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Relationships Between Dual Enrollment Parameters, College Completion, and Time to  
Completion at Tennessee Community Colleges

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A dissertation

presented to

the faculty of the Department of Educational Leadership and Policy Analysis

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Education in Educational Leadership,

concentration in Higher Education Leadership

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by

Victoria N. Mellons

May 2022

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Keywords: associate degree, dual enrollment subject, gender, race, socioeconomic status, ACT

## ABSTRACT

### Relationships Between Dual Enrollment Parameters, College Completion, and Time to Completion at Tennessee Community Colleges

by

Victoria N. Mellons

The purpose of this non-experimental quantitative study was to evaluate the relationships between completion of high school dual enrollment courses and subsequent success of first-time, full-time community college students as measured by completion of an associate degree and the time it took to complete the degree. In addition to comparing dual and non-dual enrollment student performance, the effects of the number of dual enrollment courses completed and the subject areas of those courses was evaluated. Student subgroups reviewed included gender, race, socioeconomic status, and prior academic preparation (ACT score). The focus of this study was all first-time, full-time students at TBR community colleges in the fall semesters of 2015, 2016, 2017, and 2018 who had graduated from a Tennessee high school in the 12 months prior to college enrollment.

Archival data from Tennessee community colleges used in this study included 62,644 students across the four years (2015-2018) comprising 11,949 dual enrollment students and 50,695 non-dual enrollment students. Eleven research questions were answered from these data utilizing independent samples *t* tests, two-way contingency tables using crosstabs, Pearson correlations, or descriptive statistics. Findings revealed that completing just one dual enrollment course significantly increased the probability of completing an associate degree, and this finding was

consistent across all subgroups studied. In addition, dual enrollment students completed associate degrees in significantly fewer semesters. Completing more dual enrollment courses tended to further increase the probability of completing a degree and further reduce the time to completion. Students completing all dual enrollment courses in communications were generally more likely to complete an associate degree than students completing all courses in other subject areas, and students completing all courses in non-general education were generally less likely to complete a degree.

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## DEDICATION

I would like to dedicate this work to my mother. I miss her dearly every day. She was a wonderful influence in my life and in the lives of all who knew her. She was a loving wife, a doting mother, a proud grandmother, and a caring teacher to thousands of students in her career. She always looked for the positive in every situation and found joy in everyday things. During this journey when I felt tired, beaten, and wanted to give up, I pictured her cheering me on as she did so many times in my life. She is no longer here to share in the joy of my successes, but she is always present in my heart and thoughts. This is for you, Mom!

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## Chapter 1. Introduction

Dual enrollment began in the 1970s as a strategy to increase course rigor and accelerate the progress of advanced high school students (Kim et al., 2006). Since then, dual enrollment has morphed into a credit-based transition program that is no longer just for high-achieving college-bound youth (Bailey et al., 2003). Today's dual enrollment programs are used as a strategy to improve college access and success for middle- to low-performing students as well as students from populations traditionally underrepresented in postsecondary education (Bailey et al., 2003; Struhl & Vargas, 2012).

This idea of bolstering the preparation of high school students to ease their transition to college and help them be more successful after they get there is not a new one. In the colonial era, colleges provided preparatory instruction for future students in a time when there was not a reliable secondary school system (Thelin, 2019). In the 19<sup>th</sup> century, universities worked closely with high schools to improve instruction in the basics, so students were better prepared upon arrival to college (Hampel, 2017). This would allow the college professors to concentrate on the more advanced courses. Late in the 20<sup>th</sup> century, a report detailing the failures in the American public school system caused a shift in public education methodology (Borek, 2008).

After the publication of *A Nation at Risk* in 1983, America refocused efforts to push more students toward postsecondary education (Borek, 2008). As a result, the emphasis on college preparation at the high-school level escalated. In the 1980s a variety of preparation efforts started to grow and included programs such as Advanced Placement, International Baccalaureate, and dual enrollment. With the implementation of *No Child Left Behind*, the focus on these types of programs grew even more as the Federal Government began to step into the arena of public education (USDOE, 2003a). With successive legislation such as the *Every Student Succeeds Act*

and the *Complete College Act*, more emphasis has been placed on ensuring America's workforce receives some level of education beyond high school in either a college degree or certification program (Darling-Hammond et al., 2016).

In response, many states have established aggressive college completion goals as part of their overall college completion agendas (Meehan & Kent, 2020). For example, the Texas Higher Education Coordinating Board set a goal to raise the percent of 25- to 34-year-olds with a certificate or degree to 60% by 2040 (Villarreal, 2018). In Tennessee, the *Drive to 55* initiative includes several new programs, policies, and funding to ensure that 55% of Tennessee's workforce has a degree or certificate by the year 2025 (Drive to 55 Alliance, n.d.). These initiatives are putting a spotlight on college completion and thus college readiness continues to garner attention.

Dual enrollment is an area of educational policy that has gained momentum to address college readiness as it can help students prepare for college in both academic and non-academic areas (Community College Research Center, 2012). By participating in college-level classes, high school students gain understanding of the financial, academic, psychological, and social demands of college (Bailey et al., 2003). Exposure to the increased rigor of college courses better prepares students academically and provides them with more realistic information about the skills they will need to succeed in college. In addition, dual enrollment students learn soft skills like time management and how to ask for help while still having the high-school level of support. Students also learn to navigate systems such as registration and scheduling. Dual enrollment allows students to earn college credits while still in high school which enables them to complete college in a shorter timeframe. This shorter time in college combined with the free or discounted

dual enrollment courses result in substantial financial savings for students and parents (Bailey et al., 2003).

Students who have participated in dual enrollment and learned skills to manage the rigorous college work transition those skills to their courses in college (Fuline, 2018). As a result, dual enrollment students have demonstrated improved performance in numerous high school and college success measures. From higher GPAs and graduation rates in high school (Karp et al., 2007) to a greater likelihood of enrolling, graduating, and graduating on time in college (Giani et al., 2014), dual enrollment appears to be a program with wide-reaching impact. Added to the improvement gained by simply participating in dual enrollment, research indicates that the number and types of dual enrollment courses students take are linked to college success (Giani et al., 2014). Students who accrue more dual enrollment credits show higher degrees of college success as do students who take high-rigor core academic courses through dual enrollment. It should also be noted that dual enrollment has been tied to increased success in a variety of college metrics. The effects of dual enrollment are often stronger for underrepresented or underserved populations (Henneberger et al., 2022).

With the long list of benefits and associated improvements in college outcomes, dual enrollment continues to expand and has been labeled as the “fastest growing movement in higher education in the 21<sup>st</sup> century” (Jones, 2014, p. 24). It has been implemented in all 50 states (Zinth, 2015), and data show that during the 2011-2012 school year, 2.04 million students participated in dual enrollment (Marken et al., 2013). In 2017-2018, 82% of public high schools offered dual enrollment courses (National Center for Education Statistics [NCES], 2020) and 78% of higher education institutions offered dual enrollment options in 2015-2016 (Kilgore & Taylor, 2016). Data from Tennessee shows that the trends in increased dual enrollment

participation are continuing. In the past decade, community colleges in Tennessee have seen a 67% increase in dual enrollment while experiencing an 8% decline in overall enrollment (Tennessee Board of Regents [TBR], n.d.-a). This aligns with nationwide data from the Integrated Postsecondary Education Data System (IPEDS) which shows that most of the growth in dual enrollment has occurred at the community college level (Fink et al., 2017).

Tennessee, like other states, has continually increased its investment in the efficacy of dual enrollment programs. In 2005, Tennessee adopted statewide dual enrollment policies to guide local school districts and higher education institutions in implementing and running dual enrollment programs (Mokher & McLendon, 2009). That same year the Dual Enrollment Grant was established and provided over 5,400 high school students with funding for college courses (Tennessee Higher Education Commission [THEC], 2007). The Dual Enrollment Grant was expanded to include career and technical education (CTE) dual enrollment courses in 2020 when the Governor's Investment in Vocational Education (GIVE) Act was passed (THEC, n.d.-c). In the 17 years of its existence, the Dual Enrollment Grant has provided over \$200,000,000 for more than 300,000 students to pay for dual enrollment courses (THEC, 2015; THEC, 2016; THEC, 2018; THEC, n.d.-c).

In addition to providing most of the funding students need to pay for dual enrollment courses, the State has also implemented legislation that pushes for the expansion of dual enrollment. In 2010, Tennessee changed the funding model for public institutions of higher education through the *Complete College Tennessee Act* (CCTA) (Finney, 2017). Prior to this legislation, colleges received funding based on enrollment, and therefore, the colleges had little incentive to ensure students completed their degrees. However, the new legislation started an era of outcomes-based funding. This widened the focus of institutions from recruitment to



recruitment and completion. One of the measures for community colleges in the new outcomes-based funding formula is the number of students that are dually enrolled each semester. This has magnified the focus on dual enrollment from the higher education side of the aisle and encouraged them to broaden their dual enrollment efforts. Additional legislation stemming from the *Every Student Succeeds Act* (ESSA) has led to an increased interest in promoting dual enrollment in the high schools. In Tennessee, high schools are now measured on the number of early postsecondary opportunities (EPSO) each student has had by the time they graduate (Tennessee Department of Education [TDOE], 2018). Dual enrollment falls into the pool of EPSOs and according to an executive from the Tennessee Higher Education Commission, it is the most impactful of all the EPSOs (Hanemann, 2021). So, high schools in Tennessee are utilizing the program more than ever before (TBR, n.d.-a).

Because of Tennessee's increasing investment in dual enrollment and the continuing push to expand the program, I will determine if students who complete dual enrollment courses in high school complete associate degrees more often and in a shorter timeframe than their peers who do not complete dual enrollment courses. Additionally, I will investigate the relationship between the number of dual enrollment courses a student completes and the subsequent completion and time to completion of an associate degree. Lastly, I will examine the relationship between the subject areas of dual enrollment courses completed and the subsequent completion of an associate degree.

### **Statement of the Problem**

Tennessee makes a significant financial investment each year in providing dual-enrollment grants for students in the State's high schools with the underlying assumption that by starting college early, the students will be more likely to earn a college credential and earn it in a

shorter timeframe, thus boosting the overall economy in the State. With increased focus on early postsecondary opportunities for high-school students and expanding opportunities for the Dual Enrollment Grant, more and more students in Tennessee are participating in dual enrollment courses. The purpose of this non-experimental quantitative study is to evaluate the relationships between completion of high school dual enrollment courses and subsequent success of first-time, full-time community college students as measured by completion of an associate degree and the time it took to complete the associate degree. Using archival data from Tennessee community colleges, these relationships will be evaluated in three areas: 1) comparison of success between students who completed dual enrollment courses while in high school and those who did not complete dual enrollment courses while in high school; 2) correlation of student success to the number of dual enrollment courses completed while in high school; and 3) comparison of student success between the subject areas of dual enrollment courses completed while in high school. The focus of this study will be all first-time, full-time students at TBR community colleges in the fall semesters of 2015, 2016, 2017, and 2018 who had graduated from a Tennessee high school in the 12 months prior to college enrollment. Those students will be tracked through college records for the three years following the start of their college career to determine if they completed an associate degree and the time it took them to complete the associate degree.

### **Research Questions**

The following research questions regarding the relationships between dual enrollment and college completion guided this study:

1. Is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high

school as compared to students who did not complete a dual enrollment course in high school?

2. In regard to the two ACT score categories (0-18 and 19+), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?
3. In regard to the two categories of gender (female and male), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?
4. In regard to the five categories of race (Asian, Black, Hispanic, White, and Other), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?
5. In regard to socioeconomic status (SES) in two categories (Pell recipient and non-Pell recipient), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?
6. For community college students who completed an associate degree within three years of first-time, full-time enrollment, is there a significant difference in the time to completion of the degree for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

7. When considering the timeframe for associate degree completion (one-year, two-year, and three-year), is there a significant difference in associate degree completion rates for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?
8. For community college students who completed at least one dual enrollment course in high school, is the number of dual enrollment courses completed significantly different for students who completed an associate degree within three years of first-time, full-time enrollment as compared to students who did not complete an associate degree within three years of first-time, full-time enrollment?
9. For community college students who graduated with an associate degree within three years of first-time, full-time enrollment, is there a difference in associate degree completion with each additional dual enrollment course?
10. For community college students who completed an associate degree within three years of first-time, full-time enrollment, is there a significant relationship between the number of dual enrollment courses completed and time to completion of an associate degree?
11. For first-time, full-time community college students who completed dual enrollment courses in only one subject area in high school, is there a significant difference in associate degree completion among the dual enrollment subject areas (communications, humanities/fine arts, social/behavioral sciences, history, natural science, mathematics, non-general education)?

### **Significance of the Study**

This study is timely as it offers potentially important insights to the success of dual enrollment students at community colleges in an era of multiple new and converging state policies aimed at increasing rates of college completion for Tennessee residents. Much has

changed in the college transition and completion landscape over the past decade in the nation and in Tennessee. Although multiple prior studies have identified a link between dual enrollment and college success, little has been done in recent years to determine if the correlations have remained the same or changed since the implementation of legislation like Tennessee Promise, Complete College Tennessee, and the Every Student Succeeds Act. Additionally, there have been few studies that evaluated the correlation between dual enrollment completion and success at community colleges in Tennessee and none have done so on the statewide level.

This study may aid lawmakers and institutions in determining next steps in dual enrollment strategy such as whether to “double down” on their efforts or make changes in policy like the limits associated with the dual enrollment grant. Because Tennessee is seen as a leader in K-12 and postsecondary education reform (Finney et al., 2017), the results of this study may have implications for other states who look to Tennessee for innovation and guidance. This study may also serve as a benchmark for future comparison to post-pandemic dual enrollment studies. The dataset used in this study includes the last cohort of first-time, full-time students that will have had three years to graduate with an Associate degree before the pandemic changed the landscape of education at both the high school and postsecondary levels. It also includes the first cohort of students that could have spent a significant portion of their time in college during the pandemic.

### **Definitions of Terms**

*Advanced Placement (AP)*: A program that allows high school students to experience college-level coursework and provides them an opportunity to earn postsecondary credit by passing a subject-specific comprehensive exam (TDOE, n.d.-a).

*Dual Enrollment*: A program that allows high school students to take college courses and earn college credit while still in high school (Bailey & Karp, 2003). These courses can be taught at the high school, on the college campus, or online and may be academic, career-technical, or student success focused (Cassidy et al., 2011; Edwards et al., 2011). Students earn postsecondary credit for the coursework by passing the course. The students may or may not earn high school credit simultaneously (Cassidy et al., 2011).

*Early Postsecondary Opportunities (EPSO)*: Courses or exams that give Tennessee high school students an opportunity to earn postsecondary credit while still in high school (TBR, n.d.-a).

*International Baccalaureate (IB)*: A diploma program that provides students the opportunity to take a rigorous, pre-university course of study while in high school and potentially earn postsecondary credits through comprehensive exams (TDOE, n.d.-a).

### **Limitations and Delimitations**

This study is limited by the types of enrollment and academic variables available in the dataset. Variables such as parental education, academic motivation, student's proximity to campus, and so on might affect college outcomes but were not available. Because I could only control for covariates that were observed in the dataset, any unmeasured confounders may bias the results and lead to an overestimation or underestimation of the relationship between dual enrollment and college outcomes. Another limitation is the potential confounding effects of the COVID-19 pandemic on data analysis. The COVID-19 pandemic led to massive, immediate changes in the delivery of courses in the spring semester of 2020 and continued to impact courses in the academic year 2020-2021. During these times, the students who began college in the fall semesters of 2017 and 2018 were still within the three-year window used for measuring

completion and time to completion. At the time of this study, the full effects of the pandemic in relation to college outcomes are not known.

My study is delimited to all students who enrolled as first-time, full-time students in the fall semesters of 2015 through 2018 that had graduated from a Tennessee high school in the 12 months prior to their enrollment. The fall semester of 2015 marks the first cohort of entering freshmen that could use Tennessee Promise and thus that semester is the lower bound of the timeframe for this research. The upper bound of the timeframe is the fall semester of 2018. At the time of this study, the freshmen that began college in the fall of 2018 represent the most recent cohort of first-time, full-time community college students that could be analyzed when considering the three-year timeframe to graduate with an associate degree. My study is further delimited in the dual enrollment group to students who were dually enrolled at one of the 13 TBR community colleges because data concerning dual enrollment participation at other institutions was not readily available. The results may be generalizable to other groups of students who participate in dual enrollment through TBR community colleges and then attend any of the TBR community colleges as first-time, full-time students but may not be generalizable to students who partner with other institutions to take dual enrollment courses or students who attend other postsecondary institutions.

### **Overview of the Study**

Chapter 1 presented an introduction to the study including the statement of the problem to be evaluated, the research questions which guided the study, the significance of the study, definitions of terms used throughout the paper, and the limitations and delimitations of the study. Chapter 2 presents a review of literature related to dual enrollment and its multiple connections to college success. Chapter 3 explains the research methodology used in collecting and analyzing

data for this study. Chapter 4 provides an analysis of the data. Chapter 5 presents a summary of findings, conclusions, and implications for practice and further suggested research related to the relationship between dual enrollment and college completion.



## Chapter 2. Review of Literature

Dual enrollment programs began in the 1970s as a solution to senioritis (Kim et al., 2006). By the time advanced students got to their senior year, many had already accumulated enough credits for graduation and were bored with the high school courses. To solve these problems, the idea of dual enrollment was born. Taking college-level courses during their senior year challenged the students and provided them a jumpstart on college. Since that time, the role of dual enrollment has shifted. In response to the growing need to raise rates of college readiness and success, particularly among groups that are underserved and underrepresented in college, states and school districts have turned to dual enrollment programs (Struhl & Vargas, 2012). The theory is that allowing high school students to experience real college coursework through dual enrollment is one of the best ways to prepare them for college success. As Taylor (2015) noted, dual enrollment is increasingly becoming an element in the pre-college matriculation preparation for students.

Much of the research concerning dual enrollment has concluded with a suggestion to expand dual enrollment in high schools (Ganzert, 2014; SREB, 2011; Villareal, 2018); increase the number of dual enrollment credit hours allowed; and prioritize certain subjects (Villareal, 2018). Indeed, policy makers and school officials have collaborated to expand access to dual enrollment programs as a method of improving college and career readiness among high school students (Kilgore & Wagner, 2017). In the last 20 years, state policies have made access to dual enrollment easier, especially at the community college level (Ganzert, 2014). Karp (2015) argued that “dual enrollment is a strategy that, if sufficiently leveraged, can help meet the nation’s postsecondary completion goals” (p. 103).

In the following review of relevant literature, I attempt to provide a broad picture of the dual enrollment landscape. There is a vast amount of research relating to dual enrollment and it would be impossible to catalog it all in this review. I begin with the theoretical framework that guided this study and then transition to defining dual enrollment through discussions of its prevalence, the reasons students take dual enrollment courses, and the benefits and concerns of the program. A more detailed discussion of dual enrollment as it relates to college success is included in a separate section as that topic is of particular relevance to this study. The next section contains a review of the college completion agenda with emphasis on the roles of community colleges and dual enrollment programs. I then finish the review of literature with a brief overview of dual enrollment in Tennessee.

### **Theoretical Framework**

The theoretical framework that guided my study stems from Vincent Tinto's work on student persistence in college, with special focus on student transition and adoption of college values and behaviors. Work regarding anticipatory socialization and role transitions is then introduced to expand on the mechanisms supporting student transitions. These supplemental works examine transition as it relates to premature role acquisition which is analogous to participation in dual enrollment programs prior to college entry.

Tinto (1975) began his work on student retention with the development of the Student Integration Model (SIM). This model has its roots in Durkheim's (1951) theory of suicide, which explained that suicide is more likely to occur when a person is not fully integrated into society because the person's values are vastly different than those of society and the person has insufficient interaction with others in the society. Spady (1970) first applied Durkheim's theory of suicide to higher education when he described dropout from college, a social system with its

own set of values and social structures, as analogous to suicide in the broader society. Tinto (1975) built upon Spady's work and theorized that a student's decision to leave college was largely due to their lack of integration into the values and norms of the college.

A few years later, Tinto (1988) expanded his research into student retention and noticed that the reasons students left college differed as their time in college grew. He turned to Van Gennep's (1960) *Rites of Passage* to explain this longitudinal process. Van Gennep studied the ways in which people move through societal transitions like betrothal and marriage, pregnancy and childbirth, and birth and childhood, among others. He found that when an individual successfully navigates the move from one group or community to another, the individual goes through three distinct stages: separation, transition, and incorporation. The first stage, separation, is marked by the individual disconnecting from past associations. This dissociation process leads into the next stage, transition, where the individual begins to adopt the behaviors and values of the new community. After the individual has moved through the transition stage, they arrive at the incorporation stage where they are recognized as a fully contributing member of the new community (Van Gennep, 1960).

Although Van Gennep's work involved more common social transitions such as marriage and childbearing, Tinto (1988) applied the framework to his Theory of Student Departure to describe students moving from membership in the high school community to membership in a college community. Students separate from past associations in varying degrees by breaking habits and patterns of affiliation with family and the high school environment. In the transition stage, students begin to take on the behaviors and values associated with college and eventually move to incorporation where they are seen as full members in the college community.

It is in the transition stage when students may encounter isolation, a sense of loss, and stress which are challenges to persistence, making the transition stage critical to student success (Tinto, 1988). Schlossberg (2008) defines a transition as an event that precipitates changes in relationships, roles, and routines for the individual in transition. This transition experience leads the individual to develop new assumptions about themselves and their future. Anderson et al. (2012) further explained that the process of leaving behind the old relationships, roles, routines, and assumptions and taking on new ones occurs over time in an “emergent growth process” (p. 49). In this process, adaptation and change occur leading to self-organization (Bussolari & Goodell, 2009) which in turn leads to the individual’s ability to cope with their environment (Skar, 2004).

The scope of the transition stage hinges on the degree to which the student has already begun the transition process as part of preparing for formal entry into college (Attinasi, 1989). This premature start to the transition process is known as anticipatory socialization. Tinto (1994) addresses the role anticipatory socialization may play in the student transition process but dismisses it as an uncommon occurrence. However, at the time Tinto dismissed the role of anticipatory socialization, dual enrollment had not yet become a widespread credit-based transition program. In today’s educational landscape, anticipatory socialization potentially explains much of the impact participation in dual enrollment programs has on college success.

Anticipatory socialization came to the forefront in Merton’s (1968) research on *The American Soldier*. Merton described anticipatory socialization in relation to the military where enlisted soldiers who accepted and conformed to the values of the Army were selected for promotion at higher rates than those that did not conform to the same degree. Adoption of the rules and procedures was considered necessary to progress in the military hierarchy. Merton

conceptualized his findings into a description of anticipatory socialization whereby individuals that “take on the values of the non-membership group to which they aspire, find readier acceptance by that group and make an easier adjustment to it” (Merton, 1968, p. 319).

Mortimer and Simmons (1978) built upon Merton’s work and expanded the literature concerning adult socialization. They suggested that anticipatory socialization “includes all activities – mental, behavioral, or social – that are performed in preparation for role acquisition” (p. 432). In other words, the individual attempts to adopt and emulate the behaviors and values that are perceived as appropriate for the new role in the new community. In relation to dual enrollment programs, this process of acquiring new values and behaviors is consistent with the work by Merton in that premature role acquisition can facilitate progression into a new role.

Further exploration of anticipatory socialization reveals the closely related concept of role transitions. Here the work of Burr (1972) is informative. Burr reformulated existing social theoretical ideas that attempted to explain the variation in the ease of making role transitions. One theoretical proposition that Burr examined was the role anticipatory socialization plays in adjustment to social roles. Burr’s definition of anticipatory socialization closely resembles that of Merton. He defined it as the “process of learning the norms of a role before being in a social situation where it is appropriate to actually behave in the role” (Burr, 1972, p. 408). He hypothesized that a greater degree of anticipatory socialization would result in greater ease in transitioning between roles. It is the connection between anticipatory socialization and role transition in relation to dual enrollment programs that is believed to influence student persistence. In support of this idea, Simon (2017) proposed that role transitions are structurally embedded in dual enrollment programs and serve as bridges for high school students as they transition to college, better preparing them for the rigors of academic and social life.

As students approach graduation from high school, they must decide what path they want to take. Whether it is to go to work, the military, college, or some other path, they will go through a transition from what is familiar to what is new. This transition can bring with it stress and uncertainty, and Tinto's work indicates that transition experiences play a key role in whether students persist in college. Through dual enrollment, students are exposed to norms associated with college life and are provided the opportunity to practice the role of college student prior to entry. This anticipatory socialization is believed to ease the role transition process.

### **Defining Dual Enrollment**

Dual enrollment programs, also called dual credit, concurrent enrollment, or joint enrollment, allow high school students to take college courses and earn credits toward a postsecondary degree or certificate while still attending high school (U.S. Department of Education [USDOE], n.d.). Dual enrollment falls into the category of credit-based transition programs which are focused on helping students successfully transition from high school into college (Fowler & Luna, 2009). Advanced Placement (AP), International Baccalaureate (IB), and other advanced courses are also classified as credit-based transition programs. Unlike AP or IB courses which are based on a national curriculum, offered by the high school, and require a student to pass a comprehensive end-of-course examination to earn credit, dual enrollment courses are offered in partnership with a postsecondary institution and students earn college credit by passing the course (Cassidy et al., 2011). In some instances, students can earn dual credit, meaning that when they successfully complete the dual enrollment college course, they earn both college and high-school credit for the same course (Hughes, 2010). Sometimes they may earn credit only at the college level. Dual enrollment courses may be academic in nature, or they may be focused on career and technical education (CTE) (Cassidy et al., 2011).

Dual enrollment programs vary widely from state-to-state in how they are funded; where the courses are offered; who teaches the courses; what the student mix is; who can participate; and how many courses are offered to students (USDOE, n.d.). Dual enrollment courses may be taught at the high school campus, at the college campus, at an alternate location, or through distance education (Marken et al., 2013; National Center for Education Statistics [NCES], 2019). When taught at the high school campus, all students in the dual enrollment course are high school students and the instructor may be a high school teacher recognized as an adjunct to the partnering college or a college instructor who travels to the high school to teach the dual enrollment course (Puyear et al., 2001). When taught on a college campus or alternate location, students may be in a self-contained class with no other college students or dual enrollment students may be placed into a class with other college students. When delivered through distance education, courses may be synchronous requiring students to log into the course to participate in live instruction or asynchronous allowing students to work independently to meet specified deadlines. These distance education courses may consist of only dual enrollment students or a mix of dual enrollment and other college students (Puyear et al., 2001).

The dual enrollment space is largely occupied by high school juniors and seniors with much lower numbers of sophomores and freshmen participating (Marken et al., 2013). Of postsecondary institutions that offered dual enrollment in 2011, most reported that high school juniors and seniors were eligible to take dual enrollment courses (91% and 97% respectively). Forty percent reported eligibility guidelines for high school sophomores and only 25% reported eligibility for high school freshmen (Marken et al., 2013).

There is also variation in how dual enrollment programs are structured. Students may take dual enrollment courses as part of a singleton program, a comprehensive program, or an

enhanced comprehensive program (Bailey & Karp, 2003; Cassidy et al., 2011). Students who participate in a singleton program usually take dual enrollment courses after they have completed most of their high school requirements and may take as few as one dual enrollment course while in high school (Cassidy et al., 2011). The primary goal of these programs is to enrich the high school curriculum and expose students to college-level academics while providing an opportunity to earn college credit (Bailey & Karp, 2003). Similarly, comprehensive programs also focus on academic preparation, exposure to college-level courses, and the opportunity to earn college credit, but these programs provide a more intensive college experience to students (Bailey & Karp, 2003). Dual enrollment courses in these comprehensive programs constitute a large portion of the high school career providing more opportunity to learn the behaviors and skills necessary for college success (Bailey & Karp, 2003). The most intensive dual enrollment program is the enhanced comprehensive programs which are often embedded in the middle or early college high schools (Bailey & Karp, 2003; Tobolowski & Allen, 2016). In these programs, students may earn up to 60 hours of college credit thus completing an associate degree before graduating high school (Cassidy et al., 2011). These enhanced programs are aimed at middle- to low-achieving students or students from traditionally underrepresented groups and provide additional supports such as counseling, mentoring, and general support to facilitate the transition from high school to college (Bailey & Karp, 2003; Tobolowski & Allen, 2016).

### **Prevalence of Dual Enrollment**

Dual enrollment started gaining momentum in the 1980's after the United States Department of Education released *A Nation at Risk: The Imperative for Educational Reform*, a report that contributed to the growing belief that America's schools were failing (Fincher-Ford, 1997). One of the major points in the document called for increased rigor in high school



standards (Borek, 2008). As one response to this call for action, states began passing statewide dual enrollment policies that would guarantee access to college courses for eligible students while still enrolled in high school (McCarthy, 1999). These statewide policies guarantee access, and they help institutionalize practice that lessens confusion about student eligibility, funding mechanisms, and other program components that may influence student and school participation (Kelley & Woods, 2019). In 1980, only three states had adopted statewide dual enrollment policies and that number grew to 32 states by 2000 (Mokher & McLendon, 2009). As of April 2019, forty-nine states and the District of Columbia had statewide dual enrollment policies with guidelines for access, qualifications, funding, and related issues, with New York being the only state without a statewide policy (Kelley & Woods, 2019).

As state policies enabling dual enrollment have expanded, so has participation in dual enrollment. Between 2002 and 2011, dual enrollment participation in the United States grew from approximately 1.16 million to 2.04 million students, an increase of about 75% (Marken et al., 2013; Waits et al., 2005). Based on the public-school questionnaire of the 2017 National Teacher and Principal Survey (NTPS), 82% of public high schools offered dual enrollment courses in 2017-2018. A higher percentage of rural schools (90%) offered dual enrollment to their students than did town schools (83%), suburban schools (80%), or city schools (73%) (NCES, 2020).

Kilgore and Taylor (2016) expanded on work done in 2003 by the National Center for Education Research (NCES) to collect, analyze, and report data concerning dual enrollment from the perspective of postsecondary institutions. For the academic year 2015-2016, Kilgore and Taylor found that 78% of higher education institutions in the United States offered dual enrollment options and 86% accepted dual enrollment credit in transfer. Institutions classified as

lower division, large, public, or any combination of those categories were more likely to offer dual enrollment options than institutions with other characteristics, and private institutions were less likely to accept dual enrollment credits in transfer.

### **Student Motivations for Dual Enrollment Participation**

Why do students choose to take college-level courses while still in high school? The answer varies depending on whether it is answered by dual enrollment students (Dare & Nowicki, 2015) or by educators (Dare et al., 2017). In a 2012-2013 study, 21 high-achieving dual enrollment students were asked to brainstorm as many reasons as possible for participating in dual enrollment and then sort them into categories (Dare & Nowicki, 2015). The resulting cluster map indicated that students were motivated by factors in seven categories including a) prepare for university, b) demonstrate initiative, c) get ahead, d) love to learn, e) self-fulfillment, f) seek challenge, and g) socializing. Building on the study by Dare and Nowicki, Dare et al. (2017) presented the same 85 reasons for participating in dual enrollment to 12 educators in 2015 and asked them to participate in the sorting and ranking activity. The key concepts in the resulting cluster map for educators included a) planning ahead, b) love learning, c) challenge, d) smart kids, and e) meet intellectual peers.

The results of the two groups generally overlapped with students sorting statements into more specific categories, likely because of their personal connection of being a dual enrollment student. Key findings suggest that dual enrollment is viewed from both the student and educator perspectives as good preparation for postsecondary work; both educators and students recognized the importance of the socializing aspect associated with dual enrollment; and educators underestimated the self-determined motivations students have for participating in dual enrollment (Dare et al., 2017).

Ozmun (2013) conducted a study of 114 dually enrolled high-school students in Texas to test the hypothesis that students participate in dual enrollment courses because of a pre-existing college and academic self-efficacy. The results showed that the dually enrolled students had low levels of confidence in their ability to perform tasks like communicating with professors, taking tests, writing papers, attending class, living with others, meeting friends at college and other tasks commonly associated with attending college. Therefore, high college and academic self-efficacy were not factors in the students' decisions to participate in dual enrollment courses. Ozmun concluded that the "transition function played by dual credit programs might be more pronounced and play a greater causal role than this researcher originally estimated" (p. 69).

### **Benefits of Dual Enrollment**

Proponents of dual enrollment argue that the programs prepare students for the rigors of college by exposing them to college-level work (Adelman, 2006; Kilgore & Wagner, 2017); lower the cost of postsecondary education by enabling students to earn free or reduced-cost college credits and shorten their time to completion (An & Taylor, 2015; Lichtenberger et al., 2014); provide students with more realistic information about the academic and social skills they will need to be successful in college (Kilgore & Wagner, 2017; Lichtenberger et al., 2014); and provide curricular options for students in high schools that may otherwise not be able to offer rigorous or interesting electives (Adelman, 2006; Kilgore & Wagner, 2017). Dual enrollment has also been applauded for providing a college experience to populations traditionally underserved by higher education; increasing the likelihood students will graduate from high school; and contributing to an overall college-going culture (Barnett & Kim, 2014; Cassidy et al., 2011; Kilgore & Wagner, 2017; Loveland, 2017). Administrators at the high school and college levels agree that the greatest value of dual enrollment programs is improved access to college courses,

improved affordability of college courses, and improved access to an expanded curriculum (Kilgore & Wagner, 2017).

Research has proven that dual enrollment programs provide students with a wide range of potential benefits, both academic and non-academic. On the academic side of dual enrollment, students have received tangible benefits at the high school level in improved grades and increased graduation rates (Karp, 2007) and have cited benefits of receiving dual credit for a single course and earning transferrable college credits (Barnett & Kim, 2014). The academic benefits realized once enrolled in college include improved grades (Allen & Dadgar, 2012; An, 2015; Ganzert, 2014; Jones, 2014; Oakley, 2015; Young et al., 2013), higher completion rates (An, 2013a; Blankenbarger et al., 2017; Burns et al., 2019; Ganzert, 2014; Giani et al., 2014; Grubb et al., 2017; Struhl & Vargas, 2012), shorter time to completion (Burns et al., 2019; SREB, 2011), and more, which will be discussed in greater detail in the section Dual Enrollment and College Success below. Dual enrollment has even been linked to higher earnings after graduation from college (Henneberger et al., 2022; Phelps & Chan, 2016).

When considering the non-academic benefits of dual enrollment, social and psychological effects of participation have been linked to an improved transition experience for students (Karp, 2007; Wilson, 2009). In a case study conducted by Barnett and Kim (2014) in Memphis City Schools, interviewees cited benefits such as exposure to the rigors of college coursework, improved study skills, improved time management, and increased confidence in their ability to handle college. Loveland (2017) cited these same benefits but added that students had opportunities to take more rigorous courses than what may be offered at their high school and opportunities to explore different subject areas for their future careers. Similarly, McCarthy

(1999) cited that dual enrollment may afford gifted and talented students the challenge they need to continue learning above their grade level.

Students in Ohio expressed several benefits related to their participation in dual enrollment (Fuline, 2018). Among the benefits were meeting new people, experiencing new pedagogies, decreased nervousness, increased preparedness, and experiences in the classroom. Students reported improved notetaking skills, improved test preparation strategies, and a learned ability to manage schedules while decreasing procrastination. Similarly, students in Philadelphia explained that participation in dual enrollment helped them in reducing anxiety, identifying preferences toward educational and career tracks, gaining confidence, asking for help, and learning the importance of getting involved (Wilson, 2009). These student experiences were echoed in a study by Arthur (2017) in which students stated that dual enrollment helped them gain the critical skills, support, and level of knowledge needed to be successful in college. A common theme in these studies is that experiences and skills acquired through participation in dual enrollment leads to students having increased confidence in their ability to be successful in non-dual enrollment college classes (Barnett & Kim, 2014; Fuline, 2018; Loveland, 2017; Wilson, 2009).

Also of note, Cassidy et al. (2011) found that when students attended dual enrollment courses on a college campus, they learned about the campus and became accustomed to the college environment, which helped them feel more comfortable upon transitioning to college after high school. Similarly, Duncheon (2020) found that exposure to actual college professors was necessary to get the college experience, and treating students like adults with the freedom to seek help or not was necessary to help them grow academically and socially.

Although much of the literature has cited benefits for students, more studies are now focusing on the benefits of dual enrollment for post-secondary institutions. An and Taylor (2015) suggest that community colleges are using dual enrollment as a recruiting tool. For example, dual enrollment students who might not have considered going to college may pursue a college degree after seeing that they can do college-level work. Kilgore and Taylor (2016) confirmed An and Taylor's findings when they surveyed 388 postsecondary institutions, and the responses indicated that more than 75% of the institutions used dual enrollment as a recruiting tool. Additionally, 59% of the respondents had incorporated dual enrollment into their strategic enrollment management plans, and 90% agreed that dual enrollment improves access to college courses, especially for underprepared and underrepresented students (Kilgore & Taylor, 2016). Highlighting the rationale of this strategy to use dual enrollment as a recruiting tool, Fink et al. (2017) found that 84% of students who first enrolled in a community college through dual enrollment returned to that same college for their freshman year of college. In addition to recruitment, college personnel interviewed as part of a case study in Memphis stated that their colleges benefited from increased revenue, renewed involvement in community priorities, newly developed high school-college partnerships, and better-prepared students who have the potential to increase on-time college graduations (Barnett & Kim, 2014).

### **Concerns and Challenges with Dual Enrollment**

Dual enrollment is on the rise, but some critics have concerns and caution that there are potential challenges associated with the popular program. Some college faculty are concerned about the quality of dual enrollment courses when they are delivered on the high school campus and by high school teachers (Roach et al., 2015). In the high school environment, classroom interruptions can be detrimental to the quality of dual enrollment courses and teacher

accreditation requirements are not consistent, which continues to be a concern at the postsecondary level (Catron, 2001). In about one-half of the states, high school teachers are required to have the same credentials as faculty at the partnering college (Kelley & Woods, 2019). In about 20 other states, high school teachers must have earned a master's degree or a certain number of graduate credits in the field in which they are teaching dual enrollment courses.

Gewertz et al. (2016) reported that even when the high school teachers meet the college faculty requirements and use the same curricula and pacing guides approved by the college, many higher education administrators and faculty still do not believe in the quality and rigor of dual enrollment courses taught on the high school campus. One top administrator in Texas voiced concerns that high school dual enrollment teachers may be tempted to water down their courses to ensure students pass the course because the student's GPA is high stakes for the students (Field, 2021). With no common assessment for dual enrollment courses, like those in AP and IB programs, there is no way to ensure the learning in dual enrollment courses is comparable. These concerns have led some community college faculty to doubt whether the college rigor and college experience are maintained when dual enrollment courses are offered on a high school campus (Roach et al., 2015).

In turn, these doubts have led to another major concern with dual enrollment – the transfer of dual enrollment credits (Gewertz et al., 2016). In response to the unknowns about the rigor of dual enrollment courses, some colleges limit the number of dual enrollment courses that will transfer or accept only those that were taught on college campuses, by college faculty (Field, 2021). Along with credit transfer, there is also concern that not all dual enrollment credits are applicable toward any sort of degree (Gewertz et al., 2016). When students spend time

accumulating credits that later do not transfer or apply to their major, they become at risk of dropping out or exhausting their lifetime maximum of Pell grants.

Students have also expressed concerns from their perspective based on their experiences while participating in dual enrollment courses. In Kanny's (2015) study, students who were dually enrolled reported issues in the areas of credit and grades, negative interactions with others, and limited support systems. Some students experienced a disconnect between the dual enrollment courses that were offered at their high school and the credits needed to graduate from high school. Other students expressed concerns about the impact of poor grades in the more rigorous college courses. One such concern centers around what happens when students receive a low or failing grade in a dual enrollment course, which is reflected on both their high school and college transcripts and could have a long-term negative impact (Kanny, 2015; Loveland, 2017).

Kanny (2015) also recorded students' expressions of feeling uncomfortable on the college campus, as if being judged by traditional college students and faculty because of their non-traditional student role. In addition, students noted that they had limited support from both the high school and the community college to ensure they stayed on track in their dual enrollment courses. They cited feelings of isolation from both sides due to lack of interaction with high school personnel and lack of a connection with the community college. These feelings of isolation resulted in a sense of not belonging at the college (Kanny, 2015).

Some challenges of implementing dual enrollment have also been reported. The coordination of placement testing and registration is time consuming for both the high school counselors and community college advisors (Catron, 2001). Additionally, once enrolled and registered, scheduling can be challenging, especially if the high school students are travelling to the community college campus for their dual enrollment classes. Another challenge relates to a



territorial issue in that some community college faculty feel threatened by the perceived competition of dual enrollment (Roach et al., 2015).

Along with concerns and challenges, Roach et al. (2015) reported some barriers that exist in dual enrollment programs. Policy barriers exist in connection with high academic admission standards. Financial barriers exist in varying degrees based on the funding mechanisms available to students. Even in states where dual enrollment is tuition free, there are often substantial textbook costs and other fees. In areas where dual enrollment is only offered on the college campus, transportation becomes a barrier for many students.

### **Dual Enrollment and College Success**

The postsecondary performance of students who participated in dual enrollment while in high school has been widely studied. Almost all the available research points to improved access and success for students who participate in dual enrollment, although at varying degrees and in various areas of success. Of particular interest to this study is the research pertaining to success of dual enrollment versus non-dual enrollment students; the relationship between number of dual enrollment courses and college success; and the potential impact of dual enrollment subject on college success. These areas are discussed in the following sections.

#### **Dual Enrollment versus Non-Dual Enrollment Students**

When comparing students who participated in dual enrollment courses to those who did not, research has revealed several significant findings that favor students who participated in dual enrollment. The dual enrollment students were more academically motivated and engaged (An, 2015), more likely to enroll in college after high school (Fink et al., 2017; Giani et al., 2014; Lichtenberger et al., 2014; Struhl & Vargas, 2012; Villareal, 2018); less likely to take remedial courses in college (An, 2013a; Grubb et al., 2017); likely to enroll in more courses their first

semester (Karp et al., 2007); likely to earn more credits in their first year (Allen & Dadgar, 2012); likely to obtain a higher college GPA (Allen & Dadgar, 2012; An, 2015; Ganzert, 2014; Jones, 2014; Oakley, 2015; Young et al., 2013); more likely to persist to their second year (Giani et al., 2014; Grubb et al., 2017; Hoffman, 2017; Hunter & Wilson, 2019); likely to have a shorter time to graduation (Burns et al., 2019; SREB, 2011); more likely to complete a college credential (An, 2013a; Blankenbarger et al., 2017; Burns et al., 2019; Ganzert, 2014; Giani et al., 2014; Grubb et al., 2017; Struhl & Vargas, 2012); more likely to graduate on time (Grubb et al., 2017; Villareal, 2018); and likely to have higher earnings in four to six years after high school graduation (Henneberger et al., 2022; Phelps & Chan, 2016).

### ***Completion of Degree***

Before students can complete a college degree, they must first enroll in college. Several studies from across the country indicate that dual enrollment students are more likely to enroll in college than non-dual enrollment students. In Texas, a longitudinal study of more than 3 million students over 11 years showed that participation in at least one dual enrollment course increased application, admission, and enrollment at 4-year colleges (Villareal, 2018). In a separate large study in Texas, students were tracked through six years of postsecondary education (Struhl & Vargas, 2012). The reports revealed that dual enrollment students were 2.21 times more likely to attend college than their non-dual enrollment peers.

In Colorado, Morgan et al. (2018) conducted a longitudinal study to review the college enrollment patterns of dual enrollment students over a six-year period in one school district. The results indicated that dual enrollment students were 1.25 times more likely to enroll in any college immediately after high school graduation. In a study of all community colleges in

Illinois, 91% of dual enrollment students enrolled in college as compared to only 63% of non-dual enrollment students (Taylor, 2015).

Henneberger et al. (2022) found that dual enrollment students in Maryland initially enroll in community college at a rate of 22 percentage points higher than non-dual enrollment students while they found no significant impact on initial enrollment at four-year colleges. In contrast, a statewide study in Illinois discovered that students who were dually enrolled at a community college while in high school were significantly more likely to enroll in either community colleges or four-year colleges the fall semester after high school graduation than their non-dual enrollment peers (Lichtenberger et al., 2014).

The second issue that surfaces when investigating degree completion is the topic of student retention, especially retention from the first year to the second year of college for first-time, full-time freshmen. Hunter and Wilson (2019) reviewed retention data from a single community college in Tennessee and compared that to the retention data for all community colleges in the state. Their results showed that dual enrollment students were retained from first to second year at higher rates than non-dual enrollment students within the community college (67% vs. 47.4%) and across the state (76.2% vs. 48.6%). Others have reported similar results. Morgan et al. (2018) found that dual enrollment students in Colorado were 1.16 times more likely to persist to their second year, and Struhl and Vargas (2012) found that dual enrollment students were 2.0 times more likely to return for their second year in college than their non-dual enrollment peers. However, Jones (2014) found mixed results when studying persistence in Texas. Dual enrollment had a significant, positive relationship to persistence at the university level but not at the community college level.

After a student is enrolled in college and stays beyond the first year, the next avenue of investigation turns to college completion. In a statewide study in Illinois, Blankenberger et al. (2017) continued the work of Lichtenberger et al. (2014) and reported that community college students who took dual enrollment courses were significantly more likely to obtain a postsecondary credential than their matched peers who did not participate in dual enrollment. Dual enrollment students showed a seven-percentage point increase in attaining any postsecondary credential and an eight-percentage point increase in attaining a baccalaureate degree. Similarly, An (2013a) found that dual enrollment students exhibited an eight-percentage point increase in completing any postsecondary degree when compared to their non-dual enrollment peers and a seven-percentage point increase in completing a baccalaureate degree when compared to non-dual enrollment students. A study in Maryland revealed an even larger difference in completion rates (Henneberger et al., 2022). Dual enrollment students were 15 percentage points more likely to earn a degree than non-dual enrollment students.

In North Carolina, Ganzert (2014) reported that dual enrollment students graduated at significantly higher rates than non-dual enrollment students (33.7% vs. 22.5%). This same study evaluated college success of Huskins Bill students and found similar results. Those who participated in Huskins Bill courses, a type of dual enrollment for specific vocational programs, were significantly more likely to graduate than those students who did not participate in Huskins Bill courses (28.3% vs. 22.5%). A statewide study of community colleges in Illinois showed an even larger gap with dual enrollment students completing college at a rate of 52% which was significantly higher than non-dual enrollment students who completed at a rate of 29% (Taylor, 2015). In contrast, Lawrence (2017) discovered that at one rural Mississippi community college,

dual enrollment participation did not significantly increase the likelihood of attaining an associate degree.

At the national level, An (2013a) conducted a study using pre-existing survey data and found that students who completed at least one dual enrollment course were nine percentage points more likely to attain a bachelor's degree than non-dual enrollment students. Another national level study found that dual enrollment students were 2.07 times more likely to earn a bachelor's degree than non-dual enrollment students (Hughes, 2016).

Notwithstanding all the research indicating positive correlation between dual enrollment and subsequent college success, Speroni's (2011) study offered contradictory results. In the study that tracked two cohorts of students through college for six years in Florida, there was no significant difference between dual enrollment students and non-dual enrollment students in the areas of college enrollment or degree completion. This was the only study found with results that contradicted all the positive correlations previously mentioned.

One argument that needs to be addressed here is the issue of self-selection bias and how that may relate to research that compares dual enrollment and non-dual enrollment students. Some people believe that students who choose to take dual enrollment classes while in high school tend to be students who perform well academically; therefore, the evaluation of dual enrollment versus non-dual enrollment students presents a self-selection bias. In other words, it is logical to think that students who take dual enrollment courses in high school and then perform well in college would have done so anyway, regardless of dual enrollment participation.

The potential for self-selection bias has been addressed in several studies mentioned above. Grubb et al. (2017) used propensity score matching (PSM) in their analyses to account for the likelihood a student would self-select dual enrollment courses based on pre-existing

characteristics. The foundation of the PSM technique is to “equalize observed characteristics between treatment and control groups removing observed bias from the comparison” (Grubb et al., 2017, p. 86). After using this technique to match student characteristics in the dual enrollment and non-dual enrollment groups, they found that dual enrollment students were less likely to take remedial courses and more likely to graduate in a timely manner than their matched non-dual enrollment peers. By controlling for self-selection bias, the results indicate that dual enrollment participation increases college readiness.

Other researchers have also used PSM to account for self-selection bias and found that the effects of dual enrollment participation are positively correlated to increased college success regardless of a student’s predilection to enroll in dual enrollment courses (An, 2013a; Blankenbarger et al., 2017; Giani et al., 2014; Henneberger et al., 2022; Hughes, 2016; Lichtenberger et al., 2014; Struhl & Vargas, 2012; Taylor, 2015). In addition to these quantitative studies, the qualitative study conducted by Ozmun (2013), described previously, found that high college and academic self-efficacy were not factors in students’ decisions to participate in dual enrollment. When combined, these studies indicate that students who participate in dual enrollment are more likely to succeed in college despite any preexisting tendencies to do so.

### ***Time to Completion of Degree***

Several studies at various levels have shown that students who took dual enrollment classes in high school are more likely to graduate within benchmark timeframes than their non-dual enrollment peers. In a study of The City University of New York’s College Now program, students who completed at least one College Now dual enrollment course showed reduced time to degree (Allen & Dadgar, 2012). Allen and Dadgar theorized that the reduced time to degree

was not only a result of earning college credits in high school but also the increase in credit attainment after students enter college. Another college level study found that dual enrollment students at a community college in Tennessee were 25% more likely to graduate within 2 years of enrollment and 28% more likely to graduate within 3 years (Grubb et al., 2017).

Statewide studies have shown similar results. A longitudinal study in Colorado revealed that students who participated in dual enrollment courses were 1.26 times more likely to graduate from college within six years than their non-dual enrollment peers (Morgan et al., 2018). In Texas, Struhl and Vargas (2012) evaluated three-year completion rates at two-year colleges and six-year completion rates at four-year colleges for a cohort of high-school graduates. They found that dual enrollment students were 1.83 times more likely to complete a two-year degree within three years and 1.46 times more likely to complete a four-year degree in six years than non-dual enrollment students. A larger statewide study in Texas that tracked over three million students across 11 years showed a similar outcome (Villarreal, 2018). For students who earned at least one dual enrollment credit, their likelihood of completing an associate degree within two years increased by 25% and their likelihood of completing a bachelor's degree within six years increased 15%. In Mississippi, dual enrollment students were 2.51 times more likely to graduate from a community college in three years (Oakley, 2015).

The findings from a regional study conducted by the Southern Regional Education Board (SREB) are consistent with these results (SREB, 2011). In 2010, the SREB began tracking the time to degree completion among its 16 member states, of which one is Tennessee. The data indicated that dual enrollment students were earning their two-year degrees in an average of 2.9 years versus 4.6 years for their non-dual enrollment peers. Likewise, dual enrollment students were earning their four-year degrees in an average of 4.6 years versus 5.0 years for the non-dual

enrollment students. However, the data from Tennessee in the SREB study showed no significant difference for dual enrollment students' time to completion as compared to non-dual enrollment students for either the two-year or four-year degree. The national-level study by Hughes (2016) revealed that participation in dual enrollment reduced students' time to degree by an average of two months.

### **Number of Dual Enrollment Courses**

As students complete additional dual enrollment courses, the benefits continue to accrue (Giani et al., 2014). Although fewer studies have examined the relationship between the number of dual enrollment courses a student takes and subsequent college success, a positive relationship has been shown at various levels of study. An eight-year longitudinal study of 4,600 students at a Mid-Western university revealed that each additional credit hour in dual enrollment had a statistically significant impact on increasing the probability of degree attainment (Burns et al., 2019). This finding is supported in a North Carolina study of over 15,000 community college students that showed the number of dual enrollment courses a student takes positively relates to college GPA and graduation rate (Ganzert, 2014). The results of the study by Burns et al. also indicated that each additional credit hour in dual enrollment had a statistically significant positive effect on reducing time to graduation.

A statewide longitudinal study in Texas found that increasing the number of dual enrollment credits earned positively affected college graduation rates (Villareal, 2018). The study looked at cohorts of students based on high school graduation year and revealed that the average number of students in a cohort who graduated from college continuously increased when average dual enrollment credits earned increased from 0 to 30 semester credit hours. This held true for students who completed associate degrees within two years and those who completed



bachelor's degrees within six years. Another Texas study confirmed that an increase in the number of dual enrollment courses showed a corresponding increase in a student's likelihood of enrolling in and completing college (Struhl & Vargas, 2012). In statewide study in Tennessee, Young (2021) evaluated dual enrollment impact on success at Tennessee Colleges of Applied Technology and found that students who earned a credential logged more than twice the dual enrollment hours as the students who did not receive a credential.

In contrast to Giani et al. (2014), Burns et al. (2019), and Villareal (2018), a national level study by An (2013a) showed that most of the gain for dual enrollment students occurred for students who took two dual enrollment courses and there was little added benefit beyond that. Additionally, Karp et al. (2007) discovered that the positive relationship between number of dual enrollment courses and college success was dependent on which state was investigated. In Florida, the positive effects were the same regardless of the number of dual enrollment courses taken. Whereas in New York City, the positive relationship was tied to taking two or more dual enrollment courses.

### **Dual Enrollment Subject**

As researchers continue to investigate dual enrollment from all points of view, some of that research has begun to dig into the impact different subjects of dual enrollment courses have on student success. These studies have found that there is a positive relationship between high-rigor core academic dual enrollment courses and subsequent college success (Giani et al., 2014; Morgan et al., 2018). However, the specific subjects that provide the most benefit are not consistent among the studies.

Morgan et al. (2018) evaluated high school graduates in Colorado over a five-year period to determine the effect of taking college gateway math, English, and science courses through

dual enrollment as compared to students who took dual enrollment courses, but not in these subjects. The findings showed that students who were dually enrolled in at least one gateway math course were 1.82 times more likely to enroll in college than a student who took no gateway math coursework. Similarly, students who were dually enrolled in at least one language arts gateway course were 1.86 times more likely to enroll in college. Gateway science dual enrollment courses were not significantly related to college enrollment. They also found that students who took gateway math were 1.78 times more likely to persist to their second year, with no effect for gateway science or English in this measure. Likewise, only dual enrollment gateway math was significantly related to time to degree completion; students who were dually enrolled in a gateway math course were 3.23 times more likely to graduate within six years than students who did not take a dual enrollment math course (Morgan et al., 2018). In agreement with this is the study by Giani et al. (2014) which found that each additional dual enrollment math course increased a student's odds of attaining a bachelor's degree within 6 years by 60% to 90%. Closely following were English language arts, social studies, and science. The study found little impact of dual enrollment vocational or occupational courses on students' postsecondary outcomes.

Villareal (2018) included dual enrollment subject in his research and discovered that the positive effects of dual enrollment were amplified when students took certain English and social studies courses, followed by math, science, foreign language, and computer science. Struhl and Vargas (2012) also evaluated dual enrollment subject as it related to college enrollment and concluded that English language arts courses had the most significant relationship to college enrollment, followed by CTE, foreign language, and physical education courses. Students who took any dual enrollment course were 2.21 times more likely to enroll than non-dual enrollment

students, but those who took dual enrollment English language arts were 2.75 times more likely to enroll. Contrary to the studies by Giani et al. (2014) and Morgan et al. (2018), the effect of dual enrollment mathematics courses on college enrollment was not significantly different from the average gain of taking any dual enrollment subject in the Texas study by Struhl and Vargas. However, in terms of college completion, both dual enrollment English language arts and mathematics courses exhibited a more significant impact than did dual enrollment courses in general. Students who participated in any dual enrollment course were 1.43 times more likely to complete college than non-dual enrollment students, but if students took a dual enrollment English language arts course, they were 1.72 times more likely to graduate, and if they took a dual enrollment math course, they were 1.83 times more likely to graduate (Struhl & Vargas, 2012).

In addition to the research on core academic dual enrollment courses, studies have also shown that participating in CTE dual enrollment courses is positively correlated to college success metrics (Hughes et al., 2012; Karp et al., 2007). Phelps and Chan (2016) discovered that students who complete more dual enrollment CTE credits in high school are more likely to complete a postsecondary credential. This is supported by other studies in which students who completed a CTE dual enrollment course were statistically more likely to complete college than students who had no dual enrollment (Hoffman, 2017; Struhl & Vargas, 2012) and more likely than general dual enrollment students to enroll in 4-year college and enroll full-time (Karp et al., 2007). Additionally, in Tennessee, dual enrollment CTE courses were found to significantly increase the likelihood of obtaining a certificate or diploma from any of Tennessee's Colleges of Applied Technology (Young, 2021).

## **Dual Enrollment versus Other Credit-Based Transition Programs**

Researchers have concluded that dual enrollment has stronger ties to improved college success than other advanced subjects (An & Taylor, 2015; Giani et al., 2014; Villareal, 2018). While dual enrollment and AP courses both improve four-year college enrollment and graduation rates, dual enrollment is the only one that showed a significant improvement in outcomes at community colleges in Texas (Villareal, 2018). Giani et al. (2014) concluded that the benefit students receive from dual enrollment is greater than the advantage from other advanced courses. Similar results were found at a Midwest university when it was discovered that an increased number of credits in dual enrollment was linked to reduced time to college graduation, but additional AP credits did not further reduce time to graduation (Burns et al., 2019). Conversely, in an earlier study, An (2013a) concluded that there was little difference in the effects of dual enrollment versus AP courses on degree attainment.

## **Dual Enrollment and Special Populations**

While dual enrollment courses were originally intended to accelerate the learning of high-achieving high school students, they have become more popular as method to improve college access and success for middle- to low-performing students (Bailey & Karp, 2003; Cassidy et al., 2011; Puyear et al., 2001). Dual enrollment programs have also been praised for the benefit they can provide to populations that have traditionally been underrepresented in the college going culture; populations such lower SES, non-White races, and first-generation college students (Henneberger et al., 2022; Latino et al., 2018). States are increasingly employing dual enrollment as a strategy to improve the transition from high school to postsecondary for all students and especially for members of these underserved and underrepresented groups (Giani et al., 2014).

Taylor's (2015) study of all community colleges in Illinois supports this idea. He found that more dual enrollment students of color subsequently enrolled in college (91%) than non-dual enrollment students of color (62%). Similarly, low-income dual enrollment students enrolled in college at higher levels than low-income non-dual enrollment students (85% and 58% respectively). A similar trend was seen when college completion was evaluated. Forty-three percent of dual enrollment students of color completed college compared to 23% of non-dual enrollment students of color, and 34% of low-income dual enrollment students completed college compared to only 18% of low-income non-dual enrollment students.

An (2013a) concluded that dual enrollment may especially benefit students in the lower SES category when national-level research showed a positive relation between dual enrollment and degree attainment for first-generation students and students whose parents attended college but did not complete a bachelor's degree. A later, large study in Texas reinforced this finding when it was demonstrated that students from low-income families who completed dual enrollment courses were more likely to attend college, persist in college, and complete a college degree than their peers who did not participate in dual enrollment (Struhl & Vargas, 2012).

Struhl and Vargas (2012) also saw the same positive effects for students in all racial categories who completed dual enrollment when compared to their peers who did not complete dual enrollment courses. Ganzert (2012) showed a statistically significant advantage in higher GPAs and graduation rates for non-White students who participated in dual enrollment programs when compared to their peers who did not participate in dual enrollment. Young et al. (2013) learned that Black students who participated in dual enrollment had higher college GPAs than White students who did not participate in dual enrollment.

The research comparing male and female students presents conflicting results. Studies have shown that male students had higher GPAs and were significantly more likely to complete a degree (Karp, 2007; Oakley, 2015). Other studies have shown that there is no difference in college success when comparing male and female dual enrollment students (Morgan et al., 2018; Young et al., 2013). And some studies have shown that dual enrollment provides positive effects for female students only (Ganzert, 2012) and that female dual enrollment students were more college-ready than male dual enrollment students (An & Taylor, 2015).

In the area of student academic preparation, An and Taylor (2015) discovered that the positive effects of dual enrollment on college GPA and first-year retention remain after controlling for ACT scores. Similarly, Lichtenberger et al. (2014) learned that dual enrollment students were significantly more likely to enroll in college than their non-dual enrollment peers, regardless of ACT scores. When controlling for ACT and high school GPA, dual enrollment was found to have a positive and statistically significant impact on increasing in the probability of degree attainment and reducing the time to degree completion (Burns et al., 2019).

Although the research generally indicates that dual enrollment positively affects all students, smaller effect sizes have been detected for low-income students and students of color (Taylor, 2015). Supporting this finding, Morgan et al. (2018) found no significant differences when comparing lower SES populations with their more affluent peers, and Oakley (2015) found that GPAs were lower among the lower SES students. Additionally, dual enrollment participation has not been shown to account for the gap in college GPA and remediation between low-income and moderate- to high-income students (An, 2013b). Other studies have found little evidence that the influence of dual enrollment differed by race (An & Taylor, 2015; Morgan et al., 2018). Oakley (2015) found that Black students had significantly lower GPAs than White students and

Hoffman (2017) revealed a disproportionately lower number of Black dual enrollment students persisted in college.

### **The College Completion Agenda**

In the 1970s, the nation's economy was dominated by manufacturing and 72% of the workforce had a high school diploma or less (Carnevale et al., 2010). Since that time, the skills needed in the workforce have grown significantly. From 1973 to 2007, the number of jobs that required some college education grew from 25 million to 91 million representing an increase from 28% to 59% of the workforce. About 70% of the increase comes from a transformation in the skills needed within an occupation. For example, occupations such as foreman or manufacturing supervisor that did not require higher education decades ago have morphed into new occupations like manufacturing engineer that require postsecondary education. Another 28% of the increase has resulted from the development of new occupations or the expansion of existing occupations that already required postsecondary education (Carnevale et al., 2010).

The continual rise in technology in the 19<sup>th</sup>, 20<sup>th</sup>, and 21<sup>st</sup> centuries has resulted in a “skill-biased technological change” (Carnevale et al., 2010, p. 15). In other words, the “technological development and the organizational changes that come with it favor workers with more education because they have the expertise needed to handle more complex tasks and activities” (p. 15). As the proliferation of technology continues, the demand for these skilled, educated workers grows and there is concern that America may not have enough workers with the higher education skills to meet the demand (Symonds et al., 2011). In the past decade, this has led to an increased focus on the need to improve postsecondary attainment in the United States and as of 2017, 41 states, including Tennessee, had established ambitious college completion goals with an array of policies to support those goals (Meehan & Kent, 2020).

Tennessee launched its college completion agenda with the Complete College Tennessee Act (CCTA) of 2010 (S.B. 7006, TN, 2010) and followed that with its college completion goal in 2014 (Meehan & Kent, 2020). The key components of CCTA were accountability for colleges to increase degree attainment and an outcomes-based funding formula that tied a significant portion of institutional funding to completion and retention goals (S.B. 7006, TN, 2010). This legislation mandated comprehensive reforms intended to transform higher education in the state and laid a foundation for future policies to support the college completion agenda. In 2014, Tennessee unveiled its college completion goal when it enacted the Drive to 55 initiative which established the goal of 55% of Tennesseans attaining a postsecondary credential by the year 2025 (Meehan & Kent, 2020). In addition to being a goal for higher education, this initiative was framed as a mission to secure the future economic and workforce development in Tennessee (Drive to 55 Alliance, n.d.).

### **Community Colleges in the College Completion Agenda**

In support of CCTA and Drive to 55, Tennessee has implemented policies and reforms which have put community colleges in the center of the college completion agenda (Meehan & Kent, 2020). In 2011, the year after CCTA, Tennessee implemented Transfer Pathways that guarantee a student's work at the community college will transfer to any of the state's public universities and select private colleges and universities to complete their bachelor's degree (TBR, n.d.-c). Students who complete all the courses listed for the selected major of a Transfer Pathway will earn their associate degree at the community college. When the student transfers to the four-year school, the student is guaranteed that all their courses from the community college will be accepted at the college or university and will count toward completion of their major.



Community college students who transfer to another Tennessee community college are also guaranteed that all courses will transfer with them.

To help reach the state's college completion goal, the Tennessee Promise and Tennessee Reconnect scholarships were implemented to improve college access and bolster college enrollment in the state (THEC, n.d.-e). Tennessee Promise is a last-dollar scholarship designed to provide tuition-free college for recent high school graduates (THEC, n.d.-d). In addition to the funding, there are other aspects of the program such as advising and mentoring that are intended to aid students in their transition to and persistence in college. In the fall of 2015, the first cohort of students eligible for Tennessee Promise could use the scholarship at public community colleges, colleges of applied technology, and other institutions that offered approved associate degree programs. From fall 2015 through fall 2020, the number of students using the scholarship increased by more than 19% (THEC, 2021). In these first six years of Tennessee Promise, a total of 107,923 students used the scholarship, and 91% of them used the scholarship to attend public community colleges or colleges of applied technology.

Although Tennessee Promise contributed to increased college enrollments, Tennessee realized the pipeline of potential college-going high-school graduates was not large enough to reach the state's college completion goal. In response, the Tennessee Reconnect Act was passed in 2017 and then implemented in the fall of 2018 (THEC, n.d.-a). Tennessee Reconnect is like Tennessee Promise but is targeted at adults who do not already have an associate or bachelor's degree. Through Tennessee Reconnect, these adults may attend one of Tennessee's public community colleges, colleges of applied technology, or other select colleges and universities. At its inception, there were over 900,000 adults in the state that had earned some college credit but no degree and were thus eligible to apply for the Tennessee Reconnect Grant. These scholarship

programs were implemented concurrently with the Focus on College and University Success (FOCUS) Act of 2016 (Meehan & Kent, 2020). The FOCUS Act restructured higher education in Tennessee to remove six universities from the governance of the Tennessee Board of Regents. This left the Tennessee Board of Regents governing the College System of Tennessee, the state's largest public higher education system, but with a narrower focus on the remaining 13 community colleges and 27 technical colleges (Meehan & Kent, 2020).

At the national level, an initiative to reform student success efforts at the community college level began in 2004 and soon became the non-profit organization Achieving the Dream (Achieving the Dream [ATD], n.d.). ATD recognizes that community colleges are key to the nation's efforts to ensure access to and success in higher education for all students, particularly those from historically underrepresented populations. Their work is aimed at collaboration among the network members to share knowledge, innovative solutions, effective practices, and policies that lead to improved outcomes for all students. Today, the ATD network is made up of over 300 community colleges with accompanying coaches, advisors, investors, and partners in 45 states, including Tennessee (ATD, n.d.). Tennessee first joined ATD in 2015, when two TBR community colleges gained membership (TBR, n.d.-a). By 2018 the remaining 11 TBR community colleges had joined and in 2020, Tennessee's 27 colleges of applied technology joined marking the full participation of all TBR institutions (TBR, n.d.-a).

### **Dual Enrollment in the College Completion Agenda**

Although dual enrollment began to grow in the 1980s, a number of federal and state legislations passed in the 21st century have made dual enrollment a key part of the college completion agenda. In 2003, the U.S. Department of Education held a summit that produced a series of issue papers under the framework of *No Child Left Behind* aimed at promoting dialogue

about school transformation (USDOE, 2003a). One primary theme of discussion encompassed the need to accelerate the transition for high school students into work or further education through the combined efforts of the high school and postsecondary institutions. The discussion urged high schools to “work with higher education and the business community to define the necessary knowledge and skills for success after high school, to make sure students know what those requirements are, and to give students every opportunity to acquire them” (USDOE, 2003b). Since this shift in focus urging the creation of educational partnerships, college preparation strategies have grown in response to new legislation and policies affecting all educational sectors.

In 2005, a network of governors, state education officials, postsecondary leaders, and business executives from 35 states launched the American Diploma Project (ADP) (Achieve, n.d.). The members of ADP worked together to make college and career readiness a priority in the states. The participating states, including Tennessee, worked to align high school standards, graduation requirements, assessments, and accountability with college- and career-ready expectations. This led to an increased focus on strengthening the rigor of high school courses, including the expansion of dual enrollment programs (Hoffman, 2017).

To further address the need for better alignment from K-12 education to postsecondary opportunities, Tennessee established Pathways Tennessee in 2012 to “create and support regionally and locally led approaches to addressing the ‘skills gap’ threatening young Tennesseans entering the workforce” (TDOE, 2018). The program was rebranded as Tennessee Pathways in 2018 and became a statewide program to better align K-12 education to postsecondary opportunities so students have a guided pathway to move seamlessly into college and the workforce. The program includes cross-sector collaboration across K-12, postsecondary

programs, employers, and community organizations; advisement for students from kindergarten through college and career; and early college and career experiences. With a focus on advisement, Tennessee Pathways clarifies expectations and equips students with the information needed to be successful when they transition to college and careers (TDOE, 2018).

### **Legislation Pushing the College Completion Agenda**

In 2015 when the 1965 Elementary and Secondary Education Act was reauthorized as the Every Student Succeeds Act (ESSA), states were given more autonomy in designing and building accountability systems (Darling-Hammond et al., 2016; TDOE, 2018). A key driver in the passage of ESSA legislation was the need for better alignment of secondary and postsecondary education to improve college and career readiness (CCR) and close equity gaps (USDOE, 2010). As Henig et al. (2016) explained, if K-12 and higher education, educational sectors that have traditionally operated independently of each other, become better aligned through programs such as dual enrollment, their combined efforts could lead to improved CCR and student equity.

To address CCR policies, partnerships among secondary education, higher education, and the business community are necessary (Malin & Hackmann, 2017). The most common type of these partnerships occurs between high school and community college educators who come together to create dual enrollment opportunities (Malin et al., 2017). Not only are these partnerships aimed at aligning and improving core academic courses, but businesses are often consulted to determine the fastest growing needs in the local workforce and CTE dual enrollment programs are designed around the skills workers need (Norwood, 2015). Provisions for dual enrollment are prominent throughout ESSA along with opportunities for secondary and postsecondary educational sectors to partner in developing and funding advanced coursework

like dual enrollment to aid in smooth student transitions from high school to postsecondary education (Malin et al., 2017).

### **Dual Enrollment in Tennessee**

Greater numbers of students in Tennessee are choosing dual enrollment each year as part of their high school curriculum (TBR, n.d.-a). In the past decade, community colleges in Tennessee have seen a 67% increase in dual enrollment, while experiencing an 8% decline in overall enrollment. During this time, dual enrollment went from 10% of community college total enrollment to 19% of the total enrollment. In the 2019-20 academic year, 20,533 high school students enrolled in 48,555 college courses through dual enrollment partnerships (TBR, n.d.-b).

Multiple factors have aligned to create this increased enrollment of high school students in college-level courses. In 2010 Tennessee began enacting groundbreaking legislation to revamp the state's education system to meet aggressive college completion goals (Finney et al., 2017; Karp, 2013). This comprehensive approach to reform created changes at both the secondary and postsecondary levels and included a new funding formula for postsecondary institutions; statewide funding for dual enrollment courses; statewide transfer curricula and pathways; requirements for early postsecondary opportunities for high school students; two years of free college for all Tennessee high school students; and more (Finney et al., 2017; Karp, 2013). While each of these initiatives has increased the focus on CCR, three of them are tied directly to increasing the number of students participating in dual enrollment – statewide dual enrollment funding, the new funding formula for postsecondary institutions, and requirements for early postsecondary opportunities. These are discussed in greater detail below.

## **Statewide Dual Enrollment Funding**

As Tennessee embarked on its aggressive college completion agenda, it relied heavily on the Tennessee Education Lottery Scholarship (TELS) to provide funding for Tennessee Promise, Tennessee Reconnect, Tennessee Pathways, and other initiatives tied to the Drive to 55 Goal. TELS was launched in January 2004 with the sole mission of providing funding for educational scholarships to students attending institutions of higher education in Tennessee (Tennessee Education Lottery Corporation, 2021). In its first year, TELS provided funding for five distinct scholarships awarded to students attending 2-year or 4-year institutions or Tennessee Technology Centers, now known as Tennessee Colleges of Applied Technology. The next year, the Dual Enrollment Grant became the sixth scholarship funded by TELS and was awarded to high school students taking college courses (THEC, 2007). In the 2005-2006 school year, over 5,400 dual enrollment students used the grant. The Dual Enrollment Grant puts Tennessee in the majority when it comes to funding dual enrollment. The 2017 NTPS conducted by NCES (2020) found that among public schools that offered dual enrollment in 2017-18, the majority (78%) reported that the funding most often came from the school, district, or state, followed by families and then other entities.

In the fall of 2020, the state further invested in dual enrollment with the establishment of the Governor's Investment in Vocational Education (GIVE) Act (THEC, n.d.-c). The GIVE Act expanded the Dual Enrollment Grant to fully cover the costs for students to take up to four high-need CTE courses. The administration of this scholarship is closely linked to workforce needs. The Tennessee Student Assistance Corporation (TSAC) and Tennessee Higher Education Commission (THEC) work with the Tennessee Department of Labor and Workforce Development and the Tennessee Department of Economic and Community Development to

identify in-demand occupations (THEC, 2021). Those occupations are then matched against TBR's certificate, diploma, and associate degree programs to identify the programs that lead to in-demand, high-skill employment for inclusion in the GIVE dual enrollment grant program (THEC, 2021).

The exact formula for the number of dual enrollment classes covered by the Dual Enrollment Grant has varied over the years. In the fall of 2020, the Dual Enrollment Grant maximum was expanded from 8 to 10 courses over a student's junior and senior years in high school (THEC, n.d.-c). However, the funding does not always cover 100% of the course costs. The structure for the Dual Enrollment Grant for the 2021-2022 school year is broken into several parts based on the type of postsecondary institution the student is utilizing for the dual enrollment courses; the type of course the student is taking; and what number of dual enrollment course (1-10) it is for the student (College Pays TN, n.d.). The funding for two- and four-year postsecondary institutions is set on a per-course basis whereas funding at the colleges of applied technology is based on clock hours. At all types of institutions, students enrolled in high-need dual enrollment courses as part of the GIVE Act may receive higher funding amounts for their first four courses. Regardless of the type of institution and course, funding for dual enrollment courses 5 through 10 is generally lower than the first four, and students who receive funding for more than four dual enrollment courses have the funding for courses 5 through 10 reduced from their future Tennessee HOPE Scholarship on a dollar-for-dollar basis (College Pays TN, n.d.). Despite the somewhat confusing nature of its structure, the Dual Enrollment Grant, which now includes funding through the GIVE Act, has helped over 300,000 students pay for college courses while in high school at a total cost of over \$200,000,000 to the state (THEC, 2015; THEC, 2016; THEC, 2018; THEC, n.d.-c).

## **Funding Formula for Postsecondary Institutions**

States have traditionally struggled for the right formula for distributing funding for higher education institutions and historically have used an enrollment-based funding formula which rewarded efforts to recruit students but not necessarily to help those students complete their programs of study (THEC, n.d.-b). Tennessee recognized the need to tie more funding to performance and in 1979 was the first state to implement performance-based funding to reward colleges and universities for improvement in areas like graduation rate and job placement that were tied to state goals (Li & Ortagus, 2019; THEC, n.d.-b). With only moderate results from this performance-based funding and growing concerns over low college graduation rates, Tennessee once again led the way in redefining how it would fund higher education in the Complete College Tennessee Act (CCTA) of 2010 which replaced previous performance-based funding with the Outcomes Based Funding (OBF) model (Finney, 2017; Li & Ortagus, 2019; THEC, n.d.). In this new OBF model, Tennessee colleges and universities compete for a share of the state's higher education appropriations each year based on their success in outcomes metrics associated with student progression and completion which vary among institutions based on institutional mission and priorities (THEC, n.d.-b). Metrics for both community colleges and universities include accumulation of credit hours at benchmark levels and number of degrees and certificates awarded at specified levels (Finney, 2017; THEC, n.d.-b). Differences include measuring graduation rate and research-related activities at universities and measuring student transfers, job placements, workforce training, and number of dual enrollment students at community colleges (Finney, 2017; THEC, n.d.-b). The components of the OBF model are aligned with Tennessee's Statewide Master Plan for Higher Education and thus the inclusion of



dual enrollment as a metric for community colleges has created a push for the colleges to recruit and grow the number of dual enrollment students they serve each year (Ness et al., 2019).

### **Requirements for Early Postsecondary Opportunities**

With the passage of ESSA and the focus on CCR, high schools now also have a larger stake in recruiting students to participate in dual enrollment. ESSA contains five indicators of performance that must be included in each state's accountability system, four of which are prescribed. The fifth indicator includes a list of potential measures but leaves states to decide which measure to use (Darling-Hammond et al., 2016). Many states, including Tennessee, have gravitated toward measures of college and career readiness to fulfill the fifth indicator (Potts, 2017). Student access, participation, and success in programs such as AP, IB, dual enrollment, CTE, and industry certification are among the types of metrics states are using in their accountability systems (Potts, 2017).

Tennessee's implementation of ESSA falls under the framework of *Tennessee Succeeds*, the state's strategic plan to ensure that students are prepared for college or work after high school (TDOE, 2018). *Tennessee Succeeds* addresses the requirements of ESSA through three foundational areas (standards, assessment, and accountability) and five priority areas, of which one is High School & Bridge to Postsecondary (TDOE, 2018; TDOE, n.d.-c). The accountability area of Tennessee Succeeds includes five metrics that are related to early postsecondary opportunities (EPSO), which are opportunities for high school students to earn postsecondary credit while enrolled in high school (TDOE, 2018). The goal of the High School & Bridge to Postsecondary priority is to "prepare significantly more students for postsecondary completion" and one of the key strategies to meet this goal is to "expand the number of high school students

earning early postsecondary credits and industry certifications and broaden the reach of these programs to include students who lacked these opportunities in the past” (TDOE, n.d.-c, p. 12).

The *Ready Graduate* indicator measures a school’s performance in the High School & Bridge to Postsecondary area by tracking the percentage of students who graduate from high school having met certain success milestones (TDOE, n.d.-b). These milestones include scores on national standardized tests such as ACT, SAT, and the Armed Services Vocational Aptitude Battery as well as EPSOs like AP, IB and dual enrollment, among others. Although dual enrollment is one of many options in the list, Lou Hanemann, Chief of Staff at the Tennessee Higher Education Commission, (2021) stated that “dual enrollment is the most impactful of the EPSO options” when discussing initiatives in Tennessee to increase the number of students earning a postsecondary credential.

### **Chapter Summary**

The number of students participating in dual enrollment has been growing since its inception in the 1970s, and dual enrollment has been the topic of an abundance of research. Studies have shown a long list of benefits, both academic and non-academic, for students who participate in dual enrollment. This research has led the nation to bolster its investment in dual enrollment as a college transition strategy in an era when college completion has become a major educational focus of most states. In Tennessee, a convergence of legislation and policies aimed at increasing the number of students who are prepared for college or career after high school have identified community colleges and dual enrollment as two key components in the college completion agenda.

### **Chapter 3. Research Method**

Policies concerning dual enrollment continue to evolve as dual enrollment has been recognized as a strategy to help achieve goals relating to workforce development and educational attainment (Crowe, 2020). With the implementation of legislation such as Complete College Tennessee, Tennessee Promise, and the GIVE Act, the landscape of dual enrollment in Tennessee continues to change. Therefore, new research that informs policy and practice should be performed to monitor student outcomes (Crowe, 2020). The purpose of this non-experimental quantitative study was to evaluate the relationships between completion of high school dual enrollment courses and subsequent success of first-time, full-time community college students as measured by completion of an associate degree and the time it took to complete the associate degree. Using archival data from Tennessee community colleges, these relationships were evaluated in three areas: 1) comparison of success between students who completed dual enrollment courses while in high school and those who did not complete dual enrollment courses while in high school; 2) correlation of student success to the number of dual enrollment courses completed while in high school; and 3) comparison of student success among the dual enrollment course subjects completed while in high school. This chapter contains information regarding the research questions and null hypotheses, instrumentation, population, data collection, data analysis, and a chapter summary.

#### **Research Questions and Null Hypotheses**

The research questions and corresponding null hypotheses that guided this non-experimental quantitative study are as follows:

Research Question 1: Is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment

course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>01</sub>: For the study population, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>02</sub>: For the 2015 cohort, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>03</sub>: For the 2016 cohort, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>04</sub>: For the 2017 cohort, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>05</sub>: For the 2018 cohort, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

Research Question 2: In regard to the two ACT score categories (0-18 and 19+), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>021</sub>: In regard to the ACT score category of 0-18, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>022</sub>: In regard to the ACT score category of 19+, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

Research Question 3: In regard to the two categories of gender (female and male), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>031</sub>: In regard to females, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>032</sub>: In regard to males, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment

course in high school as compared to students who did not complete a dual enrollment course in high school.

Research Question 4: In regard to the five categories of race (Asian, Black, Hispanic, White, and Other), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>0</sub>4<sub>1</sub>: In regard to Asian students, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>0</sub>4<sub>2</sub>: In regard to Black students, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>0</sub>4<sub>3</sub>: In regard to Hispanic students, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>0</sub>4<sub>4</sub>: In regard to White students, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>045</sub>: In regard to students of other races, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

Research Question 5: In regard to socioeconomic status (SES) in two categories (Pell recipient and non-Pell recipient), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>051</sub>: In regard to students who received a Pell award (low-income), there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>052</sub>: In regard to students who did not receive a Pell award, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

Research Question 6: For community college students who completed an associate degree within three years of first-time, full-time enrollment, is there a significant difference in the time to completion of the degree for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>06</sub>: For community college students who completed an associate degree within three years of first-time, full-time enrollment, there is no significant difference in the time to completion of the degree for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

Research Question 7: When considering the timeframe for associate degree completion (one-year, two-year, and three-year), is there a significant difference in associate degree completion rates for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>071</sub>: For community college students who completed an associate degree within one year of first-time, full-time enrollment, there is no significant difference in completion rates for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>072</sub>: For community college students who completed an associate degree within two years of first-time, full-time enrollment, there is no significant difference in completion rates for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>073</sub>: For community college students who completed an associate degree within three years of first-time, full-time enrollment, there is no significant difference in completion rates for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

Research Question 8: For community college students who completed at least one dual enrollment course in high school, is the number of dual enrollment courses completed significantly different for students who completed an associate degree within three years of first-



time, full-time enrollment as compared to students who did not complete an associate degree within three years of first-time, full-time enrollment?

H<sub>0</sub>8: For community college students who completed at least one dual enrollment course in high school, the number of dual enrollment courses completed is not significantly different for students who completed an associate degree within three years of first-time, full-time enrollment as compared to students who did not complete an associate degree within three years of first-time, full-time enrollment.

Research Question 9: For community college students who graduated with an associate degree within three years of first-time, full-time enrollment, is there a difference in associate degree completion with each additional dual enrollment course?

Research Question 10: For community college students who completed an associate degree within three years of first-time, full-time enrollment, is there a significant relationship between the number of dual enrollment courses completed and time to completion of an associate degree?

H<sub>0</sub>10: For community college students who completed an associate degree within three years of first-time, full-time enrollment, there is no significant relationship between the number of dual enrollment courses completed and time to completion of an associate degree.

Research Question 11: For first-time, full-time community college students who completed dual enrollment courses in only one subject area in high school, is there a significant difference in associate degree completion among the dual enrollment subject areas (communications, humanities/fine arts, social/behavioral sciences, history, natural science, mathematics, non-general education)?

H<sub>0</sub>11: For first-time, full-time community college students who completed dual enrollment courses in only one subject area in high school, there is no significant difference in associate degree completion among the dual enrollment subject areas (communications, humanities/fine arts, social/behavioral sciences, history, natural science, mathematics, non-general education).

### **Instrumentation**

Archival data from the BANNER database systems of the TBR institutions were used to conduct secondary data analyses during this study. These secure databases hold historical enrollment and demographic data for all students who attend TBR institutions and, therefore, ensure that the data used were valid and reliable. According to Dawson (2017), validity is the “extent to which a tool measures what it is supposed to be measuring” (p. 12). Because the colleges maintain these official student records, the data and results are believed to be accurate. Reliability indicates “how consistent the measurement would be if it were repeated” (Dawson, 2017, p. 12). Because secondary data was retrieved from secure, historical databases, this study could be repeated by accessing the same data. In addition to the consistency of the measurement, McCullough (1998) explains that the reliability of the statistical software used to analyze the data should also be considered. The use of commonly recognized statistical software packages can ensure this reliability. I used IBM-SPSS, version 25, which is a widely used and accepted statistical software package in social science research (Miller, 2017). For the descriptive analyses, I used Microsoft Excel.

Because archival data were used in this study, none of the students were aware of their inclusion in the study during the time periods in which data were collected. Therefore, there was no opportunity for their inclusion in the study to result in behavior modification that would have

altered the results. Additionally, no surveys or interviews were conducted. Student data provided to me was de-identified; no personally identifiable information was included in the data file. Finally, data files were maintained on a password-protected computer to ensure the confidentiality and security of the data received.

### **Population**

The population for this study included all first-time, full-time students at TBR community colleges in the fall semesters of 2015, 2016, 2017, and 2018 who had graduated from a Tennessee high school in the 12 months preceding their enrollment in the community college. The timeframe established to determine associate degree completion was three years from the semester that students began college as first-time, full-time students. Students who did not complete an associate degree within the three-year timeframe were recorded as did not complete an associate degree for the purposes of this study. All students were tagged as either dual enrollment or non-dual enrollment. Dual enrollment students completed at least one dual enrollment course in high school with a grade of C or better. Non-dual enrollment students completed no dual enrollment courses in high school with a grade of C or better.

The dataset I received from TBR included records for 77,479 students. However, I reviewed the dataset and removed records for students who did not fit the definition for the study population. This included 10,035 students who graduated before the 12 months preceding their enrollment as first-time, full-time community college students. For example, 234 of the students in the initial dataset graduated from high school in the 1980s. An additional 1,643 students were removed because they had no high school diploma, had a GED/HiSET, or had a homeschool diploma indicating they did not graduate from a Tennessee high school. I then removed 39 students because of missing or inaccurate data, and an additional 1,788 students who had no

ACT score. Lastly, 1,330 students who had received college credits through programs other than dual enrollment prior to their enrollment as first-time, full-time community college students were removed. These students were removed to eliminate the possible confounding effects of the students' participation in other college-preparatory programs such as Advanced Placement, International Baccalaureate, statewide dual credit, local dual credit, or dual enrollment through an institution other than a TBR community college. The resulting population included 16,485 students in the 2015 cohort, 15,357 students in the 2016 cohort, 15,896 students in the 2017 cohort, and 14,906 students in the 2018 cohort for a total population across the four first-time, full-time cohorts of 62,644 students.

### **Data Collection**

Data for this study were collected from secure TBR databases housed in the BANNER system. Prior to requesting the data from TBR, I successfully completed the Institutional Review Board (IRB) certification training and received approval from the East Tennessee State University IRB to proceed with the study. I consulted with the Office of Policy and Strategy at TBR to complete the Data Access Request to ensure that the data I would be requesting was appropriate to accurately measure the factors intended, thus ensuring validity. Upon approval of the Data Access Request at TBR, the data were collected from the official student records housed in the BANNER system and shared with me in a secure file transfer system. The data had been de-identified and contained no personally identifiable information such as names or college numerical identifiers.

Data collected for this study included all first-time, full-time students at TBR community colleges in the fall semesters of 2015, 2016, 2017, and 2018 who had graduated from a Tennessee high school in the 12 months prior to college enrollment. These data included a

student code assigned only for this study, term enrolled (year, month), first-time, full-time cohort (year), high school graduation date (year, month), dual enrollment status at a TBR community college (yes, no), number of dual enrollment courses completed, subject areas of dual enrollment courses completed (communications, humanities/fine arts, social/behavioral sciences, history, natural science, mathematics, non-general education), number of dual enrollment courses completed in each subject area, associate degree completion within three years of enrollment (yes, no), semester of associate degree completion (1 to 9), ACT composite score, gender, race, and SES (Pell recipient, non-Pell recipient). Two additional data fields were collected to refine the dataset but were not used for statistical analyses. Those two fields were high school diploma type and advanced college credit hours.

### **Data Analysis**

A non-experimental quantitative methodology was used to analyze data. A quantitative analysis was appropriate because of the need to use both descriptive and inferential statistics. Descriptive statistics provides tools such as graphs and tables to organize and summarize the variability in the data, whereas inferential statistics provides tools to help generalize findings beyond the set of data (Witte & Witte, 2017). Together, these statistical tools were used to form predictions regarding the hypotheses.

After receiving the data in an Excel file through a secure file transfer system, I organized it appropriately in Excel and entered it into SPSS for analysis. A two-way contingency table analysis with crosstabs was used for Research Questions 1, 2, 3, 4, 5, 7, and 11. Research question 1 was designed to compare dual enrollment completion at two levels (yes or no) with completion of an associate degree at two levels (yes or no). Research Question 2 was designed to compare dual enrollment completion at two levels (yes or no) with completion of an associate

degree at two levels (yes or no) while considering ACT composite score at two levels (0-18 or 19+). Research Question 3 was designed to compare dual enrollment completion at two levels (yes or no) with completion of an associate degree at two levels (yes or no) while considering gender at two levels (female or male). Research Question 4 was designed to compare dual enrollment completion at two levels (yes or no) with completion of an associate degree at two levels (yes or no) while considering race at five levels (Asian, Black, Hispanic, White, other). Research Question 5 was designed to compare dual enrollment completion at two levels (yes or no) with completion of an associate degree at two levels (yes or no) while considering SES at two levels (Pell recipient, non-Pell recipient). Research Question 7 was designed to compare dual enrollment completion at two levels (yes or no) with completion of an associate degree at two levels (yes or no) while considering degree completion timeframe at three levels (one-year, two-year, or three-year). Research Question 11 was designed to compare associate degree completion at two levels (yes or no) with dual enrollment subject at seven levels (communications, humanities/fine arts, social/behavioral sciences, history, natural science, mathematics, or non-general education). A two-way contingency table with crosstabs was appropriate for these analyses because this statistical test assesses if there is a statistical relationship between two qualitative variables (Green & Salkind, 2017; Witte & Witte, 2017).

An independent samples *t* test was used for Research Questions 6 and 8. Research Question 6 was designed to compare dual enrollment completion at two levels (yes or no) with time to completion of an associate degree in number of semesters. Research Question 8 was designed to compare associate degree completion at two levels (yes or no) with number of dual enrollment courses completed. An independent samples *t* test was fitting for these analyses because this statistical test compares the means of two independent groups to determine if there

is a significant difference (Green & Salkind, 2017). Pearson correlation coefficients were used for Research Question 10 which compared number of dual enrollment courses completed (predictor variable) with time to completion of an associate degree in number of semesters (outcome variable). A Pearson correlation coefficient was appropriate for this analysis because this statistical test assesses the degree to which two quantitative variables are linearly related (Green & Salkind, 2017).

Descriptive statistics were used to evaluate Research Question 9, which was designed to compare associate degree completion rates as the number of dual enrollment courses increased. Descriptive statistics were appropriate for these analyses because the intent was to summarize the data to look for general trends or potential relationships (Witte & Witte, 2017).

An alpha level of .05 was used to establish significance in this study. This level of significance is the most commonly used in educational research and represents a 5% probability of incorrectly rejecting the null hypothesis, thus indicating that a statistically significant difference exists when one does not exist, a Type I error (Frey, 2018). Furthermore, the presence or absence of statistical significance in the analysis of each research question contributed to making generalization statements about dual enrollment and college success.

Effect size, reported as Cramer's  $V$ , was provided in the SPSS results for the two-way contingency table analyses using crosstabs. Effect size for statistically significant results roughly estimates the intensity of correlation between the variables (Witte & Witte, 2017). Effect sizes for the independent samples  $t$  tests were calculated as Cohen's  $d$  in SPSS and classified as small, medium, or large effect sizes (Green & Salkind, 2017).

## Summary

Topics in this methodology chapter included research questions and corresponding null hypotheses, instrumentation, population, data collection, data analysis, and a summary. Archival data were collected from secure databases by the Office of Policy and Strategy at TBR and were provided to me with de-identified student data to maintain confidentiality. These data were collected for all first-time, full-time students at TBR community colleges in the fall semesters of 2015, 2016, 2017, and 2018 who had graduated from a Tennessee high school in the 12 months prior to college enrollment. After receiving the data, I ran statistical tests in SPSS using two-way contingency tables with crosstabs, independent samples *t* tests, or Pearson correlation coefficients to determine if any of the categories being assessed showed significance in relation to student success. I also performed descriptive analyses in Excel to summarize relationships between study variables. The results of these statistical and descriptive analyses are included in Chapter 4, followed by a summary of the results, conclusions, and implications in Chapter 5.



## **Chapter 4. Results**

The purpose of this non-experimental quantitative study was to evaluate the relationships between completion of high school dual enrollment courses and subsequent success of first-time, full-time community college students in Tennessee as measured by completion of an associate degree and the time to complete an associate degree. Using archival data from Tennessee community colleges, these relationships were evaluated in three areas: 1) comparison of success between students who completed dual enrollment courses while in high school and those who did not complete dual enrollment courses while in high school; 2) correlation of student success to the number of dual enrollment courses completed while in high school; and 3) comparison of student success among the dual enrollment course subjects completed while in high school. The following sections of this chapter provide descriptive data and research questions associated with each of the three evaluation areas.

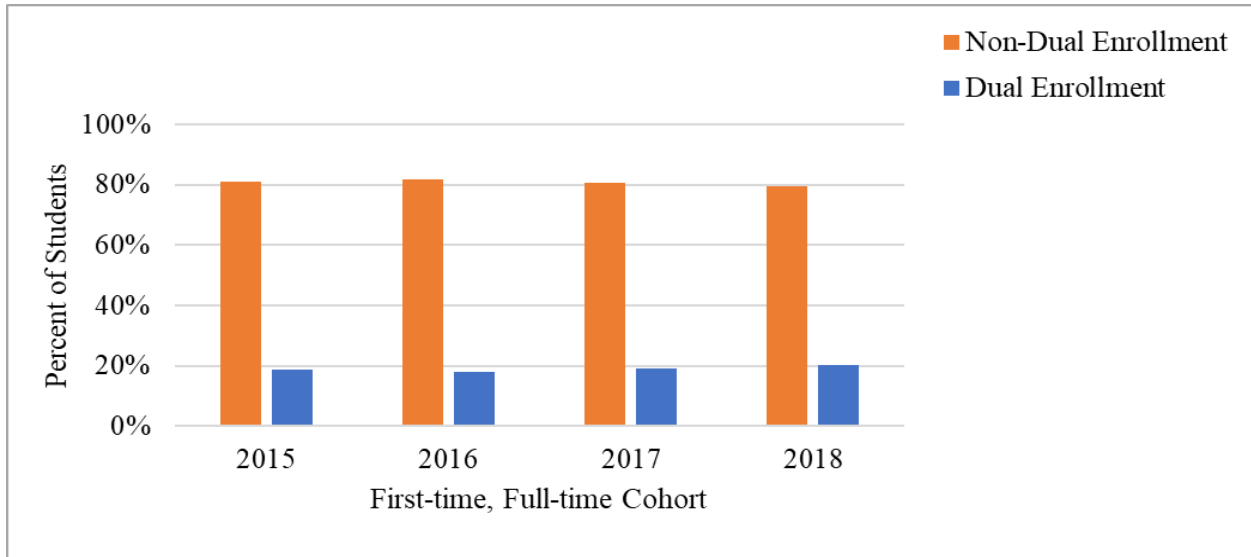
### **Analyses of Dual Enrollment versus Non-Dual Enrollment**

The study population included 62,644 community college students who graduated high school within the 12 months prior to entering college as first-time, full-time students in the fall semester of 2015 (N=16,485), 2016 (N=15,357), 2017 (N=15,896), or 2018 (14,906). The percentage of dual enrollment students in each cohort ranged from 18% to 20% as shown in Figure 1. The population included 56% female and 44% male. One percent of the study population was Asian, 16% were Black, 6% were Hispanic, 73% were White, and 4% were classified as other race. Pell Award recipients made up 54% of the population. ACT composite scores ranged from 5 to 34 with 46% (N=28,974) in the 0-18 category and 54% (N=33,670) in the 19+ category. The mean ACT score for dual enrollment students was 21.7 and for non-dual

enrollment students was 18.4. Figure 2 shows the distribution of ACT scores, and Table 1 provides the population characteristics by dual enrollment status.

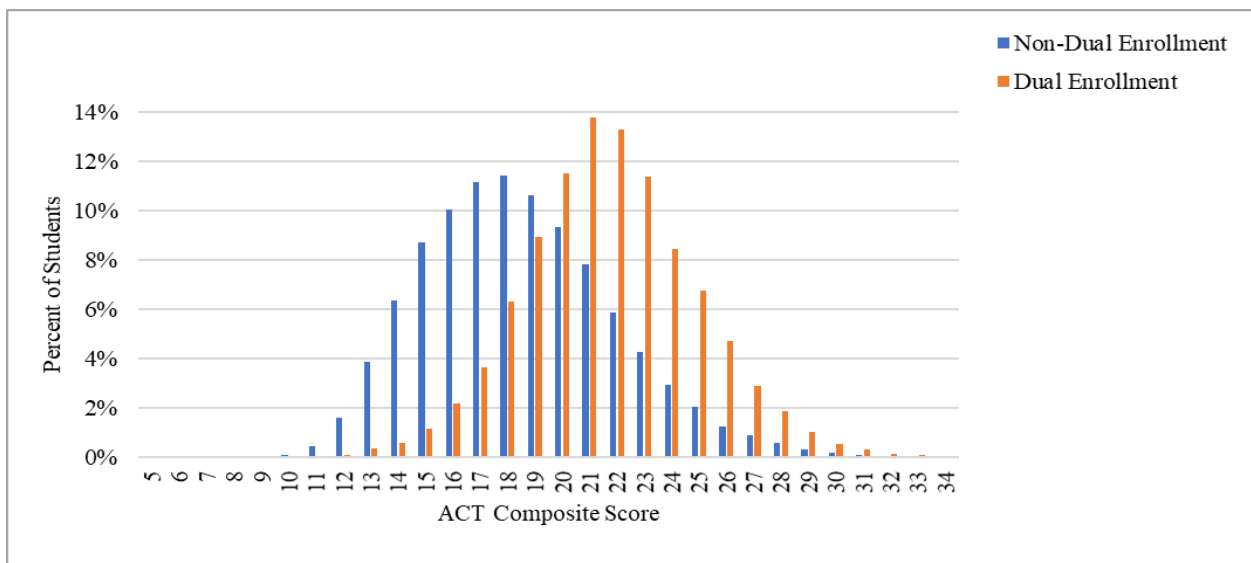
**Figure 1**

*Percent of Students by Dual Enrollment Status and Cohort*



**Figure 2**

*ACT Composite Score Distribution by Dual Enrollment Status*



**Table 1***Study Population Characteristics by Dual Enrollment Status*

|                      | Dual Enrollment |               | Non-Dual Enrollment |               | Total  |
|----------------------|-----------------|---------------|---------------------|---------------|--------|
|                      | Number          | Percent (row) | Number              | Percent (row) |        |
| Total Enrollment     | 11,949          | 19%           | 50,695              | 81%           | 62,644 |
| ACT Score            |                 |               |                     |               |        |
| 0-18                 | 1,715           | 6%            | 27,259              | 94%           | 28,974 |
| 19+                  | 10,234          | 30%           | 23,436              | 70%           | 33,670 |
| Gender               |                 |               |                     |               |        |
| Male                 | 4,458           | 16%           | 23,205              | 84%           | 27,673 |
| Female               | 7,481           | 21%           | 27,490              | 79%           | 34,971 |
| Race                 |                 |               |                     |               |        |
| Asian                | 78              | 10%           | 697                 | 90%           | 775    |
| Black                | 525             | 5%            | 9,431               | 95%           | 9,956  |
| Hispanic             | 394             | 11%           | 3,174               | 89%           | 3,568  |
| White                | 10,579          | 23%           | 35,015              | 77%           | 45,594 |
| Other                | 373             | 14%           | 2,378               | 86%           | 2,751  |
| Socioeconomic Status |                 |               |                     |               |        |
| Pell Recipient       | 5,161           | 15%           | 28,779              | 85%           | 33,940 |
| Non-Pell Recipient   | 6,788           | 24%           | 21,916              | 76%           | 28,704 |

**Research Question 1**

Is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

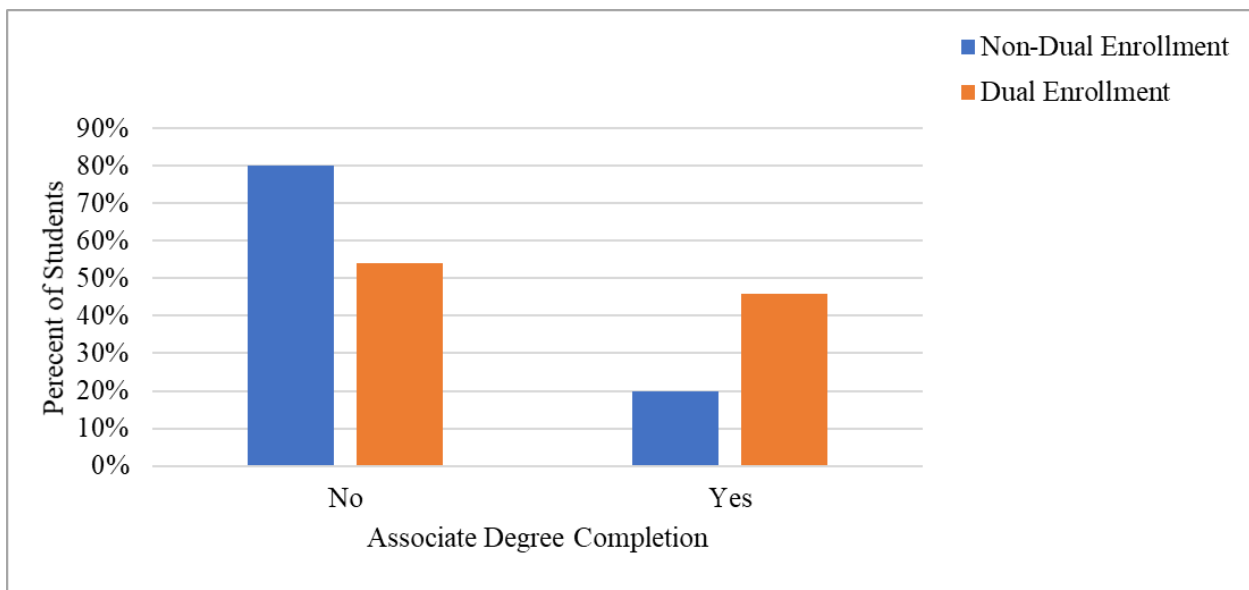
$H_{01}$ : For the study population, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual

enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

A two-way contingency table analysis was conducted to evaluate whether students who completed at least one dual enrollment course in high school graduated from community college with associate degrees at significantly different rates than students who did not complete a dual enrollment course in high school. The two variables were dual enrollment completion (yes, no) and associate degree completion (yes, no). Dual enrollment completion and associate degree completion were found to be significantly related, Pearson  $\chi^2(1, N = 62,644) = 3484.39, p < .001$ , Cramer's  $V = .24$ . Therefore, the null hypothesis  $H_{01}$  was rejected. Students who completed at least one dual enrollment course in high school were significantly more likely to graduate than those who did not complete a dual enrollment course in high school. Figure 3 presents associate degree completion percentages by dual enrollment status. Table 2 provides the proportion of dual and non-dual enrollment students who completed and did not complete an associate degree.

**Figure 3**

*Degree Completion Percentages by Dual Enrollment Status*



**Table 2***Associate Degree Completion by Dual Enrollment Status*

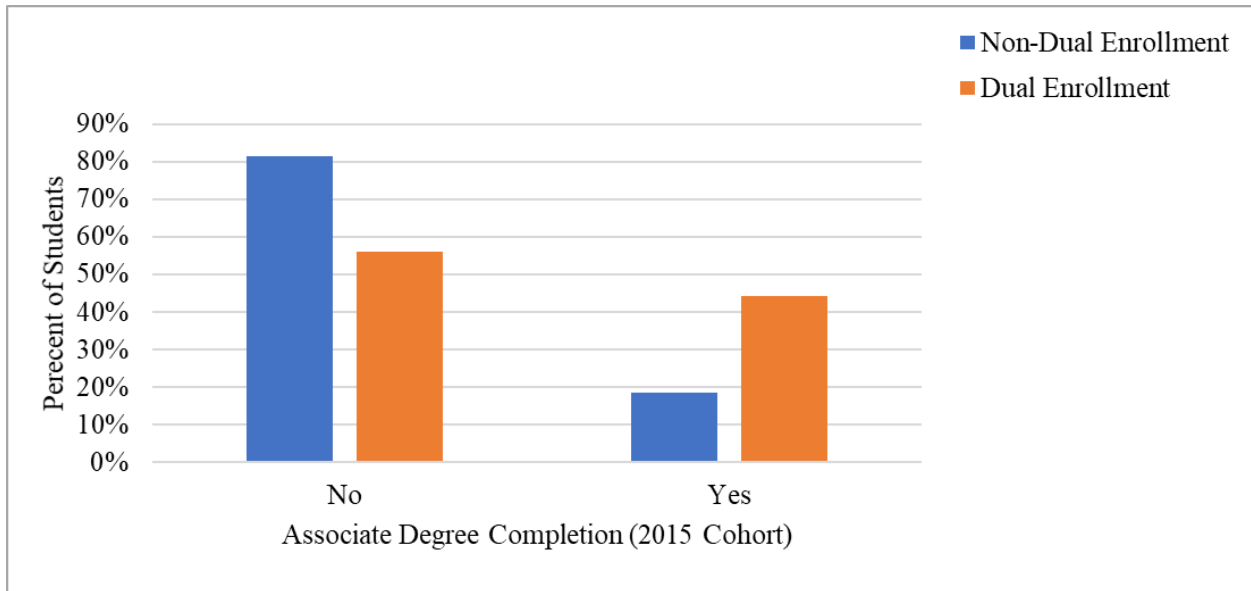
|                                   | Dual Enrollment Student | Non-Dual Enrollment Student |
|-----------------------------------|-------------------------|-----------------------------|
| Completed Associate Degree        | 5,477                   | 10,087                      |
| Did Not Complete Associate Degree | 6,472                   | 40,608                      |
| Total                             | 11,949                  | 50,695                      |

H<sub>012</sub>: For the 2015 cohort, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

A two-way contingency table analysis was conducted to evaluate whether students in the 2015 cohort who completed at least one dual enrollment course in high school graduated from community college with associate degrees at significantly different rates than students in the cohort who did not complete a dual enrollment course in high school. The two variables were dual enrollment completion (yes, no) and associate degree completion (yes, no). Dual enrollment completion and associate degree completion were found to be significantly related, Pearson  $\chi^2(1, N = 16,485) = 923.12, p < .001$ , Cramer's  $V = .24$ . Therefore, the null hypothesis H<sub>012</sub> was rejected. Students in the 2015 cohort who completed at least one dual enrollment course in high school were significantly more likely to graduate than those who did not complete a dual enrollment course in high school. Figure 4 shows associate degree completion percentages for students in the 2015 cohort by their dual enrollment status. Table 3 displays the proportion of dual and non-dual enrollment students in the 2015 cohort by associate degree completion status.

**Figure 4**

*Degree Completion Percentages by Dual Enrollment Status (2015 Cohort)*



**Table 3**

*Associate Degree Completion by Dual Enrollment Status (2015 Cohort)*

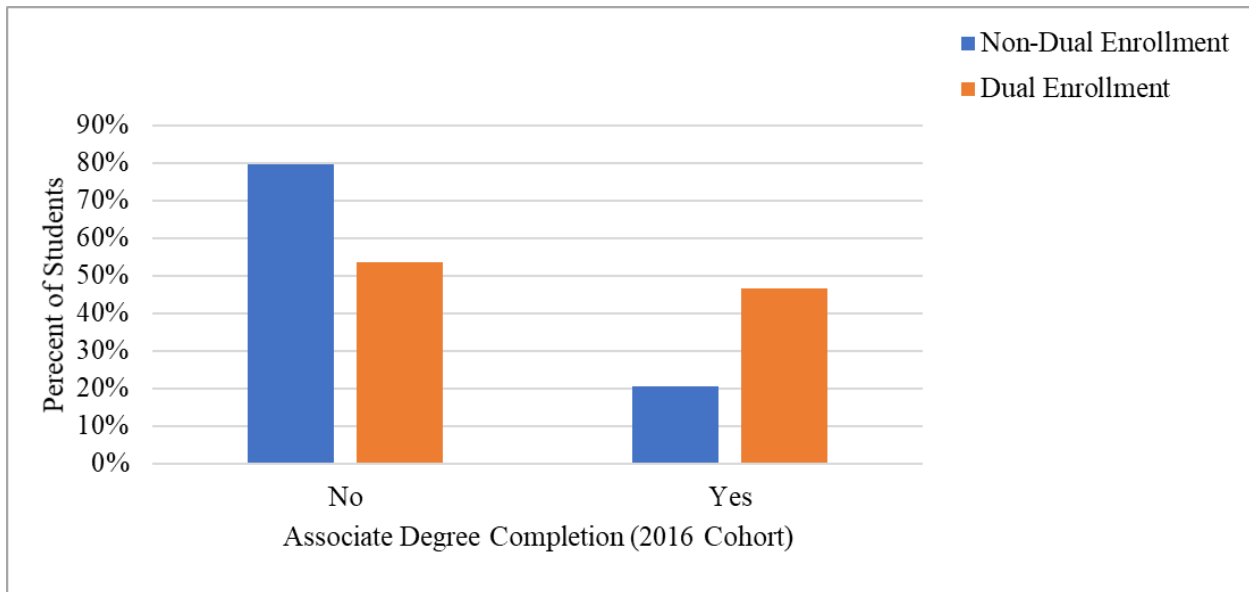
|                                   | Dual Enrollment Student | Non-Dual Enrollment Student |
|-----------------------------------|-------------------------|-----------------------------|
| Completed Associate Degree        | 1,366                   | 2,476                       |
| Did Not Complete Associate Degree | 1,731                   | 10,912                      |
| Total                             | 3,097                   | 13,388                      |

H<sub>013</sub>: For the 2016 cohort, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

A two-way contingency table analysis was conducted to evaluate whether students in the 2016 cohort who completed at least one dual enrollment course in high school graduated from community college with associate degrees at significantly different rates than students in the cohort who did not complete a dual enrollment course in high school. The two variables were dual enrollment completion (yes, no) and associate degree completion (yes, no). Dual enrollment completion and associate degree completion were found to be significantly related, Pearson  $\chi^2(1, N = 15,357) = 822.83, p < .001$ , Cramer's  $V = .23$ . Therefore, the null hypothesis  $H_{013}$  was rejected. Students in the 2016 cohort who completed at least one dual enrollment course in high school were significantly more likely to graduate than those who did not complete a dual enrollment course in high school. Figure 5 depicts completion percentages of students in the 2016 cohort by their dual enrollment status. Table 4 shows the proportion of dual and non-dual enrollment students in the 2016 cohort by associate degree completion status.

**Figure 5**

*Degree Completion Percentages by Dual Enrollment Status (2016 Cohort)*



**Table 4***Degree Completion by Dual Enrollment Status (2016 Cohort)*

|                                   | Dual Enrollment Student | Non-Dual Enrollment Student |
|-----------------------------------|-------------------------|-----------------------------|
| Completed Associate Degree        | 1,292                   | 2,576                       |
| Did Not Complete Associate Degree | 1,481                   | 10,008                      |
| Total                             | 2,773                   | 12,584                      |

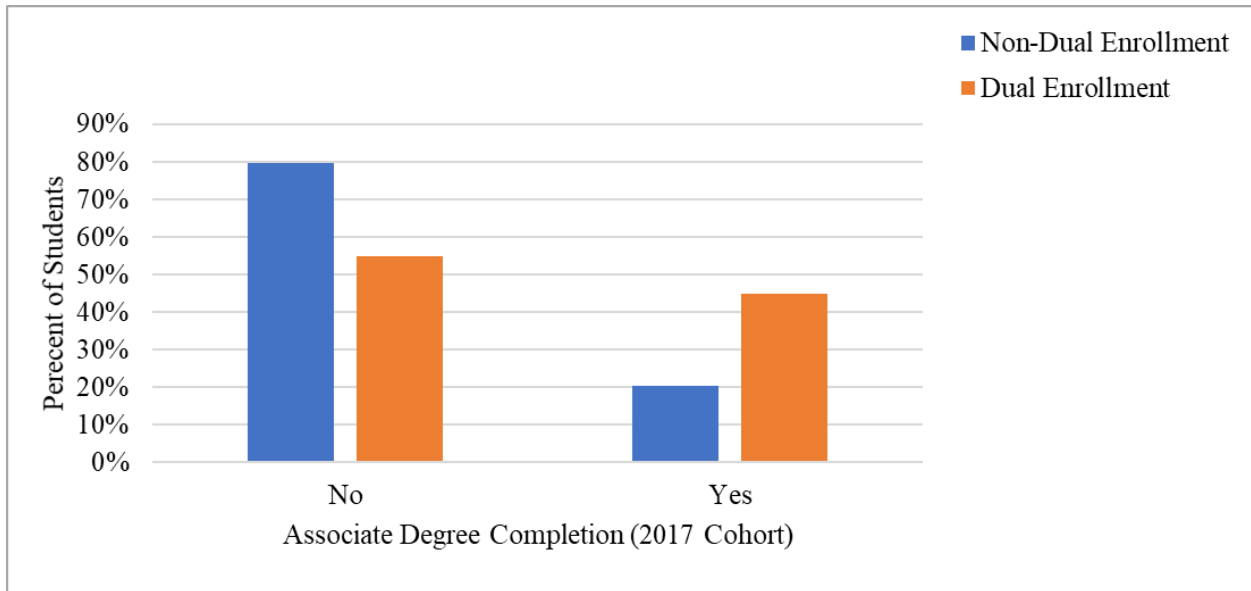
H<sub>0</sub>14: For the 2017 cohort, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

A two-way contingency table analysis was conducted to evaluate whether students in the 2017 cohort who completed at least one dual enrollment course in high school graduated from community college with associate degrees at significantly different rates than students in the cohort who did not complete a dual enrollment course in high school. The two variables were dual enrollment completion (yes, no) and associate degree completion (yes, no). Dual enrollment completion and associate degree completion were found to be significantly related, Pearson  $\chi^2(1, N = 15,896) = 793.09, p < .001$ , Cramer's  $V = .22$ . Therefore, the null hypothesis H<sub>0</sub>14 was rejected. Students in the 2017 cohort who completed at least one dual enrollment course in high school were significantly more likely to graduate than those who did not complete a dual enrollment course in high school. Figure 6 displays completion percentages of students in the 2017 cohort by their dual enrolment status. Table 5 provides the proportion of dual and non-dual enrollment students in the 2017 cohort by associate degree completion status.



**Figure 6**

*Degree Completion Percentages by Dual Enrollment Status (2017 Cohort)*



**Table 5**

*Degree Completion by Dual Enrollment Status (2017 Cohort)*

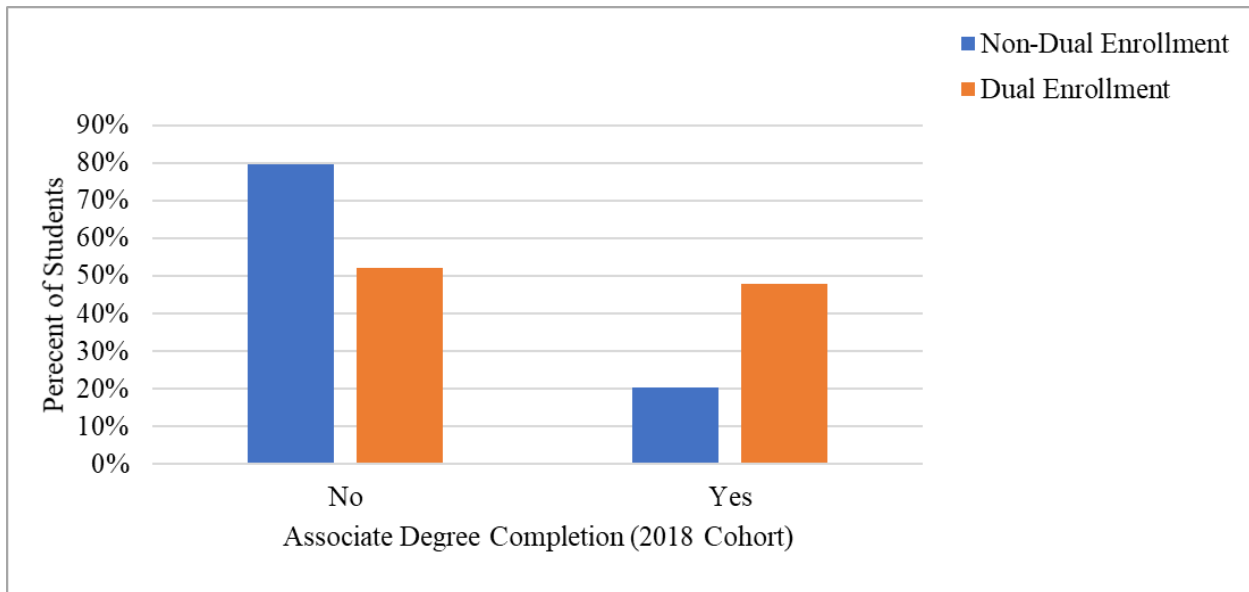
|                                   | Dual Enrollment Student | Non-Dual Enrollment Student |
|-----------------------------------|-------------------------|-----------------------------|
| Completed Associate Degree        | 1,370                   | 2,618                       |
| Did Not Complete Associate Degree | 1,676                   | 10,232                      |
| Total                             | 3,046                   | 12,850                      |

$H_{015}$ : For the 2018 cohort, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

A two-way contingency table analysis was conducted to evaluate whether students in the 2018 cohort who completed at least one dual enrollment course in high school graduated from community college with associate degrees at significantly different rates than students in the cohort who did not complete a dual enrollment course in high school. The two variables were dual enrollment completion (yes, no) and associate degree completion (yes, no). Dual enrollment completion and associate degree completion were found to be significantly related, Pearson  $\chi^2(1, N = 14,906) = 945.40, p < .001$ , Cramer's  $V = .25$ . Therefore, the null hypothesis  $H_{015}$  was rejected. Students in the 2018 cohort who completed at least one dual enrollment course in high school were significantly more likely to graduate than those who did not complete a dual enrollment course in high school. Figure 7 shows associated degree completion percentages of students in the 2018 cohort by their dual enrollment status. Table 6 shows the proportion of dual and non-dual enrollment students in the 2018 cohort by associate degree completion status.

**Figure 7**

*Degree Completion Percentages by Dual Enrollment Status (2018 Cohort)*



**Table 6***Degree Completion by Dual Enrollment Status (2018 Cohort)*

|                                   | Dual Enrollment Student | Non-Dual Enrollment Student |
|-----------------------------------|-------------------------|-----------------------------|
| Completed Associate Degree        | 1,449                   | 2,417                       |
| Did Not Complete Associate Degree | 1,584                   | 9,456                       |
| Total                             | 3,033                   | 11,873                      |

**Research Question 2**

In regard to the two ACT score categories (0-18 and 19+), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>021</sub>: In regard to the ACT score category of 0-18, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

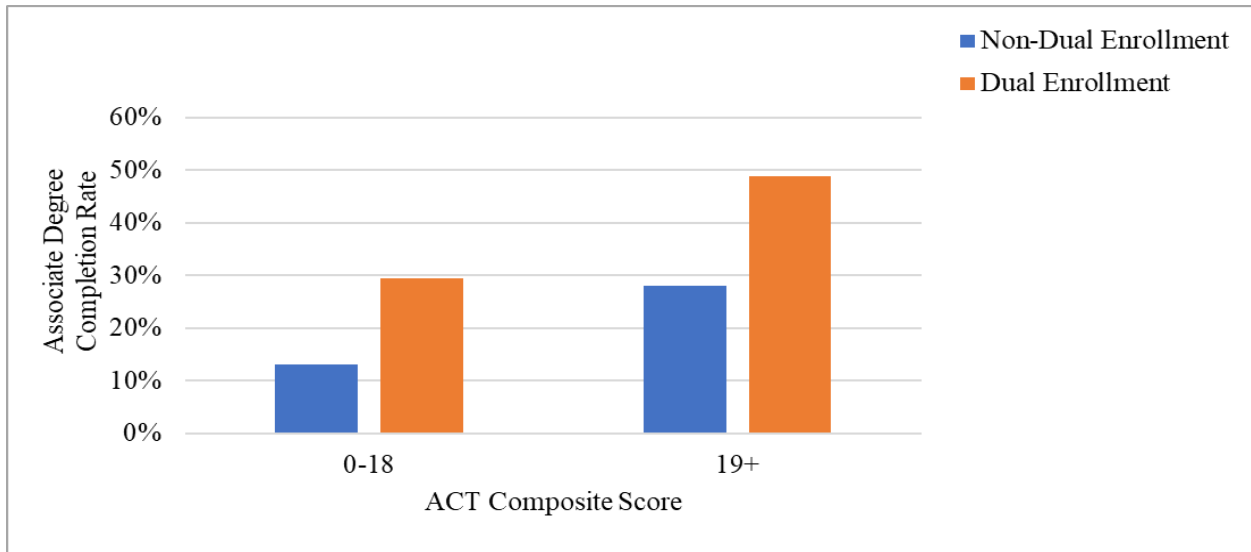
H<sub>022</sub>: In regard to the ACT score category of 19+, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

A two-way contingency table analysis was conducted to evaluate whether students who completed at least one dual enrollment course in high school graduated from community college with associate degrees at significantly different rates than students who did not complete a dual

enrollment course when ACT composite score was considered. The variables were dual enrollment completion (yes, no) and associate degree completion (yes, no) with ACT composite score separated into two grouping levels (0-18, 19+). Dual enrollment completion and associate degree completion were found to be significantly related regardless of the ACT score level. For the ACT 0-18 group, Pearson  $\chi^2(1, N = 28,974) = 362.83, p < .001$ , Cramer's  $V = .11$ . For the ACT 19+ group, Pearson  $\chi^2(1, N = 33,670) = 1346.81, p < .001$ , Cramer's  $V = .20$ . Therefore, the null hypotheses  $H_{021}$  and  $H_{022}$  were rejected. Regardless of ACT score level, students who completed at least one dual enrollment course in high school were significantly more likely to graduate than those who did not complete a dual enrollment course in high school. Figure 8 presents the percentages of students who completed an associate degree based on dual enrollment status and ACT composite score. Table 7 shows the proportion of students who completed an associate degree by ACT score and dual enrollment status.

**Figure 8**

*Degree Completion Percentages by ACT Score and Dual Enrollment Status*



**Table 7***Degree Completion by ACT Score and Dual Enrollment Status*

|                                   | ACT Score 0-18          |                             | ACT Score 19+           |                             |
|-----------------------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|
|                                   | Dual Enrollment Student | Non-Dual Enrollment Student | Dual Enrollment Student | Non-Dual Enrollment Student |
| Completed Associate Degree        | 504                     | 3,534                       | 4,973                   | 6,553                       |
| Did Not Complete Associate Degree | 1,211                   | 23,725                      | 5,261                   | 16,883                      |
| Total                             | 1,715                   | 27,259                      | 10,234                  | 23,436                      |

**Research Question 3**

In regard to the two categories of gender (female and male), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>031</sub>: In regard to females, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

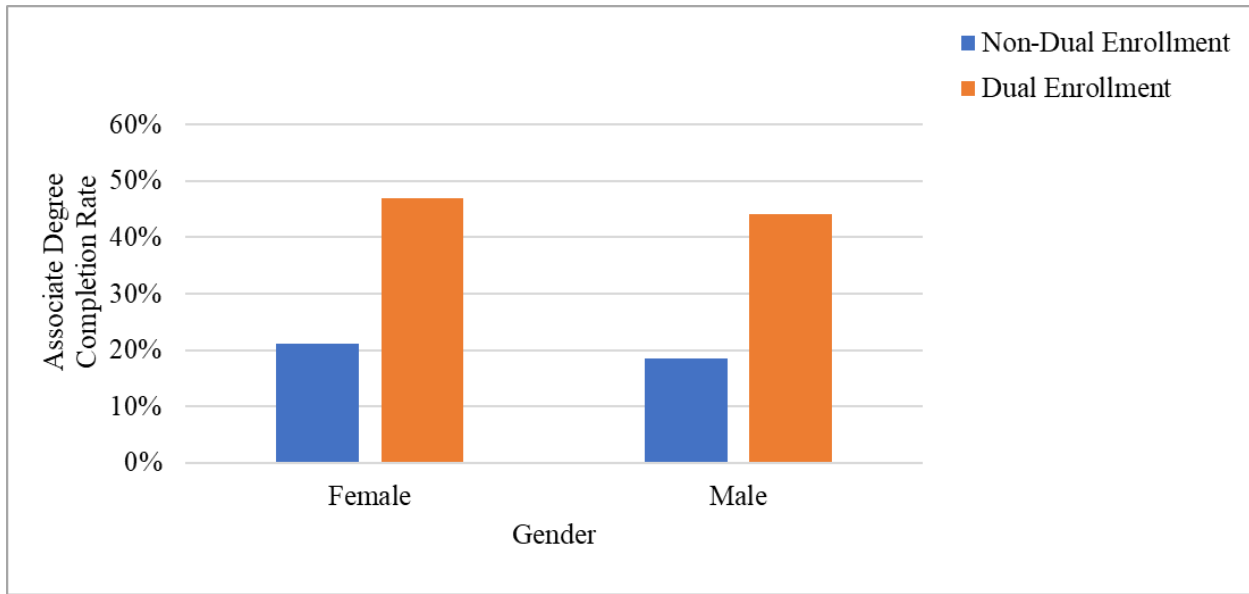
H<sub>032</sub>: In regard to males, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

A two-way contingency table analysis was conducted to evaluate whether students who completed at least one dual enrollment course in high school graduated from community college

with associate degrees at significantly different rates than students who did not complete a dual enrollment course in high school when gender was considered. The variables were dual enrollment completion (yes, no) and associate degree completion (yes, no) with gender in two groups (male, female). Dual enrollment completion and associate degree completion were found to be significantly related regardless of the gender. For females, Pearson  $\chi^2(1, N = 34,971) = 1992.58, p < .001$ , Cramer's  $V = .24$ . For males, Pearson  $\chi^2(1, N = 27,673) = 1412.27, p < .001$ , Cramer's  $V = .23$ . Therefore, the null hypotheses  $H_{031}$  and  $H_{032}$  were rejected. Regardless of gender, students who completed at least one dual enrollment course in high school were significantly more likely to graduate than those who did not complete a dual enrollment course in high school. Figure 9 displays the percentages of female and male students who completed an associate degree based on dual enrollment status and gender. Table 8 provides associate degree completion for female and male students by their dual enrollment status.

**Figure 9**

*Degree Completion Percentages by Gender and Dual Enrollment Status*



**Table 8***Degree Completion by Gender and Dual Enrollment Status*

|                                   | Female                  |                             | Male                    |                             |
|-----------------------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|
|                                   | Dual Enrollment Student | Non-Dual Enrollment Student | Dual Enrollment Student | Non-Dual Enrollment Student |
| Completed Associate Degree        | 3,508                   | 5,815                       | 1,969                   | 4,272                       |
| Did Not Complete Associate Degree | 3,973                   | 21,675                      | 2,499                   | 18,933                      |
| Total                             | 7,481                   | 27,490                      | 4,469                   | 23,205                      |

**Research Question 4**

In regard to the five categories of race (Asian, Black, Hispanic, White, and Other), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>041</sub>: In regard to Asian students, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>042</sub>: In regard to Black students, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>043</sub>: In regard to Hispanic students, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>044</sub>: In regard to White students, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>045</sub>: In regard to students of other races, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

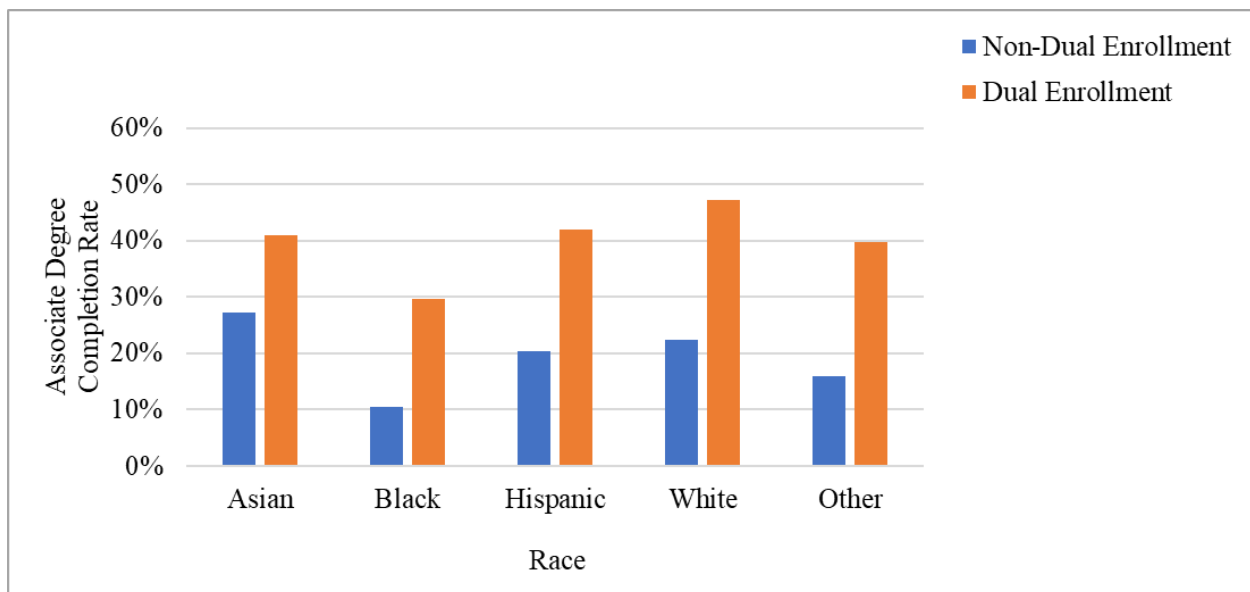
A two-way contingency table analysis was conducted to evaluate whether students who completed at least one dual enrollment course in high school graduated from community college with associate degrees at significantly different rates than students who did not complete a dual enrollment course in high school when race was considered. The variables were dual enrollment completion (yes, no) and associate degree completion (yes, no) with race in five categories (Asian, Black, Hispanic, White, other). Dual enrollment completion and associate degree completion were found to be significantly related regardless of race. For Asian students, Pearson  $\chi^2(1, N = 775) = 6.50, p = .011, \text{Cramer's } V = .09$ . For Black students, Pearson  $\chi^2(1, N = 9,956) = 128.95, p < .001, \text{Cramer's } V = .11$ . For Hispanic students, Pearson  $\chi^2(1, N = 3,568) = 91.76, p < .001, \text{Cramer's } V = .16$ . For White students, Pearson  $\chi^2(1, N = 45,594) = 2450.78, p < .001, \text{Cramer's } V = .23$ . For students of other races, Pearson  $\chi^2(1, N = 2,751) = 116.17, p < .001,$



Cramer's  $V = .21$ . Therefore, the null hypotheses  $H_{041}$ ,  $H_{042}$ ,  $H_{043}$ ,  $H_{044}$ , and  $H_{045}$  were rejected. Regardless of race, students who completed at least one dual enrollment course in high school were significantly more likely to graduate than students who did not complete a dual enrollment course in high school. Figure 10 shows the percentages of students who completed an associate degree based on dual enrollment status and race.

**Figure 10**

*Degree Completion Percentages by Race and Dual Enrollment Status*



### Research Question 5

In regard to SES in two categories (Pell recipient and non-Pell recipient), is there a significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

$H_{051}$ : In regard to students who received a Pell award (low-income), there is no significant difference in associate degree completion for first-time, full-time community college

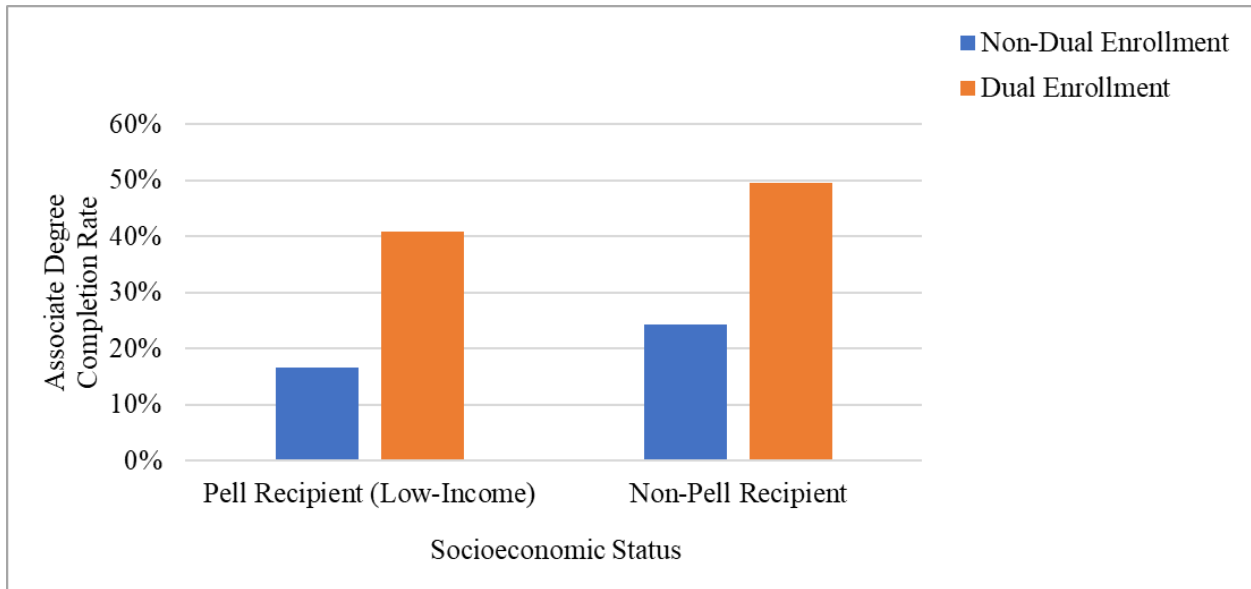
students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>052</sub>: In regard to students who did not receive a Pell Award, there is no significant difference in associate degree completion for first-time, full-time community college students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

A two-way contingency table analysis was conducted to evaluate whether students who completed at least one dual enrollment course in high school graduated from community college with associate degrees at significantly different rates than students who did not complete a dual enrollment course in high school when SES was considered. The variables were dual enrollment completion (yes, no) and associate degree completion (yes, no) with SES in two groups (Pell recipient, non-Pell recipient). Dual enrollment completion and associate degree completion were found to be significantly related regardless of SES. For the Pell recipient (low-income) group, Pearson  $\chi^2(1, N = 33,940) = 1587.82, p < .001$ , Cramer's  $V = .22$ . For the non-Pell recipient group, Pearson  $\chi^2(1, N = 28,704) = 1587.91, p < .001$ , Cramer's  $V = .24$ . Therefore, the null hypotheses H<sub>051</sub> and H<sub>052</sub> were rejected. Regardless of SES, as determined by Pell Recipient status, students who completed at least one dual enrollment course in high school were significantly more likely to graduate than those who did not complete a dual enrollment course in high school. Figure 11 shows the percentages of students who completed an associate degree by their dual enrollment status and SES. Table 9 provides the numbers of students in each grouping.

**Figure 11**

*Degree Completion Percentages by SES and Dual Enrollment Status*



**Table 9**

*Degree Completion by SES and Dual Enrollment Status*

|                                   | Pell Recipient (Low-Income) |                             | Non-Pell Recipient      |                             |
|-----------------------------------|-----------------------------|-----------------------------|-------------------------|-----------------------------|
|                                   | Dual Enrollment Student     | Non-Dual Enrollment Student | Dual Enrollment Student | Non-Dual Enrollment Student |
| Completed Associate Degree        | 2,107                       | 4,778                       | 3,370                   | 5,309                       |
| Did Not Complete Associate Degree | 3,054                       | 24,001                      | 3,418                   | 16,607                      |
| Total                             | 5,161                       | 28,779                      | 6,788                   | 21,916                      |

**Research Question 6**

For community college students who completed an associate degree within three years of first-time, full-time enrollment, is there a significant difference in the time to completion of the

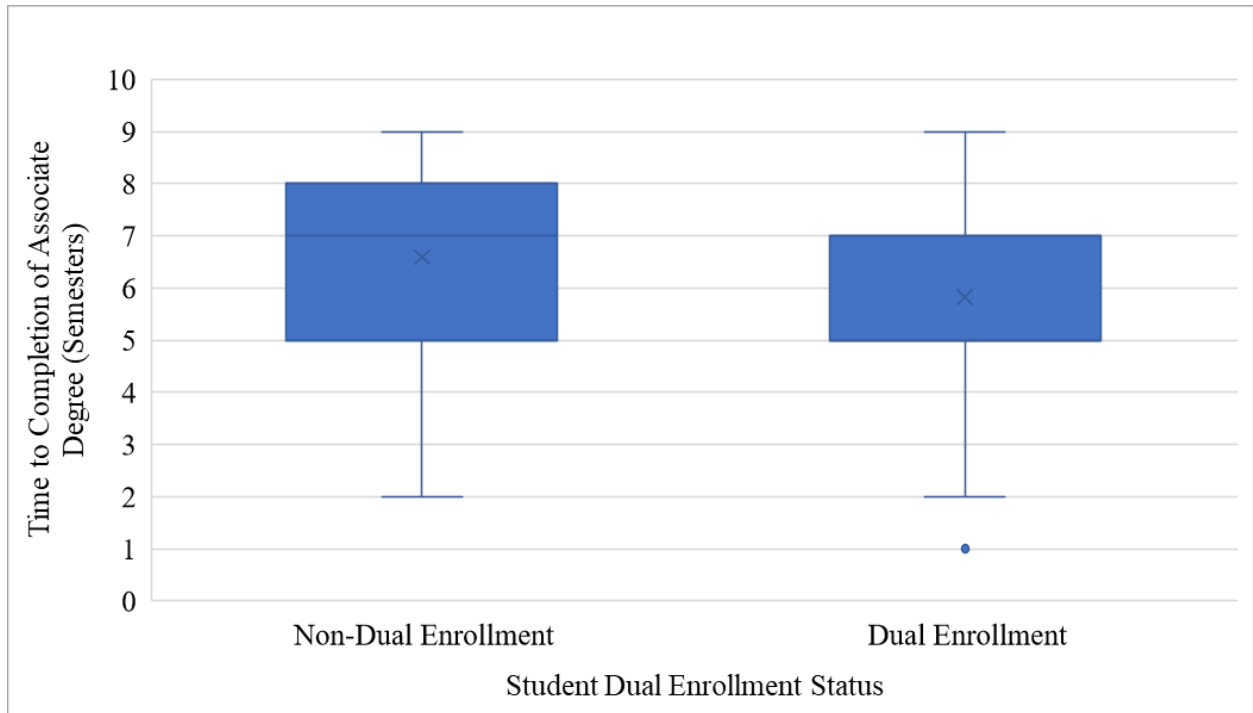
degree for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

H<sub>0</sub>6: For community college students who completed an associate degree within three years of first-time, full-time enrollment, there is no significant difference in the time to completion of the degree for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

An independent samples *t* test was conducted to evaluate the hypothesis that dual enrollment students complete an associate degree in fewer semesters than non-dual enrollment students. The number of semesters from first-time, full-time enrollment until graduation was the test variable and dual enrollment status (yes, no) was the grouping variable. The Levine's test for equality of variances was not significant ( $p = .052$ ). The *t* test was significant,  $t(15,562) = 34.11$ ,  $p < .001$ . Therefore, the null hypothesis H<sub>0</sub>6 was rejected. In general, students in the dual enrollment group completed their associate degree in significantly fewer semesters ( $M = 5.82$ ,  $SD = 1.41$ ) than their non-dual enrollment counterparts ( $M = 6.59$ ,  $SD = 1.31$ ). The 95% confidence interval was -0.81 to -0.73. The Cohen's *d* index was 1.34, which indicated a large effect size. Figure 12 shows the distributions for the two groups.

**Figure 12**

*Time to Degree Completion by Dual Enrollment Status*



**Research Question 7**

When considering the timeframe for associate degree completion (one-year, two-year, and three-year), is there a significant difference in associate degree completion rates for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school?

$H_{07_1}$ : For community college students who completed an associate degree within one year of first-time, full-time enrollment, there is no significant difference in completion rates for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

H<sub>072</sub>: For community college students who completed an associate degree within two years of first-time, full-time enrollment, there is no significant difference in completion rates for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

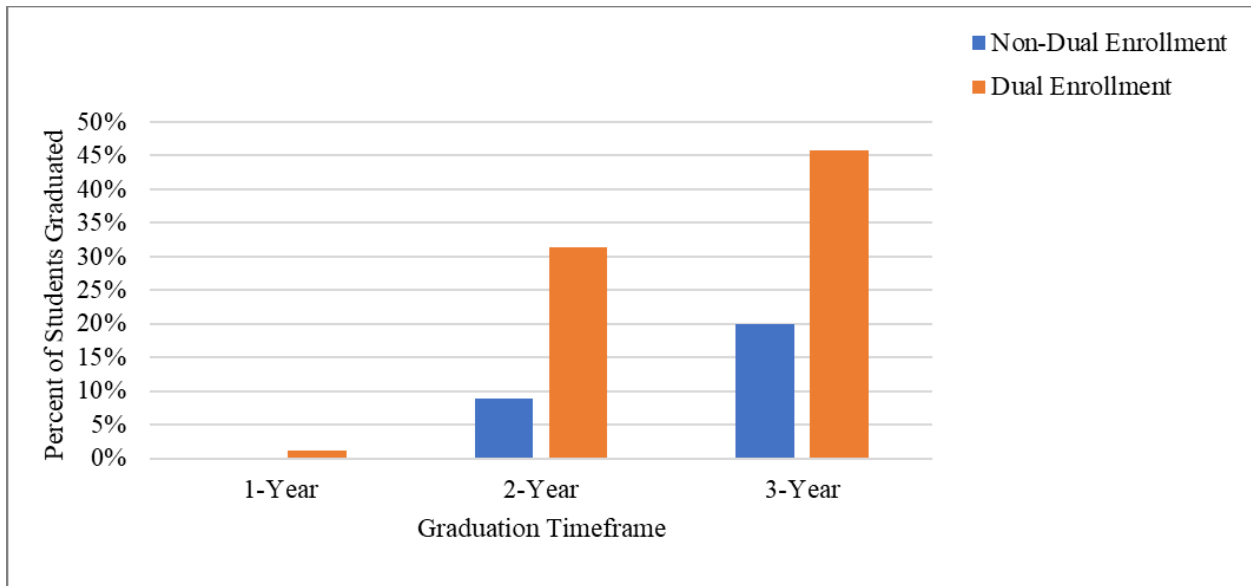
H<sub>073</sub>: For community college students who completed an associate degree within three years of first-time, full-time enrollment, there is no significant difference in completion rates for students who completed at least one dual enrollment course in high school as compared to students who did not complete a dual enrollment course in high school.

A two-way contingency table analysis was conducted to evaluate whether students who completed at least one dual enrollment course in high school graduated from community college with associate degrees at significantly different rates than students who did not complete a dual enrollment course in high school when considering degree completion within one year, two years, and three years of first-time, full-time enrollment. The two variables were dual enrollment completion (yes, no) and associate degree completion (yes, no) with degree completion timeframe in three groups (one-year, two-year, three-year). Dual enrollment completion and associate degree completion were found to be significantly related for students in each completion timeframe. For the one-year completion group, Pearson  $\chi^2(1, N = 62,644) = 517.18$ ,  $p < .001$ , Cramer's  $V = .09$ . For the two-year completion group, Pearson  $\chi^2(1, N = 62,644) = 4309.19$ ,  $p < .001$ , Cramer's  $V = .26$ . For the three-year completion group, Pearson  $\chi^2(1, N = 62,644) = 3484.39$ ,  $p < .001$ , Cramer's  $V = .24$ . Therefore, all three null hypotheses, H<sub>071</sub>, H<sub>072</sub>, and H<sub>073</sub>, were rejected. When comparing students in each completion timeframe, students who completed at least one dual enrollment course in high school were significantly more likely to graduate than those who did not complete a dual enrollment course in high school. Figure 13

presents the percentages of one-year, two-year, and three-year graduates by dual enrollment status. Table 10 shows the proportion of one-year, two-year, and three-year graduates by dual enrollment status.

**Figure 13**

*Graduation Percentages by Timeframe and Dual Enrollment Status*



**Table 10**

*Proportion of Graduates by Timeframe and Dual Enrollment Status*

|                          | Dual Enrollment Student | Non-Dual Enrollment Student |
|--------------------------|-------------------------|-----------------------------|
| Graduated within 1-Year  | 134/11,949              | 9/50,695                    |
| Graduated within 2-Years | 3,745/11,949            | 4,467/50,695                |
| Graduated within 3-Years | 5,477/11,949            | 10,087/50,695               |

**Analyses of Number of Dual Enrollment Courses**

The 11,949 dual enrollment students in this study completed 30,917 dual enrollment courses ranging from one course to 22 courses per student. Over 60% of students completed one

or two dual enrollment courses. Table 11 provides a more detailed listing of number of students in each level of dual enrollment courses.

**Table 11**

*Distribution of Students by Number of Dual Enrollment Courses*

|               | Number of Students | Percent of Dual Enrollment Students |
|---------------|--------------------|-------------------------------------|
| 1 Course      | 4,035              | 33.77%                              |
| 2 Courses     | 3,386              | 28.34%                              |
| 3 Courses     | 1,530              | 12.80%                              |
| 4 Courses     | 1,608              | 13.46%                              |
| 5 Courses     | 527                | 4.41%                               |
| 6 Courses     | 412                | 3.45%                               |
| 7 Courses     | 157                | 1.31%                               |
| 8 Courses     | 115                | 0.96%                               |
| 9 Courses     | 65                 | 0.54%                               |
| 10 Courses    | 43                 | 0.36%                               |
| 11 Courses    | 25                 | 0.21%                               |
| 12-16 Courses | 34                 | 0.28%                               |
| 17-22 Courses | 12                 | 0.10%                               |

**Research Question 8**

For community college students who completed at least one dual enrollment course in high school, is the number of dual enrollment courses completed significantly different for students who completed an associate degree within three years of first-time, full-time enrollment as compared to students who did not complete an associate degree within three years of first-time, full-time enrollment?

H<sub>0</sub>8: For community college students who completed at least one dual enrollment course in high school, the number of dual enrollment courses completed is not significantly different for students who completed an associate degree within three years of first-time, full-time enrollment



as compared to students who did not complete an associate degree within three years of first-time, full-time enrollment.

An independent samples *t* test was conducted to evaluate the hypothesis that students who complete more dual enrollment courses in high school are more likely to graduate with an associate degree. The number of dual enrollment courses completed was the test variable and associate degree completion (yes, no) was the grouping variable. The Levine's test for equality of variances was significant ( $p < .001$ ). The *t* test was significant,  $t(10172.39) = -19.19$ ,  $p < .001$ . Therefore, the null hypothesis  $H_0$  was rejected. In general, students who completed an associate degree completed significantly more dual enrollment courses ( $M = 2.95$ ,  $SD = 2.11$ ) than those who did not complete an associate degree ( $M = 2.28$ ,  $SD = 1.63$ ). The 95% confidence interval for the difference in means was -0.74 to -0.60. The Cohen's *d* index was 1.87, which indicated a large effect size.

### **Research Question 9**

For community college students who graduated with an associate degree within three years of first-time, full-time enrollment, is there a difference in associate degree completion with each additional dual enrollment course?

A descriptive analysis was conducted to evaluate the hypothesis that each additional dual enrollment course results in higher associate degree completion rates. Associate degree completion rate was calculated for 14 levels of dual enrollment courses (0 through 11, 12-16, and 17-22) as shown in Table 12. Graduation data for categories or sub-categories with less than five students were combined for presentation purposes to protect student privacy, which resulted in the last two categories of 12-16 courses and 17-22 courses. Of the 50,695 students who did not

complete a dual enrollment course, 19.9% graduated with an associate degree. The graduation rate increased to 34.6 % for students who completed one dual enrollment course; to 45.6% for completing two dual enrollment courses; and so on.

**Table 12**

*Distribution of Students by Number of Courses and Percent Graduated*

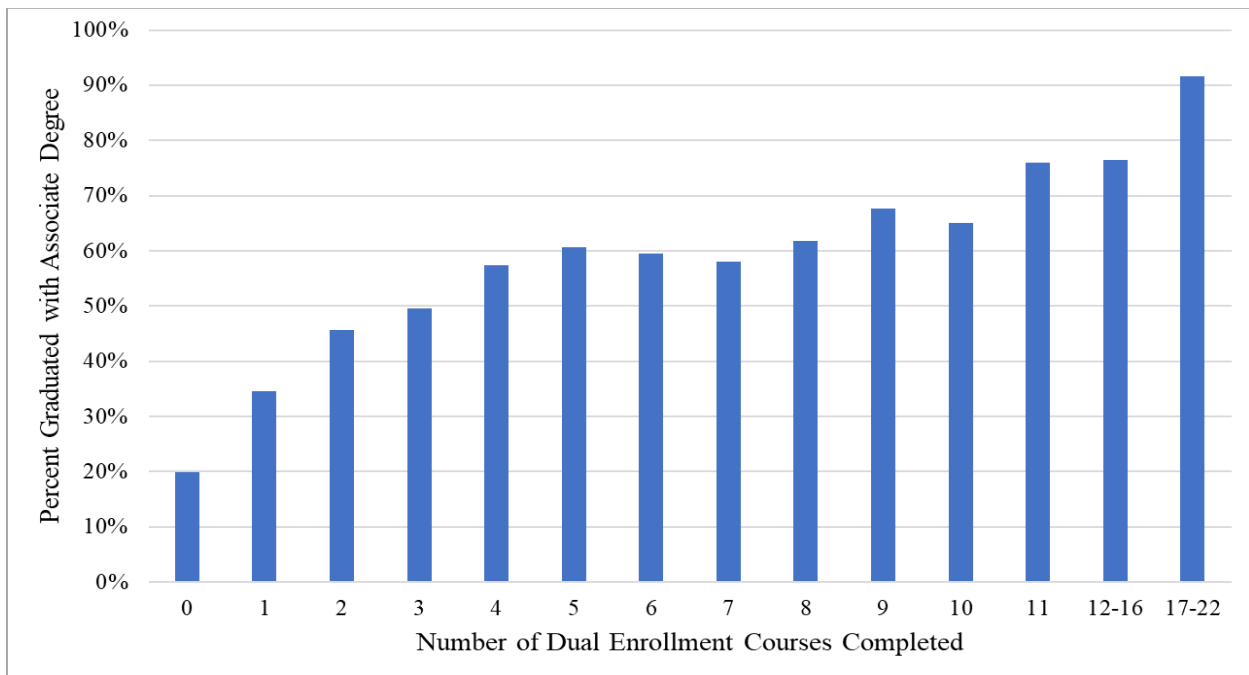
|               | Number of Students | Percent Graduated |
|---------------|--------------------|-------------------|
| 0 Courses     | 50,695             | 19.9%             |
| 1 Course      | 4,035              | 34.6%             |
| 2 Courses     | 3,386              | 45.6%             |
| 3 Courses     | 1,530              | 49.6%             |
| 4 Courses     | 1,608              | 57.3%             |
| 5 Courses     | 527                | 60.7%             |
| 6 Courses     | 412                | 59.5%             |
| 7 Courses     | 157                | 58.0%             |
| 8 Courses     | 115                | 61.7%             |
| 9 Courses     | 65                 | 67.7%             |
| 10 Courses    | 43                 | 65.1%             |
| 11 Courses    | 25                 | 76.0%             |
| 12-16 Courses | 26                 | 76.5%             |
| 17-22 Courses | 8                  | 91.7%             |

The results indicate that students who completed one dual enrollment course were 1.73 times more likely to graduate than students who completed no dual enrollment courses; students who completed two courses were 1.32 times more likely to graduate than students who completed one course; students who completed three courses were 1.09 times more likely to graduate than students who completed two courses; students who completed four courses were 1.16 times more likely to graduate than students who completed three courses; and students who completed five courses were 1.06 times more likely to graduate than students who completed

four courses. After five courses, the graduation percent fluctuated with each additional course but as Figure 14 shows, the general trend indicates that the more dual enrollment courses students completed, the more likely they were to graduate with an associate degree.

**Figure 14**

*Graduation Percentages by Number of Dual Enrollment Courses*



**Research Question 10**

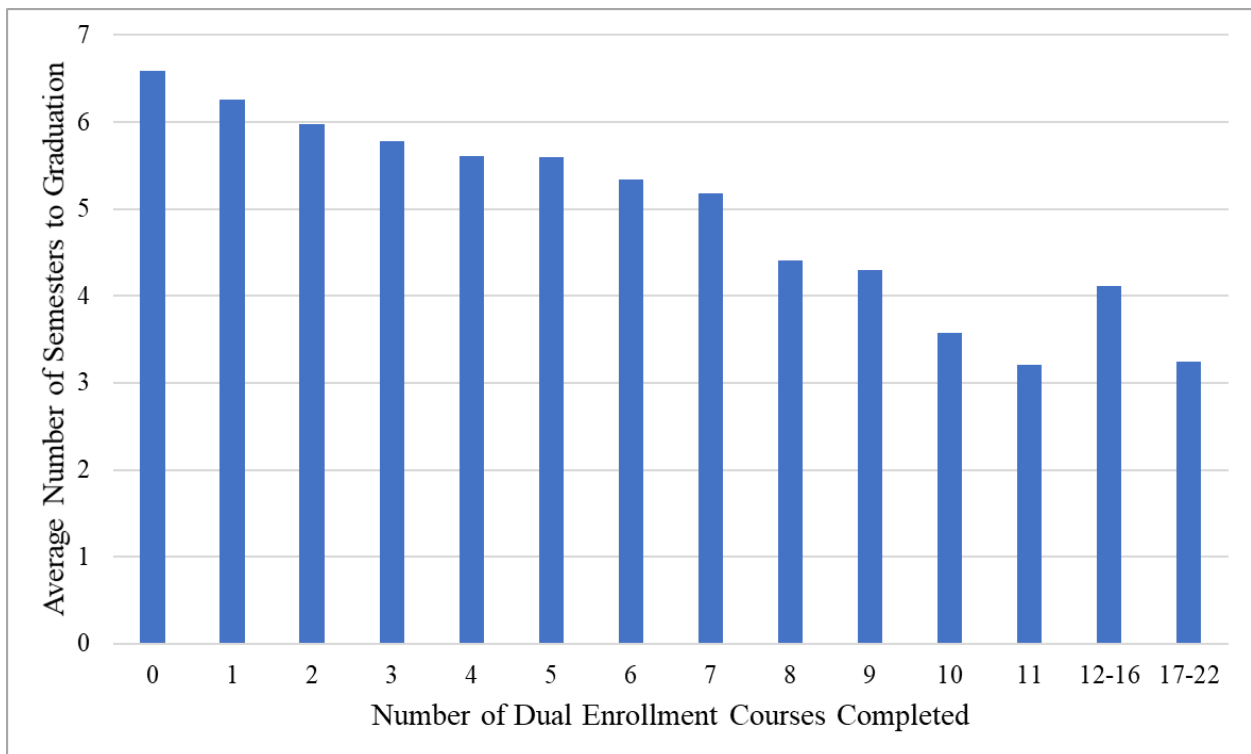
For community college students who completed an associate degree within three years of first-time, full-time enrollment, is there a significant relationship between the number of dual enrollment courses completed and time to completion of an associate degree?

H<sub>0</sub>10: For community college students who completed an associate degree within three years of first-time, full-time enrollment, there is no significant relationship between the number of dual enrollment courses completed and time to completion of an associate degree.

A Pearson correlation coefficient was computed to test the relationship between number of dual enrollment courses completed (number) and time to completion of associate degree (semesters). The results of the correlational analysis revealed a weak negative relationship between number of dual enrollment courses ( $M = 1.04$ ,  $SD = 1.89$ ) and time to completion ( $M = 6.32$ ,  $SD = 1.39$ ) and a statistically significant correlation [ $r(15,564) = -.322$ ,  $p < .001$ ]. Therefore, the null hypothesis  $H_{010}$  was rejected. In general, the results suggest that when students complete more dual enrollment courses, they are likely to complete an associate degree in fewer semesters. The average time to graduation ranged from 3.3 to 6.7 semesters as represented in Figure 15.

**Figure 15**

*Time to Degree Completion by Number of Dual Enrollment Courses*



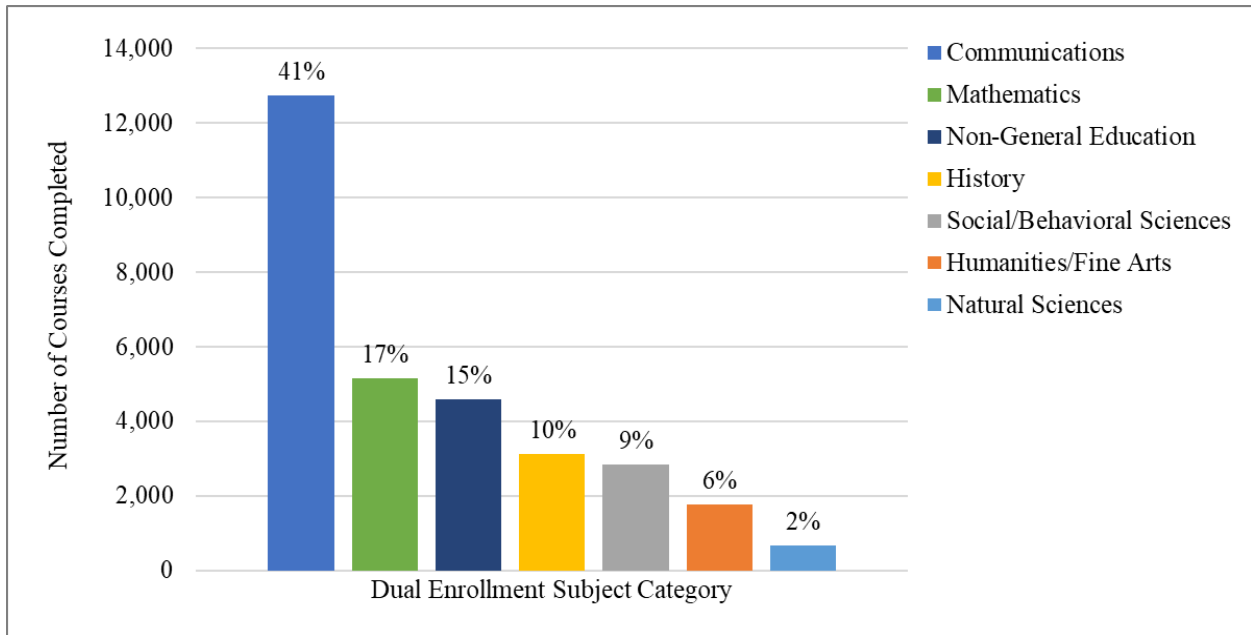
## **Analyses of Dual Enrollment Subjects**

Dual enrollment courses were divided into seven subject categories: communications, humanities/fine arts, history, mathematics, natural sciences, social/behavioral sciences, and non-general education. Communications was comprised of courses such as English composition and speech. Humanities/fine arts included courses such as art history, literature, and philosophy. Natural sciences included courses such as biology, chemistry, and physics. Social/behavioral sciences included courses such as economics, political science, and sociology. Table A1 in the Appendix provides a detailed listing of the individual course topics that make up each of the six general education core subject categories. Non-general education included any course that was not included in one of the other six general education core categories – subjects such as those in business, the medical field, or the trade skills areas.

Forty-one percent of the 30,917 dual enrollment courses were in communications, 17% were in mathematics, 15% were in non-general education, 10% were in social/behavioral sciences, 9% were in history, 6% were in humanities/fine arts, and 2% were in natural sciences as shown in Figure 16. Fifty-three percent of the 11,949 dual enrollment students completed courses in only one subject; 26% completed courses in two subjects; 13% completed courses in three subjects; 5% completed courses in four subjects, and the remainder completed courses in five, six or seven subjects as shown in Figure 17.

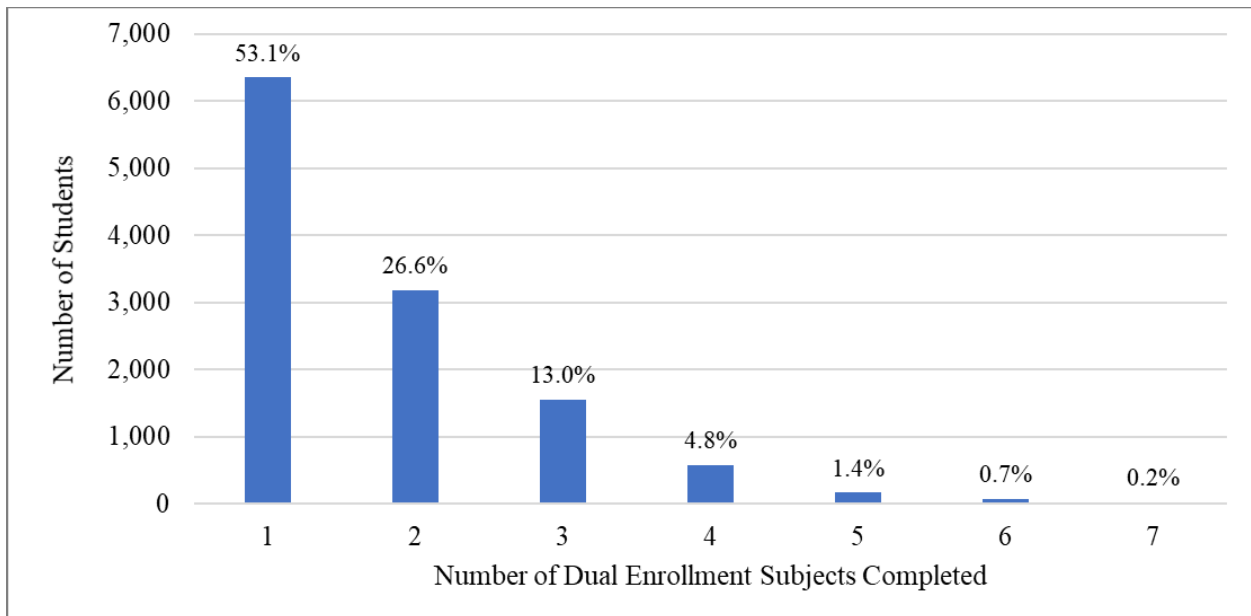
**Figure 16**

*Distribution of Dual Enrollment Courses by Subject Category*



**Figure 17**

*Distribution of Students by Number of Dual Enrollment Subjects Completed*



Of the possible 127 subject area combinations, the students in this study completed dual enrollment courses in 108 different subject area combinations ranging from students completing all dual enrollment courses in one subject area to completing courses in all seven subject areas. Over one-half of dual enrollment students were represented in the top four subject area combinations: communications (21.65%), non-general education (12.19%), mathematics (10.14%), and communications-mathematics (9.18%). Graduation rates for dual enrollment students in the different subject area combinations ranged from 0% to 100%. Table A2 in the Appendix provides a detailed breakdown of the subject area combinations by number of students and graduation rates.

### **Research Question 11**

For first-time, full-time community college students who completed dual enrollment courses in only one subject area in high school, is there a significant difference in associate degree completion among the dual enrollment subject areas (communications, humanities/fine arts, social/behavioral sciences, history, natural science, mathematics, non-general education)?

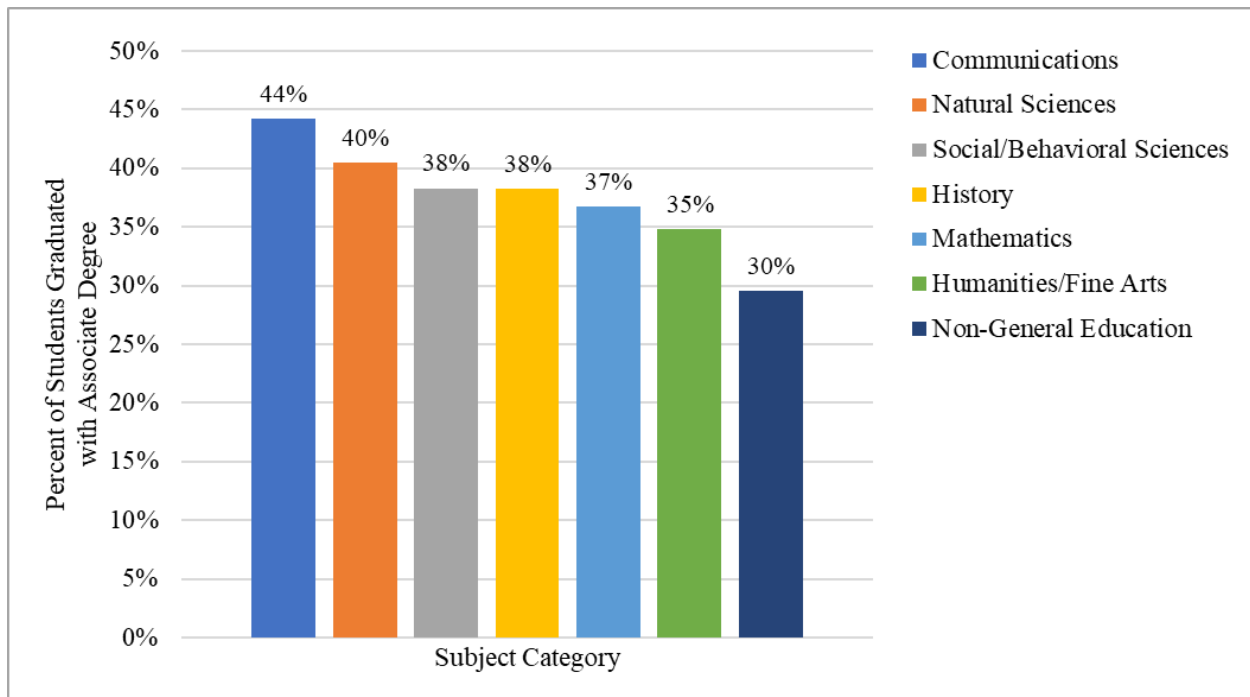
H<sub>0</sub>11: For first-time, full-time community college students who completed dual enrollment courses in only one subject area in high school, there is no significant difference in associate degree completion among the dual enrollment subject areas (communications, humanities/fine arts, social/behavioral sciences, history, natural science, mathematics, non-general education)?

A two-way contingency table analysis was conducted to evaluate whether associate degree completion was significantly different among the different dual enrollment subject areas. The two variables were dual enrollment subject area at seven levels (communications, humanities/fine arts, social/behavioral sciences, history, natural science, mathematics, non-

general education) and associate degree completion (yes, no). Dual enrollment subject area and associate degree completion were found to be significantly related, Pearson  $\chi^2(1, N = 6,350) = 87.19, p < .001$ , Cramer's  $V = .12$ . Therefore, the null hypothesis  $H_{011}$  was rejected. The proportion of students who graduated with an associate degree that completed dual enrollment courses in communications, natural sciences, social/behavioral sciences, history, mathematics, humanities/fine arts, and non-general education were .44, .40, .38, .38, .37, .35, and .30 respectively as shown in Figure 18.

**Figure 18**

*Graduation Percentages by Dual Enrollment Subject Category*



### Summary

Chapter 4 presented the research questions, null hypotheses, and data analyses in conjunction with the findings of the study through interpretation of the data. Data were analyzed



descriptively as well as through a series of statistical tests including independent samples *t* tests, Pearson correlations, and two-way contingency tables that were used to evaluate differences between the criterion and predictor variables. Data were presented in tables and figures as well as descriptively. The findings and relevant conclusions will be discussed in Chapter 5 along with implications for practice and suggestions for further research that may contribute to the existing literature.

## **Chapter 5. Summary, Conclusions, and Implications**

The purpose of this non-experimental quantitative study was to compare the academic success of first-time, full-time community college students over four entering cohorts (2015 through 2018) based on graduation with an associate degree, the time to graduation, and the influence of dual enrollment courses in high school. In addition to dual enrollment completion (yes or no), the number of dual enrollment courses completed in high school and the subjects of dual enrollment courses completed (communications, humanities/fine arts, social/behavioral sciences, history, natural science, mathematics, non-general education) were evaluated. Student characteristics reviewed include gender, race, SES, and ACT composite score.

This study adds to the literature by providing an analysis of dual enrollment completion in relation to community college success in a time when much focus and effort are being placed on increasing student access to dual enrollment courses. Specifically, as legislation and funding continue to evolve and attract more students toward dual enrollment participation and community college attendance, few studies in recent years have focused on the relationship between dual enrollment and community college success and none have done so at the statewide level in Tennessee. The 62,644 students in this study spanning four years help to build on previous research.

### **Discussion and Conclusions**

Associate degree completion within three years of first-time, full-time enrollment for dual enrollment and non-dual enrollment students was addressed in Research Questions 1, 2, 3, 4, and 5. For Research Question 1, I compared dual enrollment completion and associate degree completion for the study population and for each of the first-time, full-time cohorts separately. Associate degree completion rates were significantly higher for the dual enrollment students than

non-dual enrollment students in the study population. The associate degree completion rate for dual enrollment students was 46% compared to 20% for non-dual enrollment students. Similar results were found for each of the first-time, full-time cohorts; associate degree completion rates were significantly higher for dual enrollment students than for non-dual enrollment students in each cohort. Overall, dual enrollment students were 2.3 times more likely to complete an associate degree than non-dual enrollment students. My study of associate degree completion yielded results in line with those of An (2013a), Blankenberger et al. (2017), Henneberger et al. (2022), Hughes (2016), Ganzert (2014), and Taylor (2015), all of which found that dual enrollment students were significantly more likely to graduate from college than their non-dual enrollment peers. The results of my study add to the growing body of consensus in this area.

Research Questions 2, 3, 4, and 5 disaggregated the data based on student characteristics in four subgroups based on ACT score, gender, race, and SES. For Research Question 2, I evaluated associate degree completion in relation to dual enrollment completion and ACT composite score to determine if there were differences in degree completion between dual and non-dual enrollment students in the ACT 0-18 group and between dual and non-dual enrollment students in the ACT 19+ group. The results indicated that dual enrollment students in both the ACT 0-18 and ACT 19+ groups graduated at significantly higher rates than their non-dual enrollment peers in each category. The impact of dual enrollment appeared greater for the ACT 19+ group in which the graduation rate for dual enrollment students was 21 percentage points higher than the non-dual enrollment students in the group. Whereas in the ACT 0-18 group, the difference in graduation rates between dual and non-dual enrollment students was 16 percentage points. My findings align with those of An and Taylor (2015), Burns et al. (2019), and Lichtenberger et al. (2014) and contribute additional knowledge to this area of literature

concerning students' prior academic preparation in relation to the impact of dual enrollment participation.

For Research Question 3, I assessed the relationship between associate degree completion and dual enrollment completion when considering student gender to determine if there were differences in degree completion between female dual enrollment and female non-dual enrollment students and between male dual enrollment and male non-dual enrollment students. Findings revealed that associate degree completion rate was significantly higher for dual enrollment females than non-dual enrollment females (47% and 21% respectively). Similarly, associate degree completion rate was significantly higher for dual enrollment males than non-dual enrollment males (44% and 18% respectively). Both female and male dual enrollment groups experienced a 26-percentage point increase in graduation rate over their non-dual enrollment peers. The literature regarding gender provided conflicting results. Karp (2007) and Oakley (2015) found that male dual enrollment students were more likely to complete a degree while Ganzert (2012) found that dual enrollment only provides positive effects for female students. The findings in my study more closely align with those of Morgan et al. (2018) and Young et al. (2013) who reported that there is no difference in college success when comparing male and female dual enrollment students. More research is needed to clarify the influence of dual enrollment completion in relation to gender.

For Research Question 4, I examined associate degree completion with corresponding dual enrollment completion and student race to determine if there were differences in graduation rates between dual and non-dual enrollment students in five race categories: Asian, Black, Hispanic, White, and other race. The results showed that associate degree completion rate was significantly higher for dual enrollment students compared to non-dual enrollment students in

each race category. However, the effect size was smaller for all non-White races. The results also revealed that while dual enrollment students in each race category outperformed their non-dual enrollment peers, dual enrollment did not appear to close the gaps between non-White and White students. These findings agree with those of An and Taylor (2015) and Morgan et al. (2018) who found that all races benefit from participation in dual enrollment. Similarly, research from Ganzert (2012), Struhl and Vargas (2012), and Taylor (2015) showed that dual enrollment students of color were more likely to complete a college degree than their peers who did not participate in dual enrollment. However, Taylor's (2015) study detected smaller effect sizes for students of color, which is consistent with findings in my study. The results of my study also aligned with the research of Oakley (2015) and Hoffman (2017) that discovered that although dual enrollment benefitted Black students, it did not account for the gap in college success between Black and White students. The findings from my study generally agree with the findings of these earlier studies and contribute to the growing body of research concerning race and the effects of dual enrollment.

For Research Question 5, I assessed associate degree completion in relation to dual enrollment completion and SES to ascertain if there were differences in graduation rate between low-income dual and non-dual enrollment students and between middle- to high-income dual and non-dual enrollment students. The analysis revealed that dual enrollment students in each SES category completed associate degrees at significantly higher rates than the non-dual enrollment students in the same category. Low-income students who completed dual enrollment were 2.5 times more likely to graduate than low-income students who did not complete dual enrollment. This aligns with research by An (2013a), Struhl and Vargas (2012), and Taylor (2015) that indicated low-income students may especially benefit from participating in dual enrollment

courses. Although both groups in my study benefitted from completing dual enrollment courses, the effect size was lower for the low-income group and dual enrollment completion did not appear to lessen the gap in graduation rates between the two SES groups. These results support Taylor's (2015) research that revealed smaller effect sizes for the low-income group and An's (2013b) study that found dual enrollment did not account for the gap in college success between low-income and middle- to high-income students. The results of my study contribute to the general consensus that dual enrollment benefits students, regardless of SES but that it does not account for the overall gap in academic success between SES groupings.

In Research Questions 6 and 7, time to completion of an associate degree was addressed for dual enrollment and non-dual enrollment students who had graduated within three years of first-time, full-time college enrollment. For Research Question 6, I evaluated the relationship between dual enrollment completion and number of semesters from enrollment to graduation. Findings revealed that on average, students who completed at least one dual enrollment course graduated in significantly fewer semesters than students who did not complete dual enrollment courses. The average time to completion of an associate degree for dual enrollment students was 5.82 semesters compared to 6.59 semesters for non-dual enrollment students. This is consistent with the studies of Allen and Dadgar (2012), Hughes (2016), and SREB (2011). The literature review revealed a general consensus showing reduced time to graduation for dual enrollment students and my study adds to this consensus.

For Research Question 7, I compared one-year, two-year, and three-year graduation rates for dual enrollment and non-dual enrollment students. The differences were found to be significant for all timeframes. Dual enrollment students were 1% more likely to graduate within one year, 23% more likely to graduate within two years, and 28% more likely to graduate within

three years. This affirms the results found in the literature showing that two-year and three-year graduation rates are higher for dual enrolment students (Grubb et al., 2012; Oakley, 2015; Struhl & Vargas, 2012; Villarreal, 2018). The results of my study provide additional support of previous research concerning graduation rates within benchmark timeframes.

Research Questions 8, 9, and 10 addressed the relationships between number of dual enrollment courses completed in high school and associate degree completion. For Research Question 8, I evaluated the relationship between associate degree completion and the number of dual enrollment courses completed for students who completed at least one dual enrollment course in high school. The results indicated that dual enrollment students who completed an associate degree completed significantly more dual enrollment courses ( $M = 2.95$ ) than dual enrollment students who did not complete an associate degree ( $M = 2.28$ ). My results align with those of Burns et al. (2019), Ganzert (2014), Villareal (2018), Struhl and Vargas (2012), and Young (2021). The results of my study add to the consensus in the literature that increasing number of dual enrolment courses completed increases the likelihood students will complete a college degree.

For Research Question 9, I compared graduation rates at increasing numbers of dual enrollment courses to determine if students were more likely to graduate with each additional dual enrollment course. The analysis revealed that from zero to five courses, graduation rate increased with each additional dual enrollment course completed. The trend after five courses fluctuated but in general showed an overall positive relationship between additional dual enrollment courses and increasing graduation rates. These results contradict An's (2013a) findings which indicated that beyond two dual enrollment courses, there was little added benefit for students. However, Burns et al. (2019) found that each additional credit hour in dual

enrollment was positively related to graduation, which aligns with the results of my study. A study by Karp et al. (2007) discovered that the positive relationship between number of dual enrollment courses and college success was dependent upon which state was investigated. Review of the literature provided no distinct point at which the positive effect of dual enrollment is maximized, and my study contributes to the variety of results. Further research is needed in this area to evaluate the added value of completing more dual enrollment courses.

For Research Question 10, I compared the number of dual enrollment courses with the number of semesters from enrollment to graduation. The correlation was found to be significant. Students who completed more dual enrollment courses tended to graduate with an associate degree in fewer semesters. These results align with those of Burns et al. (2019). The literature review yielded limited research in this area, and the results of my study add to this limited knowledge base.

Research Question 11 addressed the relationship between associate degree completion and dual enrollment subject areas. I compared dual enrollment subject area to completion of an associate degree by evaluating records for students who completed all dual enrollment courses in only one subject area. The analysis revealed that dual enrollment subject area and associate degree completion were significantly related. In general, students who completed all dual enrollment courses in communications were more likely to graduate than students who completed courses in other subjects and were 2.2 times more likely to graduate than non-dual enrollment students. Students who completed all dual enrollment in non-general education courses were generally less likely to graduate than students who completed dual enrollment in core education subjects but were 1.5 times more likely to graduate than non-dual enrollment students. Morgan et al. (2018), Villareal (2018), and Struhl and Vargas (2012) found that courses



in English language arts tend to be most influential on graduation rates. In my study, English language arts was included in the communications subject area which suggests my results align with their findings. In the area of mathematics, my results contradicted the works of Morgan et al. (2018) and Giani et al. (2014) which showed that students who were enrolled in math dual enrollment courses were more likely to graduate than students in other subjects. My study generally aligned with Giani et al. (2014) in the area of vocational or occupational courses which were grouped into the non-general education subject area of my study. My results were similar to those of Hoffman (2017), Phelps and Chan (2016), and Struhl and Vargas (2012) which revealed students in any dual enrollment subject are more likely to graduate than non-dual enrollment students. A review of the literature resulted in no clear indication of which dual enrollment subject is most beneficial for college success; findings from my study add to the wide range of results. Additional research is needed to evaluate the effects of dual enrollment subject and subject combinations on college success.

When comparing college success for students who completed dual enrollment to those who did not, dual enrollment students were generally more likely to complete an associate degree within three years. This finding was consistent for each first-time, full-time cohort as well as for each sub-group of ACT score, gender, race, and SES. However, dual enrollment completion did not account for the gaps in college success among the subgroups studied. In terms of time to completion, dual enrollment students were likely to graduate in fewer semesters. As the number of dual enrollment courses increased, the likelihood of graduation increased and the time to graduation decreased. In the area of dual enrollment subject, students who completed all courses in communications were generally more likely to graduate than those who completed courses in other subjects. Whereas students who completed all courses in non-general education

tended to be less likely to graduate than students who completed all courses in general education core subjects. The results of my study contribute to the growing body of research concerning high school dual enrollment programs. Both similarities and differences were found in comparison to existing literature. This study reviewed statewide data for Tennessee community colleges. Community colleges in other states and four-year universities should review their own data for decision-making purposes.

### **Implications for Practice**

Results of this study led to several implications for practice. Because people in various areas of education and government have ties to dual enrollment, these implications are not aimed at any one group. Additionally, because this study was conducted on data from Tennessee community colleges, the implications would be the most applicable to people and students who are associated with community colleges in Tennessee. After analyzing the findings from my study, I present the following implications for practice:

1. Study data frequently to ensure the positive effects of dual enrollment continue to be realized as changes occur in dual enrollment course offerings, methods of instruction, and student access.
2. Provide greater access to dual enrollment in areas that may not currently have the facilities or staffing needed to implement the program.
3. Examine alternative criteria for placement into dual enrollment courses. Currently multiple measures for placement out of remedial coursework are being piloted at TBR community colleges.
4. Expand the Dual Enrollment Grant to provide more funding for dual enrollment courses.

5. Develop a program or partnerships that will assist students with costs that the Dual Enrollment Grant does not cover; costs such as books and certain fees.
6. Encourage students to participate in at least one dual enrollment course while in high school.
7. Increase the breadth of the Dual Enrollment Grant before increasing the depth of the grant. Based on my finding that students who completed just one dual enrollment course were 1.73 times more likely to graduate, policymakers should focus on funding fewer classes for more students (breadth) before funding more classes for fewer students (depth) when determining how to allocate the finite funds in the grant.

### **Implications for Further Research**

With the continuing and increasing focus on dual enrollment as a strategy to prepare students for college success, additional research is needed to further investigate relationships between dual enrollment parameters and college success measures. The starting point for my study was the first-time, full-time cohort of 2015, which was the first group of students who were eligible for Tennessee Promise. The ending point for my study was the 2018 cohort because that was the most recent cohort that had three years to complete an associate degree at the time of my study. As the dual enrollment landscape continues to change, it would be beneficial if the analyses in this study were replicated for cohorts beyond 2018 to determine if the positive effects of dual enrollment continue to be realized through the COVID-19 pandemic and as the dual enrollment program changes. Additional implications for further research are outlined below:

1. Evaluate dual enrollment subject relationship to college success measures at the individual subject level rather than in subject categories.

2. Study college success measures for the various subject combinations to determine if there are preferred subject combinations.
3. Evaluate the interaction of dual enrollment subjects and the number of courses completed in each subject.
4. Interview first-time, full-time community college students who completed dual enrollment courses in high school to determine what aspects of their dual enrollment courses are most beneficial in the community college setting.
5. Interview or survey high school dual enrollment students to determine why they chose to participate in dual enrollment and what benefits they expect from the program.
6. Replicate this study with data from four-year universities to discover how dual enrollment parameters are related to bachelor's degree completion.
7. Research dual enrollment completion as it relates to student enrollment and retention at community colleges and universities.
8. Study the relationship between dual enrollment completion and transfer pathways; the percentage of dual enrollment students who transfer from community college to university to complete a bachelor's degree.
9. Evaluate student success in college courses when the prerequisite course was taken as a dual enrollment course in high school.
10. Evaluate the differences between dual credit and dual enrollment in terms of college enrollment, persistence, and success.
11. Research the gaps in dual enrollment completion and effect sizes among population subgroups.

Students are faced with many choices for college preparation while in high school. To meet the State's college completion goals, high schools and colleges must partner to provide access to and support in college preparation strategies for high school students. Dual enrollment is an option that provides significant benefits for students, and in Tennessee, is a low-cost option because of state-provided funding. Continuous evaluation of the dual enrollment program is crucial as the program grows and changes. Ongoing research into topics such as the impact of dual enrollment subjects will aid in continuous improvements in the implementation of the dual enrollment program.

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APPENDIX: Supporting Tables

**Table 13**

*Individual Course Subjects in General Education Subject Categories*

| Subject Category<br><i>Course Subjects Included</i> | Subject Category<br><i>Courses Subjects Included</i> |
|-----------------------------------------------------|------------------------------------------------------|
| Communications                                      | Natural Sciences                                     |
| <i>English Composition</i>                          | <i>Astronomy</i>                                     |
| <i>Speech</i>                                       | <i>Biology</i>                                       |
| History                                             | <i>Botany</i>                                        |
| <i>History</i>                                      | <i>Chemistry</i>                                     |
| Humanities/Fine Arts                                | <i>Environmental Science</i>                         |
| <i>Art</i>                                          | <i>Geography</i>                                     |
| <i>Art Appreciation</i>                             | <i>Physical Science</i>                              |
| <i>Art History</i>                                  | <i>Physics</i>                                       |
| <i>Black Studies</i>                                | <i>Science</i>                                       |
| <i>Ethics</i>                                       | Social/Behavioral Sciences                           |
| <i>Film</i>                                         | <i>Anthropology</i>                                  |
| <i>Humanities</i>                                   | <i>Economics</i>                                     |
| <i>Literature</i>                                   | <i>Geography</i>                                     |
| <i>Music</i>                                        | <i>Global Studies</i>                                |
| <i>Philosophy</i>                                   | <i>History</i>                                       |
| <i>Photography</i>                                  | <i>Mass Communications</i>                           |
| <i>Religion</i>                                     | <i>Political Science</i>                             |
| <i>Technology in Society</i>                        | <i>Psychology</i>                                    |
| <i>Theater</i>                                      | <i>Service Learning</i>                              |
| Mathematics                                         | <i>Sociology</i>                                     |
| <i>Mathematics</i>                                  | <i>Wellness</i>                                      |
|                                                     | <i>Women's Studies</i>                               |

**Table 14***Distribution of Students by Course Subject Combination*

|                              | Dual<br>Enrollment<br>Students | Percent of Dual<br>Enrollment<br>Students | Percent<br>Graduated in<br>three years |
|------------------------------|--------------------------------|-------------------------------------------|----------------------------------------|
| comm                         | 2,587                          | 21.65%                                    | 44%                                    |
| nongened                     | 1,456                          | 12.19%                                    | 30%                                    |
| math                         | 1,212                          | 10.14%                                    | 37%                                    |
| comm, math                   | 1,097                          | 9.18%                                     | 54%                                    |
| hist                         | 562                            | 4.70%                                     | 38%                                    |
| comm, ss                     | 484                            | 4.05%                                     | 49%                                    |
| ss                           | 371                            | 3.10%                                     | 38%                                    |
| comm, hist                   | 363                            | 3.04%                                     | 48%                                    |
| comm, nongened               | 362                            | 3.03%                                     | 48%                                    |
| comm, ss, math               | 295                            | 2.47%                                     | 63%                                    |
| comm, fa                     | 242                            | 2.03%                                     | 54%                                    |
| comm, math, nongened         | 208                            | 1.74%                                     | 63%                                    |
| comm, hist, math             | 200                            | 1.67%                                     | 59%                                    |
| math, nongened               | 144                            | 1.21%                                     | 49%                                    |
| comm, fa, ss                 | 133                            | 1.11%                                     | 54%                                    |
| comm, fa, math               | 130                            | 1.09%                                     | 61%                                    |
| comm, ss, nongened           | 120                            | 1.00%                                     | 59%                                    |
| fa,                          | 115                            | 0.96%                                     | 35%                                    |
| comm, fa, ss, math           | 103                            | 0.86%                                     | 61%                                    |
| ss, math                     | 97                             | 0.81%                                     | 44%                                    |
| comm, ss, hist               | 92                             | 0.77%                                     | 53%                                    |
| comm, fa, hist,              | 81                             | 0.68%                                     | 51%                                    |
| comm, ss, math, nongened     | 77                             | 0.64%                                     | 56%                                    |
| hist, math                   | 70                             | 0.59%                                     | 40%                                    |
| comm, fa, hist, math         | 66                             | 0.55%                                     | 58%                                    |
| comm, ss, hist, math         | 60                             | 0.50%                                     | 63%                                    |
| comm, ns, math               | 49                             | 0.41%                                     | 53%                                    |
| comm, fa, nongened           | 48                             | 0.40%                                     | 46%                                    |
| ns                           | 47                             | 0.39%                                     | 40%                                    |
| ss, nongened                 | 47                             | 0.39%                                     | 30%                                    |
| comm, ns                     | 45                             | 0.38%                                     | 42%                                    |
| ss, hist                     | 43                             | 0.36%                                     | 53%                                    |
| comm, fa, ss, hist           | 42                             | 0.35%                                     | 64%                                    |
| fa, ss                       | 42                             | 0.35%                                     | 43%                                    |
| comm, hist, math, nongened   | 38                             | 0.32%                                     | 68%                                    |
| comm, fa, ss, math, nongened | 37                             | 0.31%                                     | 57%                                    |



|                                        |    |       |      |
|----------------------------------------|----|-------|------|
| hist, nongened                         | 37 | 0.31% | 54%  |
| comm, hist, nongened                   | 36 | 0.30% | 44%  |
| comm, fa, ss, hist, math               | 34 | 0.28% | 50%  |
| comm, fa, math, nongened               | 31 | 0.26% | 71%  |
| comm, ss, hist, nongened               | 31 | 0.26% | 61%  |
| comm, fa, ss, hist, math, nongened     | 28 | 0.23% | 75%  |
| comm, hist, ns, math                   | 28 | 0.23% | 57%  |
| comm, fa, ss, nongened                 | 28 | 0.23% | 50%  |
| ns, math                               | 27 | 0.23% | 33%  |
| comm, fa, ss, hist, ns, math, nongened | 26 | 0.22% | 85%  |
| fa, math                               | 25 | 0.21% | 56%  |
| comm, ss, ns, math, nongened           | 23 | 0.19% | 61%  |
| fa, ss, hist                           | 21 | 0.18% | 57%  |
| fa, hist                               | 20 | 0.17% | 45%  |
| fa, nongened                           | 19 | 0.16% | 68%  |
| comm, ns, math, nongened               | 19 | 0.16% | 47%  |
| comm, hist, ns                         | 18 | 0.15% | 33%  |
| ss, math, nongened                     | 17 | 0.14% | 65%  |
| comm, fa, hist, math, nongened         | 16 | 0.13% | 69%  |
| comm, fa, ss, ns, math, nongened       | 14 | 0.12% | 79%  |
| comm, ss, hist, ns, math, nongened     | 13 | 0.11% | 85%  |
| comm, ns, nongened                     | 12 | 0.10% | 67%  |
| comm, fa, hist, ns, math, nongened     | 11 | 0.09% | 73%  |
| comm, fa, ss, hist, nongened           | 11 | 0.09% | 64%  |
| fa, ss, nongened                       | 11 | 0.09% | 64%  |
| fa, ss, math                           | 11 | 0.09% | 55%  |
| ss, hist, math                         | 11 | 0.09% | 55%  |
| comm, ss, hist, math, nongened         | 9  | 0.08% | 100% |
| fa, ss, hist, math                     | 9  | 0.08% | 89%  |
| comm, fa, ss, hist, ns, math           | 10 | 0.08% | 80%  |
| ss, hist, nongened                     | 9  | 0.08% | 67%  |
| hist, ns                               | 9  | 0.08% | 22%  |
| comm, hist, ns, math, nongened         | 8  | 0.07% | 75%  |
| hist, math, nongened                   | 8  | 0.07% | 75%  |
| fa, math, nongened                     | 8  | 0.07% | 50%  |
| comm, fa, hist, ns, math               | 8  | 0.07% | 38%  |
| comm, ss, ns                           | 8  | 0.07% | 38%  |
| comm, fa, hist, nongened               | 7  | 0.06% | 100% |
| comm, ss, ns, math                     | 7  | 0.06% | 86%  |
| comm, fa, ns                           | 7  | 0.06% | 71%  |
| comm, fa, ns, math, nongened           | 7  | 0.06% | 71%  |
| ss, ns, math                           | 6  | 0.05% | 67%  |
| ns, nongened                           | 6  | 0.05% | 50%  |

|                                  |   |       |               |
|----------------------------------|---|-------|---------------|
| ns, math, nongened               | 5 | 0.04% | 100%          |
| fa, ss, hist, math, nongened     | 5 | 0.04% | 60%           |
| comm, ss, ns, nongened           | 5 | 0.04% | 40%           |
| ss, hist, math, nongened         | 5 | 0.04% | 20%           |
| fa, ss, math, nongened           | 5 | 0.04% | 0%            |
| comm, fa, ss, ns, nongened       | 4 | 0.03% | data removed* |
| fa, hist, math                   | 4 | 0.03% | data removed* |
| fa, hist, nongened               | 4 | 0.03% | data removed* |
| ss, ns                           | 4 | 0.03% | data removed* |
| comm, fa, ns, math               | 3 | 0.03% | data removed* |
| comm, fa, ss, hist, ns, nongened | 3 | 0.03% | data removed* |
| comm, fa, ss, ns, math           | 3 | 0.03% | data removed* |
| fa, ss, hist, nongened           | 3 | 0.03% | data removed* |
| hist, ns, math                   | 3 | 0.03% | data removed* |
| comm, fa, hist, ns, nongened     | 2 | 0.02% | data removed* |
| comm, fa, ns, nongened           | 2 | 0.02% | data removed* |
| comm, fa, ss, hist, ns           | 2 | 0.02% | data removed* |
| comm, fa, ss, ns                 | 2 | 0.02% | data removed* |
| comm, hist, ns, nongened         | 2 | 0.02% | data removed* |
| comm, ss, hist, ns, math         | 2 | 0.02% | data removed* |
| fa, ns, math                     | 2 | 0.02% | data removed* |
| fa, ss, hist, ns, math, nongened | 2 | 0.02% | data removed* |
| ss, ns, nongened                 | 2 | 0.02% | data removed* |
| comm, fa, hist, ns               | 1 | 0.01% | data removed* |
| comm, ss, hist, ns               | 1 | 0.01% | data removed* |
| fa, hist, math, nongened         | 1 | 0.01% | data removed* |
| fa, ns                           | 1 | 0.01% | data removed* |
| fa, ss, ns, nongened             | 1 | 0.01% | data removed* |
| ss, ns, math, nongened           | 1 | 0.01% | data removed* |

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\*Completion data for headcounts less than five were removed to protect student privacy.

Legend: comm = communications                      nongened = non-general education  
fa = humanities/fine arts                              ns = natural sciences  
hist = history                                              ss = social/behaviorial sciences  
math = mathematics

## VITA

### VICTORIA NELL MELLONS

- Education: Doctor of Education in Educational Leadership, concentration in Higher Education Leadership, East Tennessee State University, Johnson City, TN, 2022
- Specialist in Education, Curriculum and Instruction, concentration in Secondary Education, Tennessee Technological University, Cookeville, TN, 2009
- Master of Arts in Education, Curriculum and Instruction, concentration in Curriculum, Tennessee Technological University, Cookeville, TN, 2005
- Bachelor of Science in Mechanical Engineering, Tennessee Technological University, Cookeville, TN, 1992
- Professional Experience: Middle Tennessee Director of Operations, SAILS Program, Tennessee Board of Regents, Nashville, TN, 2016 – present
- Field Coordinator, SAILS Program, Tennessee Board of Regents, Nashville, TN, 2015 – 2016
- High School Mathematics Teacher, Warren County High School, McMinnville, TN, 2007 – 2015
- Senior Mechanical Engineer, Quality Department, Carrier Corporation, McMinnville, TN, 2000 – 2005
- Senior Mechanical Engineer, Manufacturing Support – Acetate Tow Division, Eastman Chemical Company, Kingsport, TN, 1992 – 2000