurtosis coefficients are the kurtosis values divided by the standard error of kurtosis for each coefficient. The values of these coefficients indicate if data were within the range of normality (i.e., +/- 3, Onwuegbuzie & Daniel, 2002). All variables were within the limits of normality. Additionally, Q-Q plots and histograms were visually analyzed to confirm normality of data. The Q-Q plots and histograms also illustrated the normal distribution of datasets. A correlation matrix was produced, though it was not as informative as one might expect. Pearson correlation coefficients were produced for all credit attainment levels and for all credit attainment levels across each pathway. No single coefficient was below 0.50 and no correlation coefficient was negative. Given the size of the current sample, most correlations were statistically significant. This was expected as GPAs at latter credit attainment levels (i.e. 90 hours or graduation) are built upon GPAs credits preceding it. As such, covariance amongst the dependent variables would be expected to be present to at least some extent. This expected result did not unnecessarily negate the assumptions of the robust MANOVA or the GLM methods and has been documented in prior research (Fuller, Wilson, & Tobin, 2011).

An initial MANOVA examined educational pathways (i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university) and academic success at certain GPA points (i.e., GPA at 30 credit hours earned at 60 credit hours earned, 90 credit hours earned, and graduation) for students at a single 4-year institution. A statistically significant GPA difference was present for the different pathways at 30 hours earned, 60 hours earned, 90 hours earned, and graduation (i.e., $p < .001$ for each relationship respectively). Additional multivariate

analyses were performed for each dependent variable to examine differences among the three different pathways.

Constructing and examining a general linear model (GLM) with least squares means and a Tukey-Kramer adjustment for multiple comparisons, academic performance differences in the dependent variable (i.e., GPA at 30 credit hours earned at 60 credit hours earned, 90 credit hours earned, and graduation) were compared for each independent variable (i.e., i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university). To determine difference the analysis focused on the 2011 through 2016 academic years. To address the first research question, a multivariate analysis of variance among GPAs at graduation revealed statistically significant results ($p < .001$) for all relationships. Similar to the previous GPA points, students with dual credits earned in high school outperformed the other two pathways. Students with dual credit experience graduated with a 3.31 GPA average. Community college transfer students continued to outperform first-time undergraduates and increased the difference in GPA from 90 credit hours earned to graduation. Community college transfer students graduated with the second highest average GPA of 3.20, followed by first-time undergraduate students graduating with a 3.12 average GPA. Students in each of the three pathways experienced GPA increases from 30 credit hours earned to graduation.

To address research question two, academic performance differences at 30 credit hours earned for dual credit and first-time undergraduate students were present. Dual credit students out performed first-time undergraduate students in terms of average GPA, 3.27 and 3.03 respectively ($p < .001$). No community college transfer students were

included in this calculation. In an attempt to standardize the data and get as close of a representation of how much variance the different pathways have on GPAs, community college transfer student's credits were restricted to the amount of credits needed to earn an associate's degree at a community college. In the state of Texas, the number of credits needed to earn an associate's degree is 60 credit hours. Therefore, data were delineated to ensure the study only evaluated community college students near the 60 credit hours earned. Due to the restriction, any community college transfer student who only acquired 45 hours or less prior to transferring were excluded from the study.

To address the third research question, a second multivariate analysis of variance was performed at 60 credit hours to ascertain performance differences in the dependent variable (i.e., GPA at 30 credit hours earned at 60 credit hours earned, 90 credit hours earned, and graduation) were compared for each independent variable (i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university). At 60 credit hours earned, differences emerged between the three pathways with a significant difference ($p < .001$) for dual credit students both with community college transfer students and first-time undergraduates. Community college transfer students and first time undergraduate students also had a significant difference ($p < .001$). Community college students had the lowest average GPA at 60 credit hours earned with a 2.93 GPA. First-time undergraduate students had a slightly higher average GPA at 60 credit hours with a 3.01, but the 3.23 GPA of dual credit students was the highest GPA of the three pathways at 60 credit hours earned.

To address the fourth research question, a multivariate analysis at 90 credit hours earned examined differences in the dependent variable (i.e., GPA at 30 credit hours

earned at 60 credit hours earned, 90 credit hours earned, and graduation) compared for each independent variable (i.e., dual credit, transfer from a community college, and first-time undergraduate students earning all credits at a single 4-year university). A statistically significant difference ($p < .001$) was present between dual credit students with both community college transfer students and first-time undergraduates. Likewise, statistically significant differences existed between community college and first-time undergraduates ($p < .0018$). Dual credit students earned the highest average GPA at 90 credit hours earned followed by community college transfer students and then first-time undergraduates, 3.28, 3.09, and 3.05 respectively. Previously community college transfer students had the lowest average GPA but at 90 credit hours earned, community college transfer students began to outperform the first-time undergraduate counterparts. See Table 1 for all statistics regarding the different pathways and GPA differences. Note that all pathways contained statistically significant mean differences.

Insert Table 1 about here

An additional multivariate analysis of variance checked the variance in age at admittance for the three pathways at the 4-year institution. Statistically significant results ($p < .001$) for all relationships were identified. Dual credit students entered the 4-year institution at 18.49 years of age, the lowest of any of the three pathways. First-time undergraduate students entered the 4-year institution at 18.97 years of age. Community college transfer students had the highest age of admittance at 23.34 years of age. Community college students in theory had accumulated two years' worth of credits at the

community college; however, community college transfer students entered the 4-year institution over four years older compared to the other two pathways.

Cohen's *d* effect size statistics were produced for each statistically significant mean GPA difference across credit attainment levels and pathways. All of Cohen's effect size values were extremely small ($d \leq .002$) suggesting the influence of pathways on GPA attainment, though significant, have little influence on the overall outcome of a student's GPA. Therefore, although statistically significant results are noted, results of practical importance may require further analyses. Still findings from this study may be suggestive of patterns that could be useful in future studies.

Summary

In summary, statistically significant differences for each of the research questions indicated variance was present for the three pathways comparatively at the four different GPA values. At every GPA measurement point, dual credit students outperformed with higher GPAs than their respective peers. Despite the lack of data at 30 credit hours earned for community college transfer students, community college transfer students were the only pathway not seeing a drop in average GPA from 30 credits earned to 60 credits earned. However, community college transfer students did have the lowest GPA recorded from any of the three pathways at any of the GPA points with a 2.93 average GPA at 60 credit hours earned. Despite the lowest starting point of any pathway, community college transfer students graduated with the second highest average GPA of 3.20, second only to the 3.31 average GPA of dual credit students.

Furthermore, first-time undergraduate students ended with the lowest average GPA at graduation with a 3.12 GPA. First-time undergraduate students, similar to dual

credit students, encountered a small drop in average GPA from 30 credit hours earned to 60 credit hours earned. However, both the dual credit students and first-time undergraduate students remained consistent throughout the student's time at the 4-year institution. Each of the two pathways encountered overall average GPA increases from 30 credits earned to graduation of at least 0.04 points. No matter the pathway, students in this study encountered GPA increases from the first reported average GPA until graduation.

Based off this study students with dual credit experience encounter higher GPAs at the 4-year institution compared to the other two pathways. A positive note was the GPA responses all three pathways had the longer they were enrolled at the 4-year institution. Despite a small drop in average GPA for dual credit students and first-time undergraduate students, all students earned higher GPAs as they progressed towards graduation. Each of the pathways allowed students to be successful and reach graduation, thus meeting one of the primary goals of the *60x30TX* plan (THECB, 2015a). The results also provide some context for future research into three different pathways and specifically within each pathway if certain students are more successful compared to others.

Conclusion

The need to identify pathways through higher education is only heightened with the push from the state and the *60x30TX* plan (THECB, 2015a). This study provided statistically significant variance in GPAs as a function of academic pathways. Each academic pathway indicated some positive affects in relation to GPA. However, some pathways allowed for greater increases in average GPA from 30 credit hours earned up to

graduation. Chapter V focused on implications and recommendations based off the results in this study.

CHAPTER V

DISCUSSION

Introduction

State initiatives continue to drive higher education in Texas (e.g., THECB, 2015a; THECB, 2016a). Meeting the *60x30TX* plan requires students to maneuver through the conundrum that is higher education with the least resistance possible, along with maximizing academic performance. Students' backgrounds and academic support also play a role in students reaching graduation successfully (Tinto, 2012). Prior experiences affect students' academic performance (Tinto, 1975). With enrollments in Texas higher education projecting to reach over 730,000 at public universities by 2030 (THECB, 2017c) and potential pay increases for each degree earned (THECB, 2017b), Texas must identify pathways for students allowing them to not just attend college but rather thrive after it.

Each pathway in this study allowed students to benefit from the first reported average GPA until their final GPA at graduation. Evidence of transfer shock (Hills, 1965) and the cooling out function (Clark, 1960) existed for community college transfer students during the transition to a 4-year institution. Evident as the lowest reported first reported average GPA were incurred by community college transfer students before the largest increases of any group were incurred by the same community college transfer students. Furthermore, dual credit experiences for students proved to be related to higher academic performance, at least as a function of GPA used in this study. Additionally, first-time undergraduate students performed well and despite having the lowest average

graduation GPA of the three pathways, forwent the potential transfer issues community college students face.

Due to the robust nature of the dataset and setting parameters to allow for a consistent selecting of the highest GPA within the constraints of each dependent variable for the study, all of the 11,582 data points were able to be used to determine average graduate GPA for the three different pathways (i.e., dual credit, transfer, or first-time undergraduate). Similar to previous studies (e.g., An, 2015; Karp et al., 2008; Ganzert, 2012), dual credit students performed well and graduated with an average 3.31 final GPA. Dual credit students had the highest GPA of the three pathways; thus, outperforming community college transfer and first-time undergraduate students. Community college transfer students had average graduate GPAs of 3.20, 0.11 GPA points lower than dual credit students. First-time undergraduate students performed the worst of the three pathways with an average graduate GPA of 3.12, meaning 0.19 GPA points lower than dual credit students and 0.08 points lower than community college transfer students.

Using GPA as the standard for academic success in this study, dual credit students outperformed their respective counterparts in relation to final graduate GPA. One thing to consider is the relationship dual credit enrollees have to better academically prepared students. Students must meet certain requirements to enroll in dual credit programs (THECB, 2008) compared to the open admission policies of community colleges (Texas Educational Code, §130.0011). This detail could help to explain the difference in average graduate GPA difference among the dual credit and community college transfer students.

Data from the institution's Institutional Effectiveness office did not allow for community college transfer student credits to be broken down at the 30 credit hours earned mark. Community college transfer students moved into the at least 60 credit hours earned category. The emergence of community college transfer data for research question 3 (i.e., at least 60 hours earned) unintentionally created a representation of transfer students completing near all credits possible for an associate's degree or maximum credit hours needed to transfer to a 4-year institution. Therefore, all data at the 30 credit hours earned GPA point concentrated on dual credit students and first-time undergraduate students. Dual credit students outperformed first-time undergraduate students by 0.24 average GPA points, with an average GPA of 3.27 for 30 credit hours earned. Though first-time undergraduate students did not perform equivalent to dual credit students, first-time undergraduate students still do not incur the issues of transfer shock and cooling out community college transfer students can encounter.

With nearly 6,000 data points to test the variance between academic pathways and students' GPA at 60 credit hours earned, dual credit students again earned the highest average GPA. The average GPA of 3.23 for dual credit students was 0.22 points higher than the average GPA of 3.01 for first-time undergraduates. Additionally, largest difference from highest to lowest average GPA of all four GPA points was encountered at 60 credit hours earned. Dual credit students earned average GPAs 0.30 points higher than the 2.93 average GPA earned from community college transfer students. At 60 credit hours earned, community college transfer students performed the worst of all three pathways. Perhaps the cooling out function (Clack, 1960) or transfer shock (Hills, 1965)

encountered by community college transfer students played a role in lower academic performance.

At 90 credit hours earned, similar to previous results, dual credit students outperformed their two counterparts in average GPA. Dual credit students had an increase from the 3.23 average GPA at 60 credit hours earned to a 3.28 average GPA at 90 credit hours earned. Interestingly, community college transfer students moved up from the previous 2.93 average GPA at 60 credit hours earned to a 3.09 average GPA and scored 0.04 GPA points higher than first-time undergraduates score. First-time undergraduate average GPAs of 3.05 were the lowest but did rise up from the previous 3.01 average GPA at 60 credit hours earned. The indication transfer shock (Hills, 1965) was present is supported by the increase in GPA for students as they remained at the 4-year institution for longer periods.

Academic Pathways

Historic increased in dual credit from 2000 to 2015 (THECB, 2016b) combined with state support for increasing higher education enrollments with programs like the *60x30TX* plan (THECB, 2015a), makes understanding what pathways students are academically most successful in a major concern for everyone associated with higher education. Dual credit students performed academically better at every dependent variable. Community college transfer students did not perform well until after the 60 credit hours earned. Hills' (1965) mention of transfer shock could be evident as students whom transferred from a community college struggled initially to perform academically well. On a positive note though, once passed the 60 credit hours earned community college transfer students observed the highest average GPA increases from 60 to 90 credit

hours earned and 90 credit hours earned to graduation. Community college transfer students increased 0.16 and 0.11 respectively.

When comparing total average GPA increases from 60 credit hours earned to graduation, due to the emergence of community college transfer data first at 60 credit hours earned; community college transfer student's average GPA increased 0.27 points. Comparatively, during the same time, dual credit students' GPA only increased 0.08 points and first-time undergraduates GPA increased 0.11 points. This increase for community college transfer students further indicates the need for programs and academic support for students transitioning from a community college to a 4-year institution. Programs could be implemented at the community college level and or at the 4-year institutional level. Preparing community college students prior to transfer along with some orientation courses at a 4-year institution allow for students to better acclimate and transition between academic institutions. Transfer program maps allow students at the community college level to better understand the needs at both the community college and 4-year institution (Fink & Jenkins, 2017). Furthermore, community colleges could work to replicate the academic rigor students will encounter at 4-year institutions (Fink & Jenkins, 2017). Replicating rigor, providing detailed transfer program maps, and even better advising for students at the community college level all could aide students in the difficult process of transferring between a community college and 4-year institution. Some community colleges could face challenges in replicating rigor. Faculty and staff may not want to recognize that a difference in rigor may exist; some may overcompensate, making community college coursework more rigorous than university work. Administrative leaders at both community colleges and universities should have a

keen understanding of the patterns of student transfer out of an into their respective institutions. Only then can faculty at these institutions begin to articulate the desired learning outcomes and abilities students should possess and forms of instruction and learning support needed to help students meet these standards. In particular, academic support in the first years comes at a time when students are still receptive (Tinto, 2012). Community colleges and 4-year institutions could work to ease the transition, thus equipping transfer students to perform academically better once at the 4-year institution.

First-time undergraduates and dual credit students also encountered GPA decreases between 30 credit hours earned and 60 credit hours earned. For dual credit students, this could equate to the timeframe they entered into the 4-year institution because of the numerous dual credits earned in high school. This drop could seemingly represent a form of transfer shock for these students as they leave high school and enter a 4-year institution. However, it could also be attributed to increased rigor in courses with the completion of many lower level course in high school. This still does not explain the reason for the ever so small drop of 0.02 points for first-time undergraduate students between 30 credits and 60 credits earned. Future research into the experiences of first-time undergraduates and dual credit students during the first two years of college could provide clarity to the change in GPA found in this study.

Despite the overwhelming literature supporting dual credit programs in conjunction with the findings in this study, transferring from a community college and attending a 4-year institution as a first-time undergraduate still provide viable options for students. Even with the presence of transfer shock and cooling out, transfer students encountered considerable average GPA gains with additional credits earned. First-time

undergraduates had the lowest of the three pathways graduation GPAs, but maintained consistency throughout the student's time at the 4-year university. Eliminating the risk of changing environments and allowing students to acclimate at the 4-year university earlier on in their academic careers provide some possible advantages for first-time undergraduates over the other two pathways. Tinto's (1975) model included integration into systems and how the presence of these systems on academic performance and success. First-time undergraduate students potentially acclimate sooner at the 4-year institution, as based on earning all credits compared to the other two pathways, possibility explaining the lower drop in average GPA from 30 to 60 credit hours compared to dual credit students. Meaning, this would allow first-time undergraduate students more time at the 4-year institution once acclimated, thus possibly equating to better academic successes. Nevertheless, additional research into the pathways individually could illuminate some of the benefits, issues, and barriers each pathway contains as students' progress through their higher education academic careers.

Age at Admittance

The admitted age of students in the three pathways was included in data provided for this study. Despite the fact, it was not used for answering the research questions, several implications may be made from it. A multivariate analysis indicated a statistically significant result for age at time of being admitted at the 4-year institution. As expected dual credit and first-time undergraduate students' age was similar with dual credit students being on average 18.49 years of age at admittance and first-time undergraduate students being on average 18.97 years of age at admittance. Community college transfer students could be expected to be around two years of age older due to the

attendance at the 2-year community college. However, community college students' age at admittance was 23.64 years of age or over four years of age older on average compared to the other two pathway students. This maturation factor potentially gives community college students an advantage as they enter the 4-year institution due to the increased physical, mental, and emotional changes within the community college transfer pathway (Onwuegbuzie, 2003).

Many factors could potentially play a role in this such as older students going back to school later on in life and choosing the community college route first as to take advantage of lower costs or open admissions policies. Acquiring additional hours beyond the 60 credits needed for an associate's degree could also play a role in raising the age of community college transfers. In a 2014 study, students earning an associate's degree acquired over 80 credits (Complete College America, 2014). Earning additional hours takes more time and to complete and reduces how fast students can transfer to a 4-year institution. No matter the reason, community college transfer students entered the 4-year institution on average four years older than first-time undergraduates and dual credit students. Perhaps maturation of these older students correlates with the large increase in average GPA for this pathway. Entering college sooner and graduating earlier allow for more lifetime earnings (Ma et al., 2016). The potential earnings for community college transfer students in this study would be less compared to their younger counterparts.

Recommendations

Earning college credits is only a small part of the higher education institution. Getting students through higher education and making them successful in the workforce ultimately benefits not only the student but also the economy these well-educated

students potentially end up in. Additionally, making informed decisions is also a vital part of student's progression through higher education. Part of making informed decisions is having data to support choices. This study's results helped provided some vital comparisons that historically were underrepresented in previous studies and highlighting the differences that hypothetically existed between three of the most common higher education academic pathways in Texas. Dual credit students had the highest graduating average GPA with a 3.31. This GPA outperformed community college students' average GPA at graduation of 3.20 and first-time undergraduate students' 3.12 GPA. Therefore, students, parents, advisers, and administrators looking to ensure the most likely pathway to success for students—at least as represented by GPA—should consider early participation in dual credit programs based upon these initial analyses. High schools, colleges, and universities are collectively interested and invested in students' success. Developing advising models, campaigns, and marketing tools that spell out the benefits of dual credit participation and disseminating them widely, early, and frequently to high school students is a high impact practice that may benefit students by earning increased GPAs. Furthermore, dual credit students performed well in every dependent variable studied, providing even more legitimacy for high school administrators to implement dual credit opportunities for their students. In addition, parents should highly consider encouraging their kids to participate in dual credit due to the many noted benefits along with academic success.

This study's results also illuminated the academic issues community college students face when transferring from the 2-year to 4-year institution. Community colleges should take note of the continued presence of transfer shock and work to create

curriculum and articulation agreements with 4-year institutions to better equip students with the academic skills needed at the 4-year institution. Tinto's (1975) model identified numerous barriers students face when moving through institutions, all of which can play a separate but also joint role in shaping students' ability to integrate and succeed.

Continued focus on transfer students is needed, based on this study, to allow the over 830,000 projected students in 2-year colleges by 2030 (THECB, 2107c) to successfully navigate the transition.

Additionally, communication and partnerships play a major role in creating a seamless transition between the high school and community college setting. Creating partnerships focusing on the transitional process potentially decrease the barriers students face when transferring between institutions. HB 505 enables students at an even earlier age to pursue college credits (Miller et al., 2017) Therefore, it is important for community colleges to continue to work with secondary institutions. Increasing the access to dual credit at the secondary level, combined with then a potential increase in the number of credits a student can earn prior to high school graduation, all affect the way community college's function. Students can earn enough dual credits prior to high school graduation to earn an associate's degree, thus lowering the number of students that potentially have to ever step foot on a community college campus, if all those credits were earned in the high school setting.

Community college leadership may consider new structures and approaches to leading in light of these findings. The continued increase of credits high school students have access to reduces the time a student may attend a community college, if they attend at all. While dual credit programs may enhance student experiences and outcomes, they

may also establish new patterns in college-going for students. These patterns may or may not include community colleges. To navigate this change the community college option must focus on communication with the 4-year institutions to minimize and issues students have when transferring, such as lost credits. For community college to continue to function in the future a decision may have to be made as to what the actual purpose and function of community colleges are. Community colleges must continue to focus on advising and setting expectations realistic to the expectations the 4-year institutions have. Understanding these 4-year institutions would be based on the continued communication, as previously mentioned.

More pragmatically, community college leaders must be prepared to seek new and innovative partnerships with secondary school districts to identify high quality, college-ready learning experiences for high school students interested in dual credit and college-going in general. The changing landscape of higher education only exemplifies the need for innovative programming to attract students to community college but also prepare them both academically and socially for the many challenges students in the community college degree track face. Community college leaders must focus on academic programs aimed at academic success but also on programming to prepare students for the different societal needs of each higher education structure. To identify programming that works, community college leaders must collaborate with other community college leaders to help identify successful strategies. Collaboration and communication should be the focus as community college leaders seek to find innovative ways to work with both secondary school districts and higher education institutions.

As for first-time undergraduate students, this group potentially looks to decrease even more with the coming years as dual credit and community college enrollments increase (e.g., THECB, 2017c, THECB, 2016b). Despite the shrinking number of students choosing the first-time undergraduate pathway, this study provided some validity to choosing the pathway. Students potentially acclimate sooner and did see increases in average GPA when comparing at 30 credit hours earned and graduation. Students also choosing the first-time undergraduate pathway avoid transfer shock (Hills, 1965), cooling out function (Clark, 1960), and the restrictive requirements needed for dual credit in high school. However, continued support for dual credit programs and the ease of entry and availability of community colleges should encourage advisors, counselors, administrators, parents, and to make students aware of the many benefits associated with the other two pathways.

To reiterate, communication ultimately will continue to play a major role in shaping the ever changing higher education landscape. Secondary and postsecondary leaders must continue to communicate to assist students with understanding the obstacles and barriers they will face in conjunction with the skills and techniques that will make them successful. Secondary leaders need to focus on the developing robust dual credit offerings for students and help to disseminate the growing pile of research supporting dual credit students' successes. Providing dual credit opportunities and working to develop transfer pathways, benefits everyone. Community college leaders will be forces to balance giving those students opportunities in high schools as well as bringing students onto their respective campuses. Lastly, as 4-year institutions continue to try and meet the needs of the state (THECB, 2015a), working to meet the needs of students entering with

dual credit and community college experiences will be a must. In short, leadership from all three areas will need to work to communicate and adapt as pushes from the state along with the changing student demographics evolve the higher education landscape.

Future Research

Robust data allowed over 11,000 data points to determine the average graduate GPA of the three pathways but was restricted to students at a single institution. Future research could expand on this study to incorporate additional 4-year institutions not only in Texas but also around the country. Generalizing from this single study is cautioned since only one institution's student records were used and since effect sizes were very small. Results of this study could be suggestive of patterns useful in future studies. Furthermore, identifying a system to allow for breaking down of all student grades at an institution would allow GPAs to be acquired at the end of every semester. If a researcher could backtrack into dual credit students' semester GPAs and transfer students' semester GPAs before those students enrolled at the 4-year institution, then data points would exist for all pathways at very specific points. This limitation did not allow this study to compare community college transfer students to dual credit or first-time undergraduate students because data did not exist in the system for them in a manner to be delaminated to each of the four GPA points.

Additional analyses might focus on time to degree completion, retention, financial debt accrued, or likelihood of changing majors (or not) as a function of degree attainment pathways. Each of these potential dependent variables have been the focus of many prior studies and accountability measures in higher education. Examining how student pathways to degree attainment influence these outcomes further illuminates elements not

previously examined in other studies. Collectively these elements could contribute to a more complete depiction of student experiences and allow higher education leaders to theorize new ways of influencing these dependent variables that are of considerable importance to institutions. Moreover, covariates and specific control variables such as prior intellect, gender, race, or attitudes toward learning should be included in future models to further depict an accurate picture of influences on outcomes. Future research should consider these and other dependent variables, analyzing them through the appropriate statistical analyses.

Also not enough is known about why differences exist in average GPA. This study provided insight and provided the GPA differences but lacks the information needed to examine why these differences exist for the three pathways. Additional data could help to support these findings but additionally studies focusing in on individual pathways and the many covariates could help answer why differences exist along with what the differences are between the three pathways. Future researchers are encouraged to explore the qualitative aspects of each pathway. These qualitative inquiries could provide further insights into the many challenges transfer and first-time undergraduate students face.

Additionally, comparisons could be made using the existing data comparing students from different community colleges. This result could help identify if some community college students come better prepared than others do. This could allow programs to be identified at community colleges where students are successful and be replicated at other community college where students historically were less successful. This same mentality could be applied to dual credit students. Examining dual credit

students at a regional or local level might help identify where dual credit programs are more successful than others are. Perhaps there are different program initiatives at those successful dual credit programs and they could also be replicated throughout the state. No matter the pathway examined in this study, additional in-depth analysis of any and all data could help to provide some framework to establishing successful strategies benefiting students in all the pathways.

Along with comparing different community colleges, comparisons could be made with different majors, departments, and colleges within the 4-year university. Delimiting the results to only focus on a single area within the institutions potentially highlights differences existing between students within those areas. Identifying differences between the areas allows for more prescriptive advising focused on the needs of specific students as well as curriculum changes to meet any shortcomings or challenges in certain areas.

Future comparisons also could be made on the student body at the 4-year institution. For the purpose of this study, most covariates were not considered to ascertain the impact of the three pathways exclusively. Considering how ethnicity, gender, SES, high school affiliations, or even community college affiliation could better highlight not just success in pathways but who is more likely to succeed within each pathway. Comparing covariates along with qualitative inquires potentially gives a true in-depth look at all the factors telling us why some students and pathways had better academically prepared students.

Additionally, continued efforts to refine data collected and analyzed for institutional decision making, advising, and future research. A lack of data regarding student's first semester GPA's at each institution combined with the lack of data tracking

individuals on a semester-by-semester basis limits the true comparison of GPAs for each of the three pathways in this study. Institutional research officers and staff may find the collection, analysis, and use of these and other data related to dual credit useful and informative. At minimum, institutional research leaders should reflect upon the types of data related to dual credit, transfer, and first time students. These may include diverse forms of outcomes data such as GPA at various points in time, retention, progress toward degree completion, and other forms of academic success.

A more holistic review of data related to college-going is needed. Many states have invested in the creation of longitudinal datasets, which could include student-level data on dual credit, transfer or first-time college going that could be connected to individual outcomes. Moreover, comparing credits earned at different community colleges may be beneficial for state-level policy makers. However, such an approach should take into account the diversity of different rigors each institutions holds. Nonetheless; having the ability to compare GPAs at each semester for students at a single institution and then follow them to graduation at a 4-year institution allows for a comparison with less bias and more validity. Institutional and policy makers may need to restructure datasets to be able to collect, analyze, and use such data. Continued focus on all the different kinds of data would allow for more robust comparisons of students and not just on academic performance but even with student demographics. These forms of data may be useful in future research.

Identification of successful students within each pathway also allows for research into what those respective schools or students are doing. Documentation of the successful programs or techniques these students or schools utilize helps to provide

systemic changes to existing pathways in order to better prepare students for higher education and success in it. These successes could be the result of increased rigor in dual credit or community college courses or even communication of specific degree pathways for students to follow throughout their higher education experience. This study provided a foundation for many future studies related to different pathways students can choose in their higher education journey. With the proliferation of these pathways, students should be informed about the relative outcomes of each to make a conscious selection about their pathway toward degree attainment.

Conclusion

Tinto's (1975) model suggest a multitude of factors determine the retention rates and academic success of students in higher education and including the three pathways (i.e., dual credit, transfer, or first-time undergraduate) in this study. For this study, the results were consistent with previous research (e.g., An, 2015; Karp et al., 2008; Ganzert, 2012) in regard to the success of dual credit students. Furthermore, the presence of transfer shock and/or cooling out function were possible as community college transfer students lagged behind initially at the 4-year university. Lastly, of the three pathways studied, first-time undergraduates earned the lowest average graduation GPA. Still first-time undergraduate students earned better than an average 3.00, thus giving some validity to choosing to earn all credits at a single 4-year institution.

In summary, each pathway allowed students to progress and increase the average GPA consecutively from 60 hours earned up to graduation. Parents, students, high-school administrators, and higher educational administrators all benefit from this study. With each pathway providing validity for student successes, each respective group can

focus on highlighting the differences for students. For secondary school systems with a lack of dual credit options, this study demonstrates the successes of attending a 4-year university directly or choosing to enroll in a community college. Perhaps the underlying finding should be getting students into the higher education system resulting in the best acclimation for the student. Meeting the *60x30TX* state goal (THECB, 2015a) will undoubtedly not happen without utilizing every successful credit attainment pathway. However, this study's results do illuminate the fact choosing to enroll in dual credit prior to attending a 4-year institution potentially yields the highest average GPA for students throughout their educational careers.

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Table 1

Results for MANOVA Credit Attainment Pathways

	Dual Credit			Transfer			First-time Undergraduate		
	<i>n</i>	<i>M</i>	<i>SE</i>	<i>n</i>	<i>M</i>	<i>SE</i>	<i>n</i>	<i>M</i>	<i>SE</i>
Credit Hours Earned									
30 Hours	3,033	3.27	0.05	3,033	-	-	3,033	3.03	0.05
60 Hours	5,876	3.23	0.03	5,876	2.93	0.02	5,876	3.01	0.03
90 Hours	10,170	3.28	0.02	10,170	3.09	0.01	10,170	3.05	0.01
Graduation	11,582	3.31	0.02	11,582	3.20	0.01	11,582	3.12	0.01
Age at Admittance	11,580	18.49	0.15	11,580	23.64	0.08	11,580	18.97	0.12

APPENDIX



Institutional Review Board
Office of Research and Sponsored Programs
1831 University Ave, Suite 303, Huntsville, TX 77341-2448
Phone: 936.294.4875
Fax: 936.294.3622
irb@shsu.edu
<http://www.shsu.edu/dept/office-of-research-and-sponsored-programs/compliance/irb/>

DATE: March 4, 2018

TO: Bryn Behnke [Faculty Sponsor: Dr. Matt Fuller]

FROM: Sam Houston State University (SHSU) IRB

PROJECT TITLE: *Differences in Grade Point Averages as a Function of Credit Attainment for Students at a Texas 4-Year Public University [T/D]*

PROTOCOL #: 2018-02-38593

SUBMISSION TYPE: INITIAL REVIEW

ACTION: DETERMINATION OF EXEMPT STATUS

DECISION DATE: March 4, 2018

REVIEW CATEGORY: Category 4—research involving existing, publicly available data usually has little, if any, associated risk, particularly if subject identifiers are removed from the data or specimens.

Thank you for your submission of Initial Review materials for this project. The Sam Houston State University (SHSU) IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will retain a copy of this correspondence within our records.

*** What should investigators do when considering changes to an exempt study that could make it nonexempt?**

It is the PI's responsibility to consult with the IRB whenever questions arise about whether planned changes to an exempt study might make that study nonexempt human subjects research. In this case, please make available sufficient information to the IRB so it can make a correct determination.

If you have any questions, please contact the IRB Office at 936-294-4875 or irb@shsu.edu. Please include your project title and protocol number in all correspondence with this committee.

Sincerely,

Donna Desforges
IRB Chair, PHSC

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Sam Houston State University IRB's records

Curriculum Vita

Bryn Behnke
Assistant Dean of Agriculture and Natural Sciences
Division of Agriculture and Natural Sciences
Blinn College
Email: bryn.behnke@blinn.edu

Academic Degrees

Doctor of Education- Educational Leadership
 Specialization in Higher Education Administration
Sam Houston State University, Huntsville, Texas
 Dissertation: Differences in Grade Point Averages as a Function of Credit
 Attainment for Students at a Texas 4-year Public Institution

Master of Science
 Specialization in Agriculture
Sam Houston State University, Huntsville, Texas

Bachelor of Science
 Specialization in Agricultural Business
Sam Houston State University, Huntsville, Texas
 Honors: Magna cum laude

Associate in Science
 Specialization in Agriculture
Blinn College, Brenham, Texas
 Honors: Phi Theta Kappa, Mu Alpha Theta, Sigma Kappa Delta

Professional Experience

2013-2018 Blinn College, Agriculture and Natural Sciences Division
 Agricultural Science Assistant Dean
 Agricultural Science Professor

2013-2014 Blinn College, Agricultural Sciences Department
 Agricultural Science Assistant Division Chair
 Agricultural Science Professor

2009-2013 Blinn College, Agricultural Sciences Department
 Agricultural Science Professor

Fall 2007 Blinn College, Agricultural Sciences Department

Agricultural Economics Adjunct Instructor

Publications

Refereed Publication

Behnke, B. M., Beverly, M. M., Kelley, S. F., Ullrich, D. R., Pavelock, D., & Hanagriff, R. D. (2006). A description of chapter participation in the 2000-2005 Texas FFA area leadership development events. *NACTA Journal*, 50(2), 82.

Refereed Presentation

Behnke, B., Slate, J. R., & Young, R. D., Jr. (2017). Difference in first semester GPA as a function of dual credit enrollment by ethnicity. *Journal of Basic and Applied Research International*, 19(3). Retrieved from <http://www.ikpress.org/articles-press/42>

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Beverly, M. M., Kelley S. F., & Behnke, B. M. (2006). *Evaluating University Teaching: A Summary Report of Student Ratings*. Poster session presented at the North American Colleges and Teachers of Agriculture Conference, Vancouver, Canada.

Honors and Awards

Sam Houston State University- Joe Kortz Spirit of Leadership Award 2017

Texas Junior College Agricultural Association State Advisor '12- current

Texas Junior College Agricultural Association State Secretary & Treasurer 2014- current

Blinn College Teaching Excellence Award Finalist '12,'14

Blinn College Outstanding Organization Advisor '11

American FFA degree 2002

Agricultural Club Advisor 2009- current

Increased participation by over 200% in 5 years

Increased number of volunteer events over 200% in 6 years

Average volunteered hours from club during last 6 years consistently around 4,500 hours.

Knights of Columbus Officer 2013- current

Washington County Fair Association Committee Chair 2014- current

Washington County Leadership Graduate 2018

Committees and Organizations

Professional Committees

Blinn College Divisional Leadership Council Member 2014- current
 Blinn College Divisional Leadership Council President elect- 2017-current
 Blinn College Professional Association Member 2009- 2017
 Blinn College Professional Association Vice-President 2014-2015
 Blinn College Professional Association President 2015-2016
 Blinn College - Blended Taskforce Pilot- Fall 2015- current
 Blinn College Online Course Review Team 2014- current
 Convocation Committee Fall 2014- current
 Blinn College Curriculum Committee 2014- current
 Blinn College Professional Development Advisory Committee 2014- current
 Advisory Committee Chair Agricultural Sciences Department 2014- current
 Academic Dean Selection Committee (Humanities, Visual & Performing Arts, Social Sciences)- 2014
 Advisory Committee- Center for Teaching and Learning 2014
 Chair- Agricultural Sciences Curriculum and Resource Team 2014- current
 Committee to design placing Student Evaluation of Instruction (SEOI) results online to comply with HB 2504- 2010
 Committee to design an online SEOI pilot- 2010
 Website Advisory Committee- 2010

Social Committees

Knights of Columbus Member- 2009- current
 Knights of Columbus Officer- 2009- current
 Blinn College Professional Association Fish Fry Committee- 2009 – current
 LaGrange Little League Manager- 2015- current
 Continuing Catholic Education Teacher- 2016- current

State Committees

Texas Junior College Agricultural Association 2009- current
 Texas Junior College Agricultural Association President- 2015- current
 Texas Junior College Agricultural Association Secretary & Reporter- 2015-2017