# Living the Mission: Knowing Your Students and Tracking Milestones Toward Student Success at Nashville State Community College

by

Nathan Bell, Melissa Irvin, and Anthea Sweeney

A CAPSTONE REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF EDUCATION

IN

HIGHER EDUCATION LEADERSHIP AND POLICY

# Table of Contents

# List of Appendices

# List of Tables

# List of Figures

# Executive Summary

This report and the underlying study constitute a significant part of Nashville State Community College's ("NSCC" or "Nashville State") mobilization to improve its educational outcomes in light of its democratic educational mission, as well as the current environment of heightened accountability in higher education. The report responds to NSCC's request for an analysis of historical student data to identify potential opportunities to improve its program completion rates. Specifically, the purely quantitative study utilized logistic regression to analyze a sample of 9,422 anonymous student records for individuals enrolled over the course of seven academic years at NSCC, thereby creating models predicting the likelihood of completing an associate degree or a certificate based on criteria falling into one or more of the following categories: demographic data in the form of diverse subpopulations and academic criteria identified in extant literature as relevant to program completion in the community college setting.

The demographics of interest based on NSCC's very diverse student body included the following:

- First generation students
- Adult learners
- Race
- Low-income students
- English language learners
- Part-time students
- Remedial/developmental students
- Gender
- Degree-seeking status

From these demographics, several independent variables were derived, later referred to in this report as "subpopulation" variables.

The academic criteria of interest emanating both from extant literature as well as the work of the Access to Success Initiative included the following:

- Academic preparation
- Continuous enrollment
- Summer enrollment
- Completion of 80% of coursework attempted in the first year
- Completion of College Math in the first year
- Completion of College Writing in the first year
- Completion of a student success course in the first year
- Completion of remedial/developmental requirements in the first year

From these academic criteria, several additional independent variables were derived, later referred to in this report as "milestone" variables.

The project team sought to answer three important study questions:

1.) Which milestones have a significant impact on program completion at NSCC?
2.) Are specific subpopulations less likely to complete a program based on certain attributes?
3.) Does the impact of these milestones vary by specific subpopulations?

For purposes of answering the study questions, the concept of "program completion" was analyzed separately for associate degree completion and certificate completion.

The results identified several milestones with significant impact. Specifically, the project team found that, to varying degrees but in the following order, summer enrollment, completion of 80% of coursework attempted in the first year, completion of College Math in the first year, and academic preparation as measured by COMPASS Math placement and COMPASS Writing placement were *positively associated* with associate degree completion, while completion of remedial/developmental requirements in the first year, continuous enrollment, and completion of a Student Success Course in the first year were *negatively associated* with associate degree completion. For certificate completion, the project team again found that, to varying degrees but in the following order, completion of 80% of coursework attempted in the first year and summer enrollment were *positively associated* with that outcome. However, completion of College Writing in the first year and continuous enrollment were *negatively associate*d with certificate completion.

As to NSCC's subpopulations, the project team found that degree-seeking students, adult learners, remedial/developmental students, and first generation students were, all things being equal, *more likely* to complete associate degrees, while students identified as Other Races, Black, English language learners, and part-time students, were *less likely* to accomplish that goal. For certificate completion, the project team found that degree-seekers and low-income students were *more likely* to complete, while English language learners were *less likely* to accomplish that goal.

Finally, the various interactions of the subpopulation and milestone variables in the logistic regression used to answer the third study question revealed several important findings. For associate degree completion, the following interactions were *positively associated* with that goal: degree-seeking students who continuously enroll, part-time students who complete College Math in the first year, remedial/developmental students who are also part-time students, and part-time students who enroll during the summer. Conversely, the following interactions were *negatively associated* with associate degree

completion: adult learners who enroll during summer, part-time students who complete 80% of courses attempted in the first year, first generation students who are also degree-seeking students, and remedial/developmental students who are also degree-seeking students. For certificate completion, English language learners who complete College Writing in the first year were *positively associated* with accomplishing that goal, while degree-seeking students who complete College Writing in the first year were *negatively associated* with doing so.

The implications of these results are significant for NSCC in terms of identifying several opportunities for the institution to capitalize upon existing strengths, while targeting areas in need of further evaluation and improvement. This report offers interpretations of these findings based on extant literature and provides several recommendations designed to provide NSCC with guidance on how to make the most efficient use of its limited resources to significantly improve its outcomes in the area of associate degree and certificate completion.

The primary recommendations to NSCC include:

- Using data to drive decisions (e.g., adopting strategies designed to increase summer enrollment for both associate degree and certificate students);
- Improving student access to clear, relevant, and actionable information regarding their academics; and
- Implementing multiple strategies to enhance student engagement and foment a deeper commitment to college.

# Introduction

## Scope of the Project

Nashville State Community College requires assistance identifying factors which generate positive outcomes for college completion for its student population as a whole and for specific subpopulations of interest. Nashville State recently joined the Access to Success Initiative, a consortium of institutions set on improving college completion for underrepresented minorities and low-income students. The consortium has identified key milestones that institutions can track to improve the completion rates of at-risk student populations. This study will measure the impact of many of the Access to Success milestones as well as additional factors, including membership in certain subpopulations, on eventual college completion at Nashville State in order to guide future institutional decisions on valuable targets for investment.

## Key Problem and Study Questions

The current recession in the United States has highlighted the importance of postsecondary education for securing employment. President Obama has established a goal for America to rank first in the world in the number of people with college degrees by 2020. However, this focus on postsecondary education comes at a time of declining state appropriations for higher education across the country (Rhoda, 2011). The economic situation in Tennessee mirrors the national crisis. In order to contribute to the ambitious national goal for educational attainment, the state must find an effective way to produce more degrees in light of shrinking resources. Overall, Tennessee has been relatively successful at enrolling students into postsecondary education. However, students have not been completing programs at a rate comparable to enrollments. According to Complete College Tennessee (2011), for every 100 ninth graders in the state, 67 graduate from high school, 43 of whom enroll in postsecondary institutions. However, only 19 of these 43 students complete postsecondary studies within six years of graduating from high school (Complete College Tennessee, 2011).

Increasing completion percentages for community college students in all states has been a policy priority both at the state and national levels. However, according to Engle and Lynch (2009), less than one-third of all students entering two-year institutions in the Access to Success systems complete either a certificate or associate degree or transfer to a four-year college within the system. Although students at many Tennessee community colleges have struggled from a completion standpoint, NSCC has had even more difficulty in producing graduates than its peers. The six-year associate degree graduation rate for NSCC's 2005 student cohort was 21.1%,

compared to a 26% average rate for other Tennessee community colleges during the same year (Tennessee Higher Education Commission, 2011-2012). The table below shows the six-year associate degree graduation rates for NSCC's Fall cohorts from 1996-2005 (Tennessee Higher Education Commission, 2011-2012).

**Table 1**

| NSCC Fall Cohort Completion Rates | |
|---|---|
| **Year** | **Rate** |
| 1996 | 19.7% |
| 1997 | 17.2% |
| 1998 | 17.8% |
| 1999 | 19.8% |
| 2000 | 19.8% |
| 2001 | 22.1% |
| 2002 | 22.6% |
| 2003 | 23.2% |
| 2004 | 23.6% |
| 2005 | 21.1% |

*Source: Tennessee Higher Education Commission (2011-2012)*

Because higher education levels are correlated with greater earnings, lower unemployment rates, and increased job growth (Complete College Tennessee, 2011), improving completion percentages at NSCC is imperative for the well-being of its students and the institution itself. Forty-four percent of all jobs in Tennessee will require some postsecondary training beyond high school by 2018 (Complete College Tennessee, 2011). Seven of the 10 currently fastest growing occupations in Tennessee require postsecondary education (Complete College Tennessee, 2011). In 2010, 29.3% of adult Tennessee residents had at least an associate degree, which ranked 43rd nationally (Tennessee Higher Education Commission, 2012). In addition, the *New Economy Index*, which measures the extent to which state economies are globalized and knowledge-based, ranked Tennessee 41st in the nation during 2010 (Tennessee Higher Education Commission, 2012). As the demand for an educated workforce increases, NSCC must produce graduates capable of competing for jobs.

From a policy standpoint, the Complete College Tennessee Act (CCTA) of 2010 was designed to address deficits in college completion rates in the state (Tenn. Code §§49-7-202 *et seq*., 2010). Under the CCTA, the Tennessee Higher Education Commission (THEC) was charged with developing and making recommendations for the implementation of a statewide master plan for higher education.

In conjunction with the CCTA, THEC developed an outcomes-based funding formula designed to both reinforce and incentivize the goals of the statewide master plan. The formula determines the allocation of state funding among Tennessee's two-year and four-year public higher education institutions and takes into account the unique characteristics of each institution, while assigning weighted values across a range of variables tied to productivity improvements (Complete College Tennessee Act, 2010). Thus, instead of rewarding institutions for the enrollment of students, the new funding formula links state appropriations to outcome variables.

The formula provides performance funding based on program and institutional quality, whereby institutions can gain additional funds (up to 5.45% of appropriations) for student success on national exams in major fields and general education, as well as for institutional success in program accreditation and qualitative program review (Tennessee Higher Education Commission, 2011). Before the change to the outcomes-based funding formula in 2010, NSCC received considerable appropriations simply because its enrollment numbers ranked in the top quarter of all community colleges in Tennessee. However, with outcomes now being rewarded under the new funding system, NSCC must make program completion a priority in order to receive the state appropriations needed to be successful. The following table shows the funding formula weights given to specific outcome variables for NSCC in 2011-2012.

**Table 2**

| 2011-2012 NSCC Outcome Funding Formula Variable Weights | |
|---|---|
| **Outcome Variables** | **Weights** |
| Students Accumulating 12 hours | 4% |
| Students Accumulating 24 hours | 5% |
| Students Accumulating 36 hours | 6% |
| Dual Enrollment | 5% |
| Associate Degrees | 20% |
| 1 to 2 Year Certificates | 7% |
| Less than 1 Year Certificates | 13% |
| Job Placements | 10% |
| Remedial and Developmental Success | 10% |
| Transfers Out | 10% |
| Workforce Training | 5% |
| Awards per FTE | 5% |

*Source: Tennessee Higher Education Commission (2011-2012)*

The following table displays outcome variable data by the individual year for NSCC from 2008-2011. A few interesting trends can be seen. First, although the number of 1 to 2 year certificates has decreased since 2008, the number of less than 1 year certificates, which are weighed more heavily in the funding formula than 1 to 2 year certificates, has increased over the same time period. In addition, remedial and developmental success has been on the rise while, at the same time, the number of awards given per FTE has been on the decline.

**Table 3**

| NSCC Individual Year Outcome Variable Data (2008-2011) | | | |
|---|---|---|---|
| | **Years** | | |
| **Outcome Variables** | **2008-2009** | **2009-2010** | **2010-2011** |
| Students Accumulating 12 hours | 3293 | 3984 | 3389 |
| Students Accumulating 24 hours | 2150 | 2814 | 2748 |
| Students Accumulating 36 hours | 1733 | 2076 | 2076 |
| Dual Enrollment | 790 | 926 | 1092 |
| Associate Degrees | 523 | 484 | 515 |
| 1 to 2 Year Certificates | 71 | 37 | 36 |
| Less than 1 Year Certificates | 46 | 114 | 140 |
| Job Placements | 268 | 258 | 263 |
| Remedial and Developmental Success | 2267 | 1593 | 2852 |
| Transfers Out | 585 | 667 | 658 |
| Workforce Training (i.e., Contact Hours) | 48,134 | 67,613 | 32,948 |
| Awards per FTE | 11.93 | 8.73 | 8.64 |

*Source: Tennessee Higher Education Commission (2011-2012)*

Given the importance of community college graduation in light of national and state policy goals, the purpose of the current study was to determine whether certain student characteristics (i.e., subpopulations and milestones) impact associate degree and certificate program completion at NSCC. In addition, the study analyzed whether members of certain subpopulations (e.g., first generation students, part-time students, remedial/developmental students, etc.) are less likely to complete NSCC academic programs as well as whether the impact of these milestones vary by specific subpopulation.

The results of the study will assist NSCC in developing policies tailored to certain subpopulations and focused on relevant milestones in order to increase program completion at the institution. With monetary resources for NSCC at a premium, it is imperative for the institution to invest in initiatives that will yield the highest returns. Below are the three study questions that were addressed in our research:

1.) Which milestones have a significant impact on program completion at NSCC?
2.) Are specific subpopulations less likely to complete a program based on certain attributes?
3.) Does the impact of these milestones vary by specific subpopulations?

**Nashville State Community College Profile**

Against this backdrop, Nashville State Community College provides an ideal institution to assess how an alternative model of measuring milestones and momentum points, such as that articulated by Leinbach and Jenkins (2008), might be used to predict successful outcomes. Nashville State opened in 1970 under the name "Nashville State Technical Institute". In 1984, Nashville State joined the Tennessee Board of Regents (TBR) system of state universities and community colleges. The governor of Tennessee and the Tennessee General Assembly expanded the mission of Nashville State to a comprehensive community college in 2002. The mission of Nashville State is below:

*The mission of Nashville State Community College is to provide comprehensive educational programs and partnerships, exemplary services, an accessible, progressive learning environment, and responsible leadership to improve the quality of life for the community it serves. The college serves a broad geographic area comprised of Davidson, Cheatham, Dickson, Houston, Humphreys, Montgomery, and Stewart Counties, and the Upper Cumberland region* (Nashville State Community College, 2012).

The institution boasts campuses in 9 counties including a main campus in Nashville, Tennessee. Nashville State has received local accolades for being the "Best Place for Continuing Education" since 1998. The institution's diversity statement substantiates its open access orientation as it seeks to, among other things, "maintain a campus environment that…[is] representative of the cultural and racial diversity of the communities it serves and that prepares students to engage in this society" (Nashville State Community College, 2012).

Currently, the institution offers over 80 academic concentrations in several different degree programs including Associate of Applied Science (A.A.S), Associate of Arts (A.A), Associate of Science (A.S), and Associate of Science in Teaching (A.S.T) as well as technical and general

education certificates. Students earning an A.A., A.S., and A.S.T degree have completed their general education core and are able to transfer into a TBR four-year institution to earn a bachelor's degree.

NSCC's student population in Fall 2011 was 9,883 (raw headcount) or 5,686 full-time equivalents. In terms of racial diversity, 58% of its student population were Caucasian, while 32% were African-American, 3.2% were Hispanic, and 3.6% identified as Other (Tennessee Higher Education Commission, 2011-2012). As part of its mission, NSCC also aspires to leverage this diversity to "enhance [students'] sense of community with mutual trust and respect for people from all backgrounds, including international and American cultures...and offer co-curricular and out-of-classroom activities that provide opportunities for educationally purposeful interaction that enhance learning and personal development, including intellectual, cultural, social, ethical, physical, and emotional development" (Nashville State Community College, 2012).

A few characteristics in particular distinguish NSCC from its counterparts within the state of Tennessee. NSCC educates the lowest percentage students at full-time enrollment status of all Tennessee community colleges (57.5%). It also has the second lowest percentage of first-time freshmen (15.4%). NSCC has the third highest percentage of Pell-eligible students (41.2%) and the highest state-wide percentage of adult learners (52.2%). NSCC also enrolls the highest percentage of resident alien students (1.3%) while educating the third lowest percentage of students in remedial or developmental courses (19.3%). It also has the lowest percentage of students with ACT scores (52.5%) (Tennessee Higher Education Commission, 2011-2012).

While these numbers tell a story of diversity consistent with the open access mission of a community college, they also come at a cost when NSCC's graduation rates are more closely examined. The next section will present the methodology for the study by first introducing the variables and rationale for selection.

# Methodology for All Study Questions

## Study Variables

All three of the study questions include specific independent variables divided into two categories: subpopulations and milestones. The following rationale, based on relevant literature, supports our decision for selecting and categorizing the respective independent and outcome variables.

## Rationale for Independent Variables: Subpopulations

Taken as a whole, the Nashville State student population is quite diverse in terms of demographic characteristics. Although the current study was interested in associate degree and certificate completion for the overall campus, several key subpopulations (listed in Table 4), determined by conversations with Nashville State and relevant literature, were of particular interest. Please refer to Appendix A for how the subpopulation variables were operationalized for our particular study. The following will provide rationale for the inclusion of specific subpopulations supported by research findings.

**Table 4**

| Independent Variables of Interest: Subpopulations |
|---|
| First Generation Student |
| Adult Learner |
| Race |
| Low-Income Student |
| English Language Learner |
| Part-Time Student |
| Remedial/Development Student |
| Gender |
| Degree-Seeking Status |

### *First Generation Student*

First generation students were selected as an important subpopulation because many individuals in this particular group confront specific challenges to completing college (Goldrick-Rab, 2007; Karp & Bork, 2012). Generally speaking, first generation students often work while enrolled in college and frequently disrupt their studies to take care of family members (Nunez & Cuccaro-Alamin, 1998). Often lacking social and cultural capital, first generation students are unlikely to have the "cultural repertoires" necessary to successfully conform to the often tacit rules of community college success (Karp & Bork, 2012, p. 2). First generation students often lack the ability to access individuals in their networks who can teach them the prescribed college norms (Karp & Bork, 2012). Given these challenges, first generation community college students have been shown to complete academic programs at lower rates than students

whose family members have attended college (Bailey, Jenkins, & Leinbach, 2005). Given the literature, first generation students were chosen for the study to determine whether being a member of this subpopulation impacted academic program completion at Nashville State.

***Adult Learner***

Adult learners were selected as a subpopulation of interest due to the high percentage of this student demographic attending Nashville State (52% at NSCC vs. 39% across the rest of Tennessee community colleges). Research has shown that adult learners enroll in community colleges at rates almost double that of their four-year institution enrollment rates while tending to earn higher GPAs and having better aptitude and psychosocial scores than do traditional-aged students (Calcagno, Crosta, Bailey, & Jenkins, 2007; Capps 2012). However, adult learners have been found to be less likely to complete a degree or certificate at community colleges than traditional-aged students (Choy, 2002). In contrast, Calcagno et al. (2007) observed that, after controlling for cognitive mathematics ability, adult learners were more likely than younger students to graduate, even when controlling for enrollment intensity status.

From a challenges standpoint, balancing work, family, and school is a significant barrier confronted by adult learners (Choy, 2002; Dayton, 2005). Adult learners often maintain financial independence, work part-time, have dependents, obtain GEDs, prefer occupational programs to academic ones, and seek occupational certificates rather than associate degrees or transfer to a four-year institution (Calcagno et al., 2007). Given the significance of this population for Nashville State and the findings in the literature, adult learners were selected as a subpopulation of further inquiry in terms of associate degree and certificate completion.

***Race***

Race was an additional subpopulation chosen for the study specifically because of research on the academic performance of underrepresented minority students. Despite the open access mission of community colleges, underrepresented minorities often fall short on measures of academic success (Engle & Lynch, 2009). In fact, gaps exist for earning a certificate (11% gap compared to non-minorities), earning an associate degree (10% gap compared to non-minorities), or transferring to a four-year institution (4% gap compared to non-minorities) (Engle & Lynch, 2009). Only 20% of underrepresented minority freshmen earn a certificate, earn an associate degree, or transfer to a four-year institution within four years, compared with 33% of their non-minority peers (Engle & Lynch, 2009).

Several factors have been cited as barriers to academic program completion for underrepresented minorities, including familial support and expectations, economic considerations, level of familiarity with the system, cultural understanding, as well as

relationships with feeder schools and institutions (Hawley & Harris, 2005-2006). The need for mentoring programs (Pope, 2002) and the establishment of learning communities (Barbatis, 2010; McClenney & Waiwaiole, 2005) have been advocated to help foster a climate of success for students from diverse backgrounds. With the high number of non-White students at Nashville State (approximately 40%), this subpopulation is particularly relevant and was included in the analysis of academic program completion.

***Low-Income Student***

Students from low-income backgrounds were also chosen as a subpopulation for the study. Given the fact that low-income students already lag behind their middle- and high-income peers in terms of college participation rates, the rise in higher education costs certainly affects low-income students to a greater degree than students from more affluent backgrounds (Haycock, 2006). Low-income students often attend resource-poor secondary schools (Burns, 2010; Kuh, Kinzie, Schuh, Whitt, & Associates, 2005; Jacobson & Mokher, 2009) and lack the social capital necessary to be successful in college (Karp, O'Gara, & Hughes, 2008).

From a completion standpoint, low-income students at two-year colleges were less likely to earn a credential or transfer to a four-year institution than their high socioeconomic status counterparts (Bailey et al., 2005; Jenkins & Weiss, 2011). In addition, 60% of low-income students cited financial difficulty resulting from having to bear the full monetary burden of their education as the determinative factor in not completing their degrees (Johnson, Rochkind, Ott, & DuPont, n.d.). In light of these literature findings, low-income students were selected as a subpopulation of interest for the study, especially given the fact that over one-third of the students at Nashville State come from low-income situations.

***English Language Learner***

English language learners (ELL), or those whose native language is not English, face many of the same concerns of low-income students, first-generation students, and underrepresented minorities when it comes to degree completion. ELL students are often caught in a "double academic bind", arising from their dual at-risk categorization as both pre-college students and remedial students (Tonge, 2011, p. 2). This renders them subject to enrollment in additional hours of coursework that do not count for a degree, making it more difficult and time-consuming to earn a credential.

According to Patthey-Chavez, Dillon, and Thomas-Siegel (2005), "a large segment of the ELL population, particularly for beginning levels of the discipline, begins and ends its community college studies in the ELL program" (p. 271). In addition, a study by Jenkins and Weiss (2011) found that only 5% of ELL students had earned a college credential, transferred, or remained enrolled with over 45 earned credits seven years after initial enrollment. A key factor in

assessing academic program completion is measuring the motivation and intention behind community college enrollment for ELL students (Jenkins & Weiss, 2011). Given the literature findings and the importance of the group to Nashville State, the ELL subpopulation was included in the study's assessment of academic program completion.

***Part-Time Student***

Student enrollment status (i.e., part-time vs. full-time enrollment) was also investigated as an additional subpopulation. Community college students regularly enroll part-time in order to provide life balance. In fact, almost two-thirds of community college students attend on a part-time basis (Kazis & Liebowitz as cited in Dayton, 2005). Around half of part-time enrolled community college students identify their employment, not school, as their primary focus, as compared to one-quarter of students from four-year institutions (Horn, Becktold, & Malizio as cited in Brint, 2003).

From an outcomes perspective, enrolling in community college part-time has shown a negative association with program completion. Jacobs and King (2002) found that part-time enrollment, even more so than student age, accounted for lower rates of completion among older students. In addition, community college students who start full-time are more likely than part-time students to complete a credential and persist in college over the first three years (College Board, 2012).

A limitation for current research at community colleges is that most studies use first-time, full-time enrolled students as their unit of analysis (Dellow & Romano, 2002). According to the National Center for Educational Statistics (NCES) (2011), first time, full-time degree-seeking students made up only 7% of all students attending a community college for credit during the 2008-2009 academic year. With a majority of community college students enrolling on a part-time basis, the inclusion of only full-time enrolled students eliminates a meaningful group from the analysis and may not yield an accurate representation of what is occurring on campus from a completion standpoint. In order to provide a more holistic view of outcomes, our study included both part-time and full-time students in the analysis to better understand associate degree and certificate program completion at Nashville State.

***Remedial/Developmental Student***

An additional subpopulation of interest for the study included students identified as needing remedial or developmental education courses upon enrolling at Nashville State. Of first-time students at public two-year colleges in 1999-2000, 30.4% of students reported taking at least one remedial course (Sparks & Malkus, 2013). In addition, Sparks and Malkus (2013) found that first-year students in associate degree programs had a higher percentage of students taking remedial courses than first-year students in certificate programs.

Research on the impact of being a remedial student has been mixed: Remedial students have been shown to be more successful in completing college level courses but also may be less likely to complete a degree (Calcagno et al., 2007; Goldrick-Rab, 2007; Leinbach & Jenkins, 2008; Barbatis, 2010; Offenstein, Moore, & Shulock, 2010). Bailey and Morest (as cited in Burns, 2010) found low completion rates and high dropout rates for students enrolled in remedial courses. In addition, according to Bailey et al. (2005), students required to take remedial classes are less likely to complete any type of community college credential. Hoyt (1999) observed that as the number of areas needing remediation (i.e., Math, Reading, etc.) increased for community college students, departure rates from the institution also rose.

In contrast, Jepsen (as cited in Crisp & Nora, 2010) observed a positive correlation between enrolling in developmental courses and returning to the institution for a second year. Also, Crews and Aragon (2004) found that completion rates of community college students were similar between students enrolled in a developmental writing course during their first semester and students not enrolled in such a course. Given the research findings and importance of facilitating positive outcomes for remedial students, this subpopulation was included in the study to analyze whether membership impacted completion rates.

***Gender***

Given a recent shift in completion rates, gender was a subpopulation chosen for analysis. Since the early 1990s, "more young women than young men have been completing college" (Wang & Parker, 2011, p. 9). Although women are enrolling in college at higher rates, men are more likely to begin their postsecondary education at a community college (Goldrick-Rab, 2007). In addition, male community college students are more likely than female students to transfer to a four-year institution; yet, of students who do transfer, females are more likely to complete the bachelor's degree (Bailey et al., 2005).

From a retention perspective, gender does not seem to play a large part in whether community college students decide to stay enrolled in school (Fike & Fike, 2008; Craig & Ward, 2008). However, from a completion standpoint, gender differences do appear to exist. Male students continue to fall behind females in terms of program completion at all educational stages: from primary through postsecondary levels (Sum et al., 2003). The growth rate from 1989-1990 to 1999-2000 in the amount of associate degrees awarded to women was 29% compared to 18% for men (Sum et al., 2003). In 2000, women earned 151 associate degrees for every 100 associate degrees earned by men (Evelyn, 2002). According to the NCES (2012), the percentage of associate degrees earned by females increased from 60% in 1999-2000 to 62% in 2009-2010. With evidence in the literature of increasing

graduation rates for female community college students, the study investigated whether gender had a significant impact on completing an associate degree or certificate program at Nashville State.

***Degree-Seeking Status***

The final subpopulation in the study involved the degree-seeking status of students at Nashville State. Community college students are rather unique in that their reasons for enrollment (i.e., graduation, transfer, develop job skills, learn English, etc.) often vary (Jenkins & Weiss, 2011; Dellow & Romano, 2002). In addition, students from certain subpopulations (e.g., underrepresented minorities) may not relate with traditional definitions of academic success (e.g., graduation, program completion, etc.), especially if they have other goals for enrolling in community college (Harbour, Middleton, Lewis, & Anderson, 2003).

Among the general population, 90% of community college students enter with the intention of earning a credential or transferring to a four-year institution (Goldrick-Rab, 2007; Hoachlander, Sikora, & Horn, 2003). However, among two-year college students in 1995-1996 with intent to graduate, only 26% of students had completed their program of study by 2001 (Goldrick-Rab, 2007). Simply self-identifying as a degree-seeker upon initial enrollment at a community college does not appear to be a clear indication of future student behavior (Morgan as cited in Goldrick-Rab, 2007). Given the research findings, degree-seeking status was included in the study to analyze whether membership affected academic program completion for Nashville State students.

**Rationale for Independent Variables: Milestones**

The use of an additional group of independent variables (i.e., milestones) in this study is another important recent development in research on outcomes in higher education. With the shift towards assessing postsecondary educational outcomes, researchers have worked to define what constitutes successful results in college and what factors can positively support those outcomes. Unfortunately, much of the data on outcomes in college focuses on measuring only two benchmarks: the "start" (i.e., the level of academic preparation) and the "finish" (i.e., degree completion) (Calcagno et al., 2007). However, for the past ten years, literature centered on educational outcomes at community colleges has increasingly recommended the use of progress indicators that are successfully and unsuccessfully completed during a student's enrollment (Alfonso, Bailey, & Scott, 2005; Calcagno et al., 2007; Leinbach & Jenkins, 2008; Offenstein et al., 2010; Attewell, Heil, & Reisel, 2012). Based on this and other research, the following rationale will introduce the specific milestone variables (listed in Table 5) used in the study. Please refer to Appendix A for how the milestone

variables were operationalized for our particular study.

**Table 5**

| Independent Variables of Interest: Milestones |
|---|
| Academic Preparation |
| Continuous Enrollment |
| Summer Enrollment |
| Completing at least 80% of Courses Attempted in First Year |
| Completing College Math in First Year |
| Completing College Writing in First Year |
| Completing Student Success Course in First Year |
| Completing All Remedial/Developmental Courses in First Year |

***Academic Preparation***

Academic preparation is an important variable to consider in terms of its impact on program completion at Nashville State. To best assist students in meeting progress indicators, postsecondary institutions must understand the impact that prior academic performance can have on future achievements. Measures of high school academic performance have consistently been shown as a strong predictor of college enrollment as well as postsecondary academic success (Adelman, 2006; Goldrick-Rab, 2007; Burns, 2010; Porchea, Allen, Robbins, & Phelps, 2010). High school GPA and standardized test scores, common measures of academic preparation, are significantly linked to higher college GPAs as well as degree attainment (Burns, 2010; Porchea et al., 2010).

Adelman (2006) indicated "curricular intensity" (i.e., the academic requirements and rigor) as the most important factor in providing the academic resources necessary for postsecondary success. When evaluating the significance of proper academic preparation in the context of two-year institutions, the issue becomes even more challenging given the open access mission of community colleges. Since two-year institutions cannot become more academically selective without shifting their institutional mission, community colleges must discover ways to propel all students to academic success despite uneven starting points. For this study, academic preparation was used in the analysis to determine its influence on associate degree and certificate program completion at Nashville State.

***Continuous Enrollment***

Research indicates that being enrolled continuously improves the likelihood of reaching key momentum points as well as degree attainment (Adelman, 2006; Goldrick-Rab, 2007; Burns, 2010). Encouraging continuous enrollment is essential for the timely accumulation of credits, a key aspect of positive academic momentum (Offenstein et al., 2010). Even when evaluating 16 other variables, Adelman (2006) observed that continuous enrollment increased the likelihood of degree completion by 43%, including students who were enrolled part-time.

Students with breaks in enrollment had a 37.4% lower completion rate in certificate programs and a 10.7% lower completion rate in associate degree programs (Alfonso et al., 2005). However, for many community college students, challenges (e.g., tuition costs and full-time employment as well as family responsibilities) often inhibit their ability to remain enrolled continuously until degree completion (Goldrick-Rab, 2007). Given its positive association with program completion in the literature, the study included continuous enrollment as a key milestone variable for assessing associate degree and certificate completion at Nashville State.

***Summer Enrollment***

Another method that students may use to build positive academic momentum is summer enrollment. Taking courses during the summer allows students to complete additional credits if they are only enrolled part-time or to make up credit hours lost from failed or dropped courses (Offenstein et al., 2010). Summer classes have also been shown to improve persistence, which is a factor positively linked to continuous enrollment (Offenstein et al., 2010; Attewell et al., 2012). Students who earn at least four credit hours in the summer improve their chances of completing a degree, especially for African American students (Adelman, 2006). Attewell and others (2012) demonstrated a 7 to 16 point improvement in associate degree completion rates for students who completed summer school after their first year in college. Thus, summer enrollment was a variable of interest utilized in the study to determine the impact on academic program completion for students at Nashville State.

***Completing at least 80% of Courses Attempted in the First Year***

Connected to continuous enrollment, it is equally important that students are completing the courses they attempt. The ability to successfully earn credit hours creates academic momentum towards key milestones (Offenstein et al., 2010). In fact, students who withdrew or repeated at least 20% of their courses during the first year were 50% less likely to earn a certificate or an associate degree (Adelman, 2006). The same holds true when evaluating subpopulations: Traditional-aged students who completed at least 50% of attempted credits during their first year had a 15.5% increase in degree completion while adult learners showed an 11.5% improvement in graduation rates at the same progress indicator (Calcagno et al., 2007).

Earning fewer than 20 credit hours during the first year of enrollment can decrease the likelihood of completing a degree by one-third (Adelman, 2006). This momentum point (earning 20 or more credits during the first year) seems to be especially relevant for young, traditionally-aged students who see greater progress towards degree completion by earning more credits earlier in their college career (Calcagno et al., 2007). At two-year

institutions, students who earn fewer than 12 credit hours during the first term were between 8 and 13 points less likely to complete an associate degree (Attewell et al., 2012). The completion of at least 80% of courses attempted in the first year was included in the study as a milestone variable of interest as it pertains to impacting associate degree and certificate program completion at Nashville State.

***Gateway Courses***

In addition to academic preparation, continuous enrollment, summer enrollment, and the completion of at least 80% of courses attempted in the first year, other "gateway courses" have been shown to be essential to maintaining academic momentum (Leinbach & Jenkins, 2008; Offenstein et al., 2010). Researchers have begun to point towards this type of coursework (e.g., College Math, College Writing, student success courses, and developmental classes) as relevant for the success of students at two-year institutions (Leinbach & Jenkins, 2008; Burns, 2010; Offenstein et al., 2010).

College Math, College Writing, and student success courses have been labeled as "gatekeepers" that serve as a signpost for students as a measure of their aptitude and positive progress towards program completion (Goldrick-Rab, 2007). Leinbach and Jenkins (2008) found that students were three times more likely to reach a key milestone if they completed College Math and College Writing. Finishing a College Math course early during enrollment has yielded positive results on degree attainment (Offenstein et al., 2010). For remedial students, completing a first-year writing course may double the likelihood that these students will earn a degree (Calcagno et al., 2007). In addition, enrolling in a student success course early can provide students with access to college-related knowledge (e.g., study skills, program or transfer requirements, support services, etc.) that is essential for persistence and course completion (Burns, 2010). Student success courses have been shown in some studies to improve degree completion (Barbatis, 2010; Burns, 2010) and to be particularly salient for part-time students and adult learners (Offenstein et al., 2010).

When considering remedial/developmental course completion, these requirements have been shown to impede academic progress towards important outcomes, especially when students delay completion of those requirements past the first year (Offenstein et al., 2010) or if students falsely believe the courses count for college credit (Goldrick-Rab, 2007). On average, around two-thirds of students enrolled in remedial courses successfully complete these requirements (Goldrick-Rab, 2007). Completing developmental courses has been linked to improved retention and graduation rates, particularly at community colleges, where the vast majority of students are required to take at least one remedial course (Adelman, 2006; Burns, 2010). Fike and Fike (2008) identified the completion of

developmental Math as a significant predictor of retention for community college students. Given the literature findings, the gateway course variables of interest for this study included: (1) completion of College Math in the first year, (2) completion of College Writing in the first year, (3) completion of a student success course in the first year, (4) and completion of all remedial/developmental courses in the first year.

**Rationale for Outcome Variables**

Each of the three study questions also has two outcome variables: earned associate degree and earned certificate. As a community college, NSCC offers both technical certificate programs as well as a number of associate degrees (Nashville State Community College, 2012). According to the CCTA which, as stated previously, determines the sum total of state appropriations awarded yearly, the amount of certificates and associate degrees that students earn account for 40% of the overall amount of state appropriations awarded to Nashville State (Complete College Tennessee Act, 2010). Therefore, it is in the best interest of the institution to examine factors that affect completion in both areas. These outcome variables are also operationalized in Appendix A.

**Table 6**

| Outcome Variables of Interest |
|---|
| Earned Associate Degree |
| Earned Certificate |

**Data and Sampling for All Study Questions**

The Institutional Research Office at Nashville State provided archival student data from Sungard Banner, the institution's primary data management software for student records, for the project. Specifically, we received Fall semester enrollment data from Fall 2005, Fall 2006, Fall 2007, Fall 2008, Fall 2009, Fall 2010, and Fall 2011. All students who were enrolled at Nashville State during the respective Fall term were included in the data set.

In terms of the student population at Nashville State, the Fall enrollment numbers for each year are shown below:

**Table 7**
**NSCC Fall Enrollment Numbers by Academic Year**

| Fall Semester | Student Enrollment |
|---|---|
| Fall 2005 | 7,156 |
| Fall 2006 | 7,142 |
| Fall 2007 | 7,056 |
| Fall 2008 | 7,713 |
| Fall 2009 | 8,869 |
| Fall 2010 | 9,834 |
| Fall 2011 | 9,876 |
| **Total** | **57,646** |

We used a proportionate stratified random sampling method to create our study sample from the seven years of data provided by Nashville State. Based on feedback from Nashville State officials, one population of considerable interest to the institution was underrepresented minority students. Thus, race served as our stratum

for the sampling process in order to ensure the presence of the nine race subgroups within the sample. The nine race categories included: (1) Resident Alien, (2) Black Non-Hispanic, (3) American Indian/Alaskan Native, (4) Hispanic, (5) Asian, (6) White Non-Hispanic, (7) Unknown, (8) Pacific Islander, and (9) Two Races or More. However, for our eventual data analysis we paired the race categories down from nine to six: (1) Resident Alien, (2) Black Non-Hispanic, (3) Hispanic, (4) Asian, (5) White Non-Hispanic, and (6) Other Races (which combined the categories of American Indian/Alaskan Native, Unknown, Pacific Islander, and Two Races or More). We randomly selected 1,500 students from each year using the race percentages of the total enrollment. For example, if the Fall 2007 student population was 25% Black Non-Hispanic, we wanted to make sure that Black Non-Hispanic students in our Fall 2007 sample made up 25% of the sample. The sample yielded 10,500 students from the seven years of Fall enrollment data. However, there was a high probability that the same students could appear in multiple years (e.g., Fall 2007, Fall 2008, and Fall 2010). Thus, in order to prevent the same students from being included in the sample multiple times, the researchers, with the help of a student identification number, eliminated all students that appeared from multiple years, keeping only the entry for the earliest enrollment year. After eliminating multiple entries, the final student sample for the study yielded 9,422 students.

Table 8 shows percentages of our sample (9,422 students) and percentages of the overall population (57,646 students) in regard to our subpopulations of interest. It is important that the percentages are similar in order to generalize the study's findings to the overall Nashville State population.

**Table 8**

**Comparison of Subpopulation Distribution in Sample versus Population**

| Subpopulations | Percent of Sample (9,422 students) | Percent of Population (57,646 students) |
|---|---|---|
| First Generation Student | 31.3% | 32.7% |
| Adult Learner | 50.8% | 52.1% |
| Low-Income Student | 35.4% | 37.6% |
| English Language Learner | 7.4% | 7.7% |
| Remedial/Developmental Student | 55.2% | 55.7% |
| Gender | 58.8% Female | 59.5% Female |
| Part-Time Status | 73.5% | 74.0% |
| Race | 59.0% White Non-Hispanic<br>27.4% Black Non-Hispanic<br>6.8% Other Races<br>2.9% Asian<br>2.8% Hispanic<br>1.1% Resident Alien | 58.4% White Non-Hispanic<br>27.9% Black Non-Hispanic<br>7.0% Other Races<br>2.9% Asian<br>2.9% Hispanic<br>1.0% Resident Alien |
| Degree-Seeking Status | 81.6% Degree-Seeking | 84.7% Degree-Seeking |

# Data Analysis for All Study Questions

Because our outcome variables (i.e., completion of associate degree and certificate programs) are binary or categorical in nature, we chose to analyze the relationships between the multiple independent variables (i.e., subpopulations and milestones) and program completion through logistic regression. With the logistic regression model, we are able to show how the probability or likelihood of program completion changes based on our multiple independent variables.

Before addressing the data analysis methods for our particular study questions, it is important to discuss collinearity and the testing we did to address it. Because of the multiple subpopulations and milestones, we knew that there was a chance our variables included redundant information and could be highly correlated. Multicollinearity occurs when there are high correlations amongst multiple independent variables. When variables are collinear, "there is not enough distinct information in the variables for the multiple regression to operate properly" (Sweet & Grace-Martin, 2008, p. 165). In order to assess whether our independent variables were measuring similar constructs, we included all of our independent variables in a linear regression model and assessed collinearity. We ran two different linear regression models in this manner: one for completion of associate degree and one for completion of certificate program. Collinearity is measured by tolerance and variation inflation factor (VIF). The tolerance level "represents the proportion of variability that is not explained by the other independent variables in the regression model" (Andrews, 2007). The VIF is the reciprocal of tolerance and "measures the degree to which the interrelatedness of the variable with other predictor variables inflates the variance of the estimated regression coefficient for that variable" (Andrews, 2007). A large VIF indicates high multicollinearity between variables. In addition, as the tolerance gets closer to 0, the chance of multicollinearity between the variables increases. In general, if the tolerance for each variable is greater than .20 and the VIF is less than 10, the assumption is the variables are measuring unique constructs, and multicollinearity is not a substantial issue. We ran the collinearity tests for both our associate degree completion and certificate completion models. The results of the collinearity tests on both models do not indicate significant interrelatedness between the variables. Please refer to the collinearity tables in Appendix B for further information. The following will introduce the three study questions of interest.

# Study Question 1

## Statistical Model for Study Question 1

Our first study question asks: *Which milestones have a significant impact on program completion at Nashville State?* To address this question, we ran two different logistic regression models, one for associate degree completion and one for certificate program completion. Our independent variables in the regression included the subpopulations and milestones of interest, although this question was primarily focused on the impact of the milestones on program completion. In addition, we dummy coded our race variable to pull out specific races of importance (e.g., Black, Hispanic, Asian, Resident Alien, and Other Races). Whites were used as a comparison group and were not directly included in the regression model. In addition, we wanted to take into account the potential effects of having data from multiple years in the regression model. Thus, we dummy coded each year of data received in order to control for year. Fall 2005 was used as a comparison group and was not directly included in the regression model.

After running the two logistic regression models, we looked specifically at the logistic regression coefficient, the odds ratio, and the statistical significance level for each milestone. The logistic regression coefficient shows the direction and strength of the relationship between the milestones and program completion, similar to a correlation coefficient. However, because the coefficient is measured on a log scale, the strength of the relationships is often difficult to gauge (Sweet & Grace-Martin, 2008). Thus, the odds ratio is the logistic coefficient with the log taken out, making it much easier to interpret. The odds ratio displays the odds of program completion for each one-unit increase in the milestone variables (Sweet & Grace-Martin, 2008). Finally, the statistical significance level identifies whether the relationship between the milestone variables and program completion can be attributed to chance. A significance level of .05 was used for our analyses.

Again, although our regression model includes subpopulation, milestone, and year variables, we were primarily interested in the relationships between the milestones and program completion to address this study question. These findings will now be discussed.

## Findings for Study Question 1

The respective outputs associated with the logistic regression models for both associate degree and certificate completion are found in Appendix C.1 and C.2. Table 9 (Associate Degree Completion and Relationship with Milestones) and Table 10 (Certificate Completion and Relationship with Milestones) detail the findings for Study Question 1 and will facilitate a prioritization process by NSCC.

The logistic regression model utilized to answer this study question demonstrated a high level of explanatory power with reference to their usefulness as measured by the Omnibus Tests of Model Coefficients, which indicated statistical significance (*p*=.000) for both the model predicting completion of associate degree and the model predicting completion of a certificate (See Appendix C.1 and C.2). This means, in each case, the regression model's relative usefulness in predicting outcomes, indicating how much of the relevant outcome's variation (completion of either an associate degree or certificate) was due to its relationship with the respective independent variables, is very high. Specifically, the probability of obtaining the given chi-square statistic in each case, if there is in fact no effect of the independent variables on the outcome variable, is shown to be less than .000. The presentation of findings is systematically organized first by associate degree completion, followed by certificate completion.

***Associate Degree Completion by Milestone***

The logistic regression model designed to predict **associate degree completion** revealed statistically significant and *positive* relationships for the independent variables of academic preparation, as measured by COMPASS Math placement (*OR*=1.15; *p*=.003) and COMPASS Writing placement (*OR*=1.10; *p*=.024), summer enrollment (*OR*=4.46; *p*=.000), completion of College Math in the first year (*OR*=1.33; *p*=.001), and completion of at least 80% of courses attempted in the first year (*OR*=3.33; *p*=.000). The odds ratio for COMPASS Math placement indicated that each one-unit increase in that scale makes a student 1.15 times more likely to complete an associate degree. Likewise, the odds ratio for COMPASS Writing placement indicated that each one-unit increase in that scale makes a student 1.10 times more likely to complete an associate degree. Enrolling in summer classes makes a student 4.46 times more likely to complete an associate degree, while completing College Math in the first year makes associate degree completion 1.33 times more likely. Finally, completing at least 80% of courses attempted in the first year makes a student 3.33 times more likely to complete an associate degree. Based on the odds ratios, therefore, the milestones having the largest positive impact on associate degree completion, in order of importance, are summer enrollment and completion of 80% of courses attempted in the first year. Factors having a more modest positive impact on associate degree completion, in order of importance, are completing College Math in the first year, Compass Math placement, and Compass Writing placement.

By contrast, three variables negatively influence associate degree completion: continuous enrollment (*OR*=.50; *p*=.000), completion of a student success course in the first year (*OR*= .09; *p*=.016), and completion of remedial/developmental requirements in the first year (*OR*=.73; *p*=.016). The odds

ratio indicated that continuous enrollment makes a student .50 times less likely to complete an associate degree, while completing the student success course in the first year makes a student .09 times less likely to complete an associate degree. In addition, completing all remedial/developmental requirements within the first year was shown to make a student .73 times less likely to complete an associate degree. Based on the odds ratios, therefore, completion of remedial/developmental requirements in the first year has the greatest negative impact on associate degree completion, followed closely by continuous enrollment. Completion of a student success course in the first year also has a negative impact, but its influence is more modest.

Independent variables found not to have a statistically significant relationship with completing an associate degree included academic preparation, solely as it relates to COMPASS Reading placement ($p$=.924), and completion of College Writing in the first year ($p$=.483).

**Table 9**

**Associate Degree Completion and Relationships with Milestones**

| Factors Having a Positive Impact (in order of importance) | Odds Ratio | Factors Having a Negative Impact (in order of importance) | Odds Ratio | Factors Having No Impact |
|---|---|---|---|---|
| Summer Enrollment | 4.46 | Completion of Remedial/Developmental Courses in First Year | .73 | COMPASS Reading Placement |
| Completion of 80% of Courses Attempted in First Year | 3.33 | Continuous Enrollment | .50 | Completion of College Writing in First Year |
| Completion of College Math in First Year | 1.33 | Completion of Student Success Course in First Year | .09 | |
| COMPASS Math Placement | 1.15 | | | |
| COMPASS Writing Placement | 1.10 | | | |

***Certificate Completion by Milestone***

The logistic regression model designed to predict **certificate completion** revealed statistically significant and *positive* relationships for the independent variables of summer enrollment (*OR*=2.38; *p*=.000) and completion of at least 80% of courses attempted in the first year (*OR*=2.57; *p*=.000). The odds ratio for summer enrollment indicated that taking summer classes makes a student 2.38 times more likely to earn a certificate, while completing at least 80% of courses attempted in the first year makes a student 2.57 times more likely to earn a certificate. Based on the odds ratios, the milestone with the greatest positive influence on earning a certificate is completion of 80% of courses attempted in the first year, followed by summer enrollment.

Conversely, two variables negatively influence certificate completion in a statistically significant way: continuous enrollment (*OR*=.37; *p*=.000) and completing College Writing in the first year (*OR*=.76; *p*=.035). The relevant odds ratios suggest that continuous enrollment, in the context of certificate completion, makes a student .37 times less likely to succeed, while completing College Writing in the first year makes a student .76 times less likely to succeed. Thus, the milestone having the most negative influence on earning a certificate is completion of College Writing in the first year, followed by continuous enrollment.

Independent variables found not to have a statistically significant relationship with completing a certificate included academic preparation as measured by COMPASS placement in Math (*p*=.279), Reading (*p*=.898), or Writing (*p*=.938), Completion of College Math in the first year (*p*=.489), and completion of a student success course in the first year (*p*=.098).

**Table 10**

**Certificate Completion and Relationships with Milestones**

| Factors Having a Positive Impact (in order of importance) | Odds Ratio | Factors Having a Negative Impact (in order of importance) | Odds Ratio | Factors Having No Impact |
|---|---|---|---|---|
| Completion of 80% of Courses Attempted in First Year | 2.57 | Completion of College Writing in First Year | .76 | Academic Preparation (COMPASS Placement in Math, Reading, or Writing) |
| Summer Enrollment | 2.38 | Continuous Enrollment | .37 | Completion of College Math in First Year |
| | | | | Completion of a Student Success Course in First Year |

**Discussion of Findings for Study Question 1**

These results essentially provide NSCC with a roadmap for increasing associate degree and certificate completion because they clearly indicate which factors are significantly associated with program completion, whether positively or negatively. The findings point the way toward areas that should be expanded and enhanced versus areas that need to be redressed, mitigated, or modified.

With respect to associate degree completion, the results support the positive impact illuminated by extant research of summer enrollment, course completion rates, and building positive momentum toward program completion through gateway courses. Acknowledging that there are nuanced results for various subpopulations that will be elaborated upon later, summer enrollment had the largest positive association with associate degree completion. This is not surprising given prior research indicating summer enrollment's tendency to increase overall persistence and contribute to continuous enrollment among students (Offenstein et al., 2010; Attewell et al., 2012). Based on descriptive statistics for our sample, only 48.5% of students enroll in summer classes at NSCC, suggesting there may be a need to focus more closely on policies, procedures, programs, and strategies that will encourage more students (among those subpopulations most positively impacted) to enroll in and successfully complete summer classes. Acknowledging that there are varying impacts for different subpopulations, the positive influence of completing 80% of courses attempted in the first year is supported by previous research that found successful completion of coursework builds momentum toward key milestones and accumulating credits (Offenstein et al., 2010). In addition, below a specific threshold (i.e., less than 12 credit hours during the first term), students at two-year institutions are 8 to 13 points less likely to complete an associate degree (Attewell et al., 2012); any factor posing a threat to accumulating at least that number of credits within that timeframe should be closely examined. Based on the descriptive statistics for our sample, 40.5% of students at NSCC do not successfully complete 80% of courses attempted in the first year which makes it more likely that a significant number will confront challenges achieving the threshold identified by Attewell and colleagues (2012).

The results also show that encouraging students to complete College Math in the first year is positively associated with completing an associate degree. College Math falls in the category of gateway courses viewed as essential milestones to maintain academic momentum (Leinbach & Jenkins, 2008; Offenstein et al., 2010) as well as indicators of success for students at two-year institutions (Leinbach & Jenkins, 2008; Burns, 2010; Offenstein et al., 2010). Based on the descriptive statistics for our sample, 84.1% of students at NSCC do not complete College Math in the first year. This is a

significant missed opportunity because, as illuminated by Leinbach and Jenkins (2008), this group would be three times more likely to reach key milestones and attain a degree if its students completed College Math within the first year (Offenstein et al., 2010).

Also, the results demonstrated a positive association between COMPASS Math and COMPASS Writing placement and associate degree completion. This finding supports previous research that shows that academic preparation is a significant factor in predicting college success (Adelman, 2006; Goldrick-Rab, 2007; Burns, 2010; Porchea et al., 2010). Although NSCC does not have the same admissions criteria as more selective higher education institutions, it is important to acknowledge the impact that academic preparation has on associate degree completion.

In addition to opportunities to capitalize on factors positively associated with associate degree completion, it is equally important for NSCC to seize upon solutions that will eliminate apparent barriers to successfully realizing that goal. Based on the results, factors to examine include completion of remedial/developmental courses in the first year, continuous enrollment, and completing a student success course in the first year, in that order of priority. Interestingly, one would be right to consider these results counterintuitive, as their very purpose is to encourage degree completion. However, for purposes of this study, the project team only examined associate degree completion and certificate completion as outcome variables, with no consideration given to a student successfully transferring to a four-year institution. It is quite possible that these results indicate a negative association with associate degree completion for the very fact that transfer students, while ultimately successful, complete their degrees at institutions other than NSCC.

Having acknowledged this possibility, however, does not obviate the need to consider whether the results are instructive in terms of highlighting bona fide opportunities for improvement at NSCC. The completion of remedial/developmental courses in the first year does impede academic progress, a counterintuitive finding made most acute when students mistakenly believe those courses count for college credit (Goldrick-Rab, 2007). A qualitative question not addressed by this study is to what extent students at NSCC erroneously believe college credit is attached to such courses. Moreover, to the extent that college credit does not attach, time spent in these courses may, for some students, detract from the objective of accumulating much needed college credits (Offenstein et al., 2010). However, it is important to bear in mind that under the CCTA, four-year institutions are effectively barred from providing remediation, making community colleges the exclusive provider of remedial/developmental courses in the state, even for students who never had any intention of pursuing degrees within their

walls. This fact may also contribute to these findings.

The results relating to continuous enrollment were quite counter to the way that variable was discussed in the literature. Whereas continuous enrollment was found to be negatively associated with associate degree completion at NSCC, extant literature described it as integral to timely credit accumulation (Offenstein et al., 2010) which in turn builds momentum toward associate degree completion (Adelman, 2006) as distinguished from breaks in program enrollment (Alfonso et al., 2005). One possible explanation for why continuous enrollment may have a different impact at NSCC with respect to associate degree completion (other than students transferring to other institutions) could be the previously acknowledged variation in community college students' motivations for enrolling in college (Mullin, 2011). Personal development goals, such as mastering a specific job skill (Jenkins & Weiss, 2011) or pursuing a creative outlet, could account for students continuously enrolling but not completing an associate degree. Based on descriptive data for our sample, 58.5% of NSCC's students do not enroll in courses continuously. Whether this is an adverse event in need of redress by the institution will depend directly on whether associate degree completion is a goal for those students.

The final area of discussion is the apparently negative association of completion of a student success course in the first year with associate degree completion. However, as a practical matter, given that NSCC's student success course (College Success – NSCC 1000) was only adopted at NSCC in Fall 2010 and that our sample only includes students enrolled through Fall 2011, there would not have been any students taking the student success course who graduated by the time of this study. For future reference however, it is important to note that extant literature indicates that while generally, completing student success courses can be necessary to provide students with college-related knowledge (Burns, 2010) and, more implicitly, behavioral expectations (Karp & Bork, 2012), some research indicates that such courses appear to have a negative impact on Black students (Offenstein et al., 2010). This is a significant finding given that, based on descriptive statistics for our sample, 55% of students completing NSCC's student success course are Black. This fact would highlight an area to be further evaluated should analysis of future data bear out research indicating a negative relationship with associate degree completion for this subpopulation.

With respect to certificate completion, the results again support the positive impact of completing 80% of courses attempted in the first year (Offenstein et al., 2010) and summer enrollment (Offenstein et al., 2010; Attewell et al., 2012). The fact that these variables remain impactful for certificate completion points to the potentially large impact institution-wide initiatives designed to encourage these outcomes could have on

program completion rates, albeit tempered somewhat by nuanced impacts for various subpopulations. It also points to the fact that these variables remain relevant regardless of variance in students' choice of credential. It is clear that summer enrollment and encouraging completion of 80% of courses attempted in the first year are areas to be leveraged in favor of improving institutional outcomes. Similarly, the negative association between continuous enrollment and completion of a credential is also true as it pertains to certificate completion (although to a lesser extent than for associate degree completion). Parallel to the discussion earlier, whether this is an area in need of redress would depend on whether students who continuously enroll indicate an intention to complete a certificate.

One area of genuine concern for NSCC's consideration is the negative association between completion of College Writing in the first year and certificate completion. While this finding was counter to general research indicating that completion of College Writing could a) indicate students' aptitude towards program completion (Goldrick-Rab, 2007) as a gateway course, b) triple the likelihood of reaching key milestones (Leinbach & Jenkins, 2008), and c) double the likelihood of earning a degree (Calcagno et al., 2007), the fact that none of NSCC's technical certificate programs require College Writing means that pursuing these courses may actually impede students' ability to build momentum toward completion of key milestones within the certificate program (Leinbach & Jenkins, 2008). This point perhaps escapes students who make these choices without meaningful monitoring of their registration. These considerations will serve to contextualize NSCC's prioritization of milestones having a significant impact on program completion at Nashville State.

# Study Question 2

## Statistical Model for Study Question 2

For the second question, we asked: *Are specific subpopulations less likely to complete a program based on certain attributes?* To address this question, we utilized the same two logistic regression models that we ran for Study Question 1: one for associate degree completion and one for certificate program completion. Our independent variables included the subpopulations and milestones, although this question was primarily focused on the impact of subpopulation membership on program completion. In addition, we dummy coded our Race variable to pull out specific races of interest (e.g., Black, Hispanic, Asian, Resident Alien, and Other Races). Whites were used as a comparison group and were not directly included in the regression model. In addition, we wanted to take into account the potential effects of having data from multiple years in the regression model. Thus, we dummy coded each year of data received in order to control for year. Fall 2005 was used as a comparison group and was not directly included in the regression model.

After running the two logistic regression models, we looked specifically at the logistic regression coefficient, the odds ratio, and the statistical significance level for each milestone variable. The logistic regression coefficient shows the direction and strength of the relationship between the subpopulations and program completion, similar to a correlation coefficient. However, because the coefficient is measured on a log scale, the strength of the relationships is often difficult to gauge (Sweet & Grace-Martin, 2008). Thus, the odds ratio is the logistic coefficient with the log taken out, making it much easier to interpret. The odds ratio displays the odds of program completion for each one-unit increase in the subpopulation variable (Sweet & Grace-Martin, 2008). Finally, the statistical significance level identifies whether the relationship between the subpopulations and program completion can be attributed to chance. A significance level of .05 was used for our analyses.

Again, although our regression model includes subpopulation, milestone, and year variables, we were primarily interested in the relationships between the subpopulations and program completion to address this study question. These findings will now be discussed, first for associate degree completion and then for certificate completion.

## Findings for Study Question 2

The respective outputs associated with the logistic regression models for both associate degree and certificate completion are found in Appendix C.1 and C.2. Table 11 (Associate Degree Completion and Relationship with Subpopulations) and Table 12 (Certificate Completion and

Relationship with Subpopulations) detail the findings for Study Question 2 and will facilitate a prioritization process by NSCC.

The logistic regression models utilized to answer this study question, identical to those used for Study Question 1, demonstrated a high level of explanatory power with reference to their usefulness as measured by the Omnibus Tests of Model Coefficients, which indicated statistical significance ($p$=.000) for both the model predicting completion of associate degree and the model predicting completion of a certificate (See Appendix C.1 and C.2). This means, in each case, the regression model's relative usefulness in predicting outcomes, indicating how much of the relevant outcome's variation (completion of either an associate degree or certificate) was due to its relationship with the respective independent variables, is very high. Specifically, the probability of obtaining the given chi-square statistic in each case, if there is in fact no effect of the independent variables on the outcome variable, is shown to be less than .000.

***Associate Degree Completion by Subpopulation***

The logistic regression model designed to predict **associate degree completion** revealed statistically significant and *positive* relationships for the independent variables related to membership in the following subpopulations: first generation students (*OR*=1.21; $p$=.016), adult learners (*OR*=1.56; $p$=.000), remedial/developmental students (i.e., remedial/developmental status) (*OR*=1.27; $p$=.029), and degree-seeking students (*OR*=2.73; $p$=.000). The relevant odds ratios indicate that membership in the group designated first generation student makes a student 1.21 times more likely to complete an associate degree, while adult learner status makes a student 1.56 times more likely to do so. Remedial/developmental status makes a student 1.27 times more likely to complete an associate degree, while degree-seeking status makes a student 2.73 times more likely to complete an associate degree. From these findings, being a degree-seeking student has the largest positive impact on associate degree completion followed next by being an adult learner, a remedial/developmental student, or a first generation student, in that order.

Conversely, membership in the following four subpopulations revealed negative statistically significant relationships with associate degree completion: English language learners (*OR*=.62; $p$=.004), part-time students (*OR*=.41; $p$=.000), Black students (*OR*=.66; $p$=.000), and Other Races (*OR*=.69; $p$=.007). The relevant odds ratios indicate that being an English language learner makes a student .62 times less likely to complete an associate degree, while part-time status makes a student .41 times less likely to do so. Membership in the subpopulations denoted as Black or Other Races decreases a student's likelihood of completing an associate degree by .66 and .69 times, respectively. Thus, it appears the

subpopulations most likely *not* to complete an associate degree are those students identified as Other Races, Black, English language learners, and part-time students, in that order. These are NSCC's most vulnerable populations vis-à-vis associate degree completion.

Subpopulation variables for whom membership was found to be irrelevant to the completion of an associate degree because of the lack of a statistically significant relationship included low-income students ($p$=.090), gender ($p$=.217), Hispanic ($p$=.977), Asian ($p$=.762), and Resident Alien ($p$=.493).

**Table 11**

**Associate Degree Completion and Relationships with Subpopulations**

| Less Vulnerable Subpopulations (in order of relative strength) | Odds Ratio | More Vulnerable Subpopulations (in order of relative weakness) | Odds Ratio | Subpopulations Whose Membership is Irrelevant to Completion |
|---|---|---|---|---|
| Degree-Seeking Student | 2.73 | Other Races | .69 | Low-Income Student |
| Adult Learner | 1.56 | Black | .66 | Gender |
| Remedial/Developmental Student | 1.27 | English Language Learner | .62 | Hispanic |
| First Generation Student | 1.21 | Part-Time Student | .41 | Asian |
| | | | | Resident Alien |

***Certificate Completion by Subpopulation***

The logistic regression model designed to predict **certificate completion** revealed statistically significant and *positive* relationships for the independent variables of low-income students (*OR*=1.57; $p$=.000) and degree-seeking students (*OR*=3.34; $p$=.000). The relevant odds ratios indicated that low-income status makes a student 1.57 times more likely to complete a certificate, while degree-seeking status makes a student 3.34 times more likely to do so. Thus, in terms of subpopulations, it appears that being a degree-seeking student has the largest positive impact on certificate completion followed next by being a low-income student.

By contrast, membership in one subpopulation stands out as having a statistically significant, *negative* relationship with certificate completion: being an English language learner (*OR*=.34; $p$=.000). The relevant odds ratio indicated that English language learners are .34 times less likely to complete a certificate. So, in terms of subpopulations, being an English language learner has the single greatest negative impact on certificate completion.

Membership in the following subpopulations did not have a statistically

significant relationship with completing a certificate: first generation students ($p$=.105), adult learners ($p$=.104), part-time students ($p$=.353), remedial/developmental students ($p$=.067), gender ($p$=.762), or any designation of race.

**Table 12**

**Certificate Completion and Relationships with Subpopulations**

| Less Vulnerable Subpopulations (in order of relative strength) | Odds Ratio | More Vulnerable Subpopulations (in order of relative weakness) | Odds Ratio | Subpopulations Whose Membership is Irrelevant to Completion |
|---|---|---|---|---|
| Degree-Seeking Student | 3.34 | English Language Learner | .34 | All Other Subpopulations |
| Low-Income Student | 1.57 | | | |

**Discussion of Findings for Study Question 2**

The results for Study Question 2 reveal findings that both support and run contrary to current research on community college degree completion. This section includes a discussion of the statistically significant positive and negative relationships between our subpopulations of interest and associate degree and certificate completion.

To begin, first generation students were found to be more likely to earn an associate degree. This result runs contrary to research that revealed that first generation students have lower completion rates (Bailey et al., 2005) and face many unique academic challenges, including a lack of cultural know-how and unequal access to individuals that can teach norms (Karp & Bork, 2012). Our study's findings indicate that Nashville State has been reaching its first generation students in their pursuit toward associate degree completion. Further exploration into what the institution is doing for its first generation students could be a beneficial asset to other subpopulations of interest. With first generation students making up 31% of our sample, this subpopulation will continue to be important to the institution, given the open access mission of Nashville State.

Adult learners, representing 50.8% of our sample, were found to be more likely to earn an associate degree. Previous research has shown that balancing life's many responsibilities provides a challenge for adult learners in earning a credential (Choy, 2002; Dayton, 2005). Juggling work and family with school obligations can make it difficult to focus on academic endeavors. However, the findings in the current study indicate that adult learners at Nashville State are succeeding at a higher rate than traditional-aged students at the institution. This supports research by Calcagno et al. (2007) that found adult learners were more likely to complete a degree, when controlling for mathematics ability. Looking at the current study, one reason for the

finding could be our operationalization of adult learner. Perhaps, we would have seen different results had we measured employment standing, relationship status, or number of dependents to get a better sense of the factors that seem to impact adult learners, outside of simply age, when it comes to associate degree completion. As Nashville State continues to enroll the highest percentage of adult learners at two-year Tennessee institutions, NSCC must provide resources and accommodations to meet the unique needs of this subpopulation.

Students in need of remediation were found to be more likely to complete an associate degree. This finding runs contrary to research that revealed remedial students to be less likely to complete a credential and more likely to drop out (Bailey & Morest, as cited in Burns, 2010; Bailey et al., 2005). Over 55% of students in the sample were identified as needing remediation. Although some studies have revealed a positive correlation between outcomes of interest (i.e., completion and retention) and enrolling in remedial courses (Jepsen, as cited in Crisp & Nora, 2010; Crews & Aragon, 2004), our finding was somewhat surprising given the fact that remedial students are required to take extra courses, in addition to degree requirements, in order to complete an associate degree. This particular subpopulation at Nashville State deserves further exploration. Perhaps, as Hoyt (1999) points out, a completion rate difference exists for NSCC remedial students based on the number of remediation areas needed, a factor that was not measured in the current study.

Degree-seeking student status was a positive finding in respect to both associate degree and certificate completion. In other words, being a degree-seeking student increased the probability of earning either credential. Although Goldrick-Rab (2007) found that intent to earn a credential did not always correlate with actually earning one, our study revealed that being a degree-seeking student matters. In our sample, 81.6% of students identified as degree-seekers. Although degree-seeking students were more likely to earn an associate degree or certificate, what is keeping those who initially started as a degree seeker from earning a credential? Answers to this question will help NSCC set the stage for future increases in program completion rates for degree-seeking students.

Although no statistically significant difference was found between low-income status and associate degree completion, low-income students were more likely to earn a certificate at Nashville State. This result goes against previous research revealing that students from low socioeconomic backgrounds were less likely to earn a credential or transfer to a four-year institution than their high socioeconomic status peers (Bailey et al., 2005; Jenkins & Weiss, 2011). Although the information cannot be verified by our research, perhaps low-income students, who made up 35.4% of our sample, are

better able to complete certificate programs simply due to less financial and time constraints when compared to associate degree pursuit. In other words, students in certificate programs are not required to invest as much money or time as associate degree seekers. This could give low-income students a better opportunity to earn the certificate credential.

In addition to the statistically significant, positive findings discussed, our study also revealed negative relationships between degree completion and specific subpopulations. English language learners were less likely to earn both associate degrees and certificates. This finding supports previous research that investigated the challenges ELL students face when pursuing an academic credential (Tonge, 2011; Patthey-Chavez et al., 2005; Jenkins & Weiss, 2011). Perhaps, ELL students, who made up 7.4% of our sample, are enrolling at NSCC to acquire the language skills needed to enter the workforce, without necessarily having a desire to earn a credential. Nashville State needs to better understand enrollment intent for ELL students in an effort to retain and eventually graduate a higher percentage of these students. The ELL subpopulation is very important to Nashville State, looking at its enrollment numbers compared to other two-year Tennessee institutions. However, despite the significance, institutional program offerings exclusively for ELL students are not available to help in their college transition.

In addition, part-time students were found to be less likely to earn an associate degree. This result supports research regarding the academic difficulties faced by this subpopulation (College Board, 2012; Jacobs & King, 2002). Part-time students are a subpopulation of interest for Nashville State, especially given the high enrollment rates at the institution. In fact, part-time students made up over 73% of our sample. It is not surprising that part-time students complete at lower rates simply because credit accumulation does not occur at the same rate as full-time students.

Finally, in regard to race, students identified as Black or Other Races were found to be less likely to earn an associate degree. Engle and Lynch (2009) observed that minority students were less likely than non-minority students to earn a credential, complete an associate degree, or transfer to a four-year institution. Our results support this finding as it pertains to the completion of an associate degree for Blacks and Other Races. Blacks made up 27.4% of our sample while 6.8% of students were identified as Other Races. It is difficult to interpret the results for Other Races simply because this particular race category was made up of four different race classifications. However, Blacks are certainly a subpopulation of interest for NSCC and deserve attention in order to increase associate degree completion.

This discussion of the findings for Study Question 2 will help Nashville State prioritize programs and resources for subpopulations of interest that will have the

highest return on investment. As monetary resources for higher education continue to see reductions, careful and efficient planning must be utilized in order to receive the greatest and most wide-reaching benefits. The next section will present our third study question.

# Study Question 3

**Statistical Model for Study Question 3**

Finally, the third study question asks: *Does the impact of these milestones vary by specific subpopulations?* For example, does the impact of being continuously enrolled at Nashville State vary by whether a student is characterized as low-income? Because we are interested in associate degree completion and certificate completion, we again utilized two logistic regression models.

In order to assess the impact of our milestones across subpopulations for associate degree completion, we devised interactions between specific subpopulations and milestones. We looked at the subpopulations and milestones that reached statistical significance in the logistic regression model used for Study Questions 1 and 2 and created interaction terms between the statistically significant variables. Each interaction term was computed using the standard method of multiplying the individual component variables of interest by one another. Each product, an interaction, was then used in the regression model like any other variable. The only statistically significant variables that were left out of the interaction terms were COMPASS Math placement, COMPASS Writing placement, and Other Races. COMPASS Math placement and COMPASS Writing placement, both measures of academic preparation, were not used for the interaction terms simply because we wanted to focus on the milestone variables that Nashville State could improve on going forward. Due to the open access mission of Nashville State, the academic preparedness levels of its students are outside the control of the institution. In addition, Other Races was left out of the interaction terms due to the difficulty of understanding the results for this subpopulation. The Other Races variable combined four different races. Thus, interpreting the results and making recommendations would be challenging, especially if it is unknown which race groups within Other Races were impacted the most. For these reasons, COMPASS Math placement, COMPASS Writing placement, and Other Races were not used for the interaction terms. Again, our logistic regression model for Study Question 3 includes all of our subpopulation variables, milestones, and years, much like Study Questions 1 and 2. However, we also included interaction terms in the logistic regression model for all of the possible combinations between statistically significant subpopulations and milestones (except for COMPASS Math placement, COMPASS Writing placement, and Other Races) from the initial logistic regression model used in Study Question 1 and 2 for associate degree completion.

In order to assess the impact of our milestones across subpopulations for certificate completion, we were interested in the interactions between specific

subpopulations and milestones. We looked at the subpopulations and milestones that reached statistical significance in the logistic regression model used for Study Questions 1 and 2 and created interaction terms between the statistically significant variables. Thus, our logistic regression model for Study Question 3 includes all of our subpopulation variables, milestones, and years, much like Study Questions 1 and 2. However, we also included interaction terms into the logistic regression model for all of the possible combinations between statistically significant subpopulations and milestones from the initial logistic regression models used in Study Question 1 and 2 for certificate completion. The interactions used and findings will now be discussed.

**Findings for Study Question 3**

The respective outputs associated with the logistic regression models including interactions for both associate degree and certificate completion are found in Appendix C.3 and C.4. Table 14 (Statistically Significant Relationships between Interactions and Associate Degree Completion) and Table 16 (Statistically Significant Relationships between Interactions and Certificate Completion) detail the findings for Study Question 3 and will facilitate a prioritization process by NSCC.

This section will also describe the interactions used in each of two additional logistic regression models and the respective findings to determine whether the impact of the respective milestones varied by certain subpopulations (or combinations thereof) with respect to either associate degree completion or certificate completion. The logistic regression models utilized to answer this study question demonstrated a high level of explanatory power with reference to their usefulness as measured by the Omnibus Tests of Model Coefficients, which indicated statistical significance ($p$=.000) for both the model predicting completion of associate degree and the model predicting completion of a certificate. This means, in each case, the regression model's relative usefulness in predicting outcomes, indicating how much of the relevant outcome's variation (completion of either an associate degree or certificate) was due to its relationship with the respective independent variables or interactions, is very high. Specifically, the probability of obtaining the given chi-square statistic in each case, if there is in fact no effect of the interactions on the outcome variable, is shown to be less than .000. For more information about this test, please refer to Appendix C.3 and C.4.

***Associate Degree Completion by Interaction***

Table 13 lists the 63 numbered interactions used in the logistic regression model designed to predict associate degree completion. It is best to be cautious of spurious findings in a regression model with a high number of variables, particularly

when it includes statistical interaction terms. While it was difficult to find research on interpreting interaction terms in educational research, findings from other disciplines, such as psychology and biology, recommend some choices to avoid when designing regression models that contain interaction terms. Ganzach (1997) commented that high levels of multicollinearity between independent variables might result in false significant interaction results. However, the multicollinearity test run on our regression models demonstrated low levels of collinearity. Additional research on spurious correlations advises against using a small sample size with a high number of factors in the model as well as avoiding the running of multiple models to remove variables once they are shown not to be statistically significant (Anderson, Burnham, Gould, & Cherry, 2001); neither of these scenarios is applicable in this study. Although the same research also recommends limiting the use of measured variables (Anderson et al., 2001), this suggestion stems from the desire to prevent multicollinearity, which has already been addressed in this model through statistical evaluation.

Although there is a large number of interaction terms included in the associate degree regression model for Study Question 3, we found no clear evidence within extant literature to indicate that restricting the number of terms was advisable for our study design. However, the decision to restrict the interaction type to two-way interactions using only the variables that produced statistically significant results in Study Questions 1 and 2 (except for COMPASS Math placement, COMPASS writing placement, and Other Races) was a deliberate decision to limit the number of interactions in the hopes of uncovering more complex relationships between the subpopulations and the academic milestone variables.

**Table 13**

| INTERACTIONS USED IN ASSOCIATE DEGREE COMPLETION LOGISTIC REGRESSION | |
|---|---|
| 1. First Generation Student and Continuous Enrollment | 32. Black and Summer Enrollment |
| 2. First Generation Student and Summer Enrollment | 33. Black and Completion of College Math in First Year |
| 3. First Generation Student and Completion of College Math in First Year | 34. Black and Completion of Student Success Course in First Year |
| 4. First Generation Student and Completion of Student Success Course in First Year | 35. Black and Completion of at least 80% of Courses Attempted in First Year |
| 5. First Generation Student and Completion of at least 80% of Courses Attempted in First Year | 36. Black and Completion of Remedial/Developmental Courses in First Year |
| 6. First Generation Student and Completion of Remedial/Developmental Courses in First Year | 37. Black and Adult Learner |

| INTERACTIONS USED IN ASSOCIATE DEGREE COMPLETION LOGISTIC REGRESSION | |
|---|---|
| 7. Adult Learner and Continuous Enrollment | 38. Black and First Generation Student |
| 8. Adult Learner and Summer Enrollment | 39. Black and Part-Time Student |
| 9. Adult Learner and Completion of College Math in First Year | 40. Black and English Language Learner |
| 10. Adult Learner and Completion of Student Success Course in First Year | 41. Black and Degree-Seeking Student |
| 11. Adult Learner and Completion of at least 80% of Courses Attempted in First Year | 42. Part-Time Student and English Language Learner |
| 12. Adult Learner and Completion of Remedial/Developmental Courses in First Year | 43. Part-Time Student and First Generation |
| 13. English Language Learner and Continuous Enrollment | 44. Part-Time Student and Adult Learner |
| 14. English Language Learner and Summer Enrollment | 45. Part-Time Student and Degree-Seeking Student |
| 15. English Language Learner and Completion of College Math in First Year | 46. English Language Learner and Adult Learner |
| 16. English Language Learner and Completion of Student Success Course in First Year | 47. English Language Learner and First Generation Student |
| 17. English Language Learner and Completion of at least 80% of Courses Attempted in First Year | 48. English Language Learner and Degree Seeking Student |
| 18. English Language Learner and Completion of Remedial/Developmental Courses in First Year | 49. First Generation Student and Adult Learner |
| 19. Part-Time Student and Continuous Enrollment | 50. First Generation Student and Degree Seeking Student |
| 20. Part-Time Student and Summer Enrollment | 51. Degree Seeking Student and Adult Learner |
| 21. Part-Time Student and Completion of College Math in First Year | 52. Remedial/Developmental Student and Continuous Enrollment |
| 22. Part-Time Student and Completion of Student Success Course in First Year | 53. Remedial/Developmental Student and Summer Enrollment |
| 23. Part-Time Student and Completion of at least 80% of Courses Attempted in First Year | 54. Remedial/Developmental Student and Completion of College Math in First Year |
| 24. Part-Time Student and Completion of Remedial/Developmental Courses in First Year | 55. Remedial/Developmental Student and Completion of Student Success Course in First Year |
| 25. Degree-Seeking Student and Continuous Enrollment | 56. Remedial/Developmental Student and Completion of at least 80% of Courses Attempted in First Year |
| 26. Degree-Seeking Student and Summer Enrollment | 57. Remedial/Developmental Student and Completion of Remedial/Developmental Courses in First Year |

| INTERACTIONS USED IN ASSOCIATE DEGREE COMPLETION LOGISTIC REGRESSION | |
|---|---|
| 27. Degree-Seeking Student and Completion of College Math in First Year | 58. Remedial/Developmental Student and English Language Learner |
| 28. Degree-Seeking Student and Completion of Student Success Course in First Year | 59. Remedial/Developmental Student and Black Student |
| 29. Degree-Seeking Student and Completion of at least 80% of Courses Attempted in First Year | 60. Remedial/Developmental Student and Adult Learner |
| 30. Degree-Seeking Student and Completion of Remedial/Developmental Courses in First Year | 61. Remedial/Developmental Student and Part-Time Student |
| 31. Black and Continuously Enrolled | 62. Remedial/Developmental Student and Degree-Seeking Student |
| | 63. Remedial/Developmental Student and Degree-Seeking Student |

The logistic regression model including the above-listed interactions revealed statistically significant and *positive* relationships between the following interactions and completing an **associate degree**: part-time students and summer enrollment (*OR*=1.55; *p*=.009), part-time students and completion of College Math in the first year (*OR*=2.09; *p*= .000), degree-seeking students and continuous enrollment (*OR*=2.99; *p*=.001) and remedial/developmental students and part-time students (*OR*=1.76; *p*=.003). The relevant odds ratios indicated that part-time students enrolling during the summer are 1.55 times more likely to complete an associate degree, while part-time students who complete College Math in the first year are 2.09 times more likely to complete an associate degree. Degree-seeking students who are also continuously enrolled are 2.99 times more likely to complete an associate degree, while remedial/developmental students who are part-time students are 1.76 times more likely to do so. Based on the odds ratios, the interaction with the greatest positive impact on associate degree completion is between degree-seeking status and continuous enrollment, followed closely by part-time students and completion of College Math in the first year. More modest positive impacts are seen by being both a remedial/developmental student and part-time student as well as a part-time student who enrolls in summer, in that order.

Conversely, four interactions were found to have statistically significant, *negative* relationships with completing an associate degree: adult learners and summer enrollment (*OR*=.72; *p*=.042), part-time students and completion of at least 80% of courses attempted in the first year (*OR*=.52; *p*=.000), first generation students and degree-seeking students (*OR*=.45; *p*=.003) and remedial/developmental students and degree-seeking students (*OR*=.42; p=.001). The relevant odds ratios associated with these interactions revealed that adult learners who enroll in summer

classes are .72 times less likely to complete an associate degree. Part-time students who complete 80% of courses attempted in the first year are .52 times less likely to complete an associate degree. First generation students who are also degree-seeking students were .45 times less likely to complete an associate degree. Finally, remedial/developmental students who are also degree-seeking students were .42 times less likely to do so. Based on the odds ratios, the interaction with the greatest negative impact on associate degree completion is between adult learners and summer enrollment, followed by part-time students and completion of at least 80% of courses attempted in the first year, first generation students who are degree-seeking students and remedial/developmental students who are also degree-seeking students, in that order.

No other interactions had a statistically significant relationship with the completion of an associate degree. It is important to note here that this logistic regression model did not yield results of any kind for the requested interaction between degree-seeking students and completion of a student success course in the first year, possibly because of the infinitesimal size of this group in the sample.

**Table 14**

**Statistically Significant Relationships between Interactions and Associate Degree Completion**

| Interactions with a Positive Impact on Associate Degree Completion (in order of impact) | Odds Ratio | Interactions with a Negative Impact on Associate Degree Completion (in order of impact) | Odds Ratio |
|---|---|---|---|
| Degree-Seeking and Continuous Enrollment | 2.99 | Adult Learner and Summer Enrollment | .72 |
| Part-Time Student and Completion of College Math in First Year | 2.09 | Part-Time Student and Completion of at least 80% of Courses Attempted in First Year | .52 |
| Remedial/Developmental Student and Part-Time Student | 1.76 | First Generation Student and Degree-Seeking Student | .45 |
| Part-Time Student and Summer Enrollment | 1.55 | Remedial/Developmental Student and Degree-Seeking Student | .42 |

***Certificate Completion by Interaction***

Table 15 below lists the 13 numbered interactions used in the logistic regression model designed to predict certificate completion.

**Table 15**

| INTERACTIONS USED IN CERTIFICATE COMPLETION LOGISTIC REGRESSION | |
|---|---|
| 1. English Language Learner and Continuous Enrollment | 8. Low-Income Student and Completion of at least 80% of Courses Attempted in First Year |
| 2. English Language Learner and Summer Enrollment | 9. Degree-Seeking Student and Continuous Enrollment |
| 3. English Language Learner and Completion of College Writing in First Year | 10. Degree-Seeking Student and Summer Enrollment |
| 4. English Language Learner and Completion of at least 80% of Courses Attempted in First Year | 11. Degree-Seeking Student and Completion of College Writing in First Year |
| 5. Low-Income Student and Continuous Enrollment | 12. Degree-Seeking Student and Completion of at least 80% of Courses Attempted in First Year |
| 6. Low-Income Student and Summer Enrollment | 13. English Language Learner and Low-Income Student |
| 7. Low-Income Student and Completion of College Writing in First Year | |

The logistic regression model designed to predict **certificate completion** and including the above-listed interactions revealed a statistically significant and *positive* relationship between English language learners completing College Writing in the first year and successfully completing a certificate (*OR*=6.91; *p*=.008). The odds ratio indicated that students in this category were 6.91 times more likely to complete a certificate. This interaction has the single greatest positive impact on certificate completion at NSCC.

On the other hand, the same logistic regression model revealed a statistically significant, *negative* relationship between degree-seeking students completing College Writing in the first year, and completing a certificate (*OR*=.37; *p*=.023). The odds ratio indicated students in this category were .37 times less likely to complete a certificate. This interaction has the single greatest negative impact on certificate completion at NSCC.

No other interactions had a statistically significant relationship with the completion of a certificate.

**Table 16**

**Statistically Significant Relationships between Interactions and Certificate Completion**

| Interactions With A Positive Impact On Certificate Completion | Odds Ratio | Interactions With A Negative Impact On Certificate Completion | Odds Ratio |
|---|---|---|---|
| English Language Learner and Completion of College Writing in First Year | 6.91 | Degree-Seeking Student and Completion of College Writing in First Year | .37 |

**Discussion of Findings for Study Question 3**

Although Study Question 3 was designed to reveal more complex relationships between the subpopulations and milestones, many of the findings proved to be consistent with current research on degree completion. As for associate degree completion, part-time students were shown to have positive and statistically significant relationships with summer enrollment and completing College Math within the first year. These results parallel findings from Attewell and others (2012) who also observed marked improvements in students' college completion rates especially at community colleges. As a gateway course, successfully completing College Math has been shown to improve student attitudes about their progress and academic aptitude (Goldrick-Rab, 2007). The largest positive relationship was found between degree-seeking intention and continuous enrollment which demonstrated students are almost three times more likely to complete an associate degree. This is particularly salient for Nashville State since research by Adelman (2006) revealed that the benefits of continuous enrollment extend to students enrolled part-time, which accounts for over three-fourths of NSCC students.

The one result that was contrary to extant literature was the positive relationship between remedial/developmental students and part-time status. While some studies showed that developmental students were less likely to persist (Hoyt, 1999) or continue into college level courses (Bailey et al., 2005), other research revealed that developmental writing may improve students' academic performance in comparison to students who do not take the course (Crews & Aragon, 2004). Additionally, adult students were shown to benefit in some ways from remediation as a mechanism to prepare for college after an extended absence (Calcagno et al., 2007). Since adult students account for over 50% of NSCC's campus, this could have influenced the positive relationship between remediation and part-time status. In this study, we also operationalized part-time students as those who were enrolled part-time at least 51% of the time; this may

not be a nuanced enough definition of part-time status to reveal the negative impact of part-time enrollment if students were enrolled full-time at some point during their college career.

When evaluating the negative and statistically significant results from the associate degree interactions, students with degree-seeking intentions (i.e., enrolled in associate degree or certificate programs) were less likely to complete an associate degree if they are first generation students or developmental students. Both of these results are consistent with prior findings on college completion: First generation students may not be equipped with prior knowledge of positive college-going behavior that can increase the likelihood of success (Karp & Bork, 2012). In addition, research has shown that while *taking* remedial courses does not have a negative effect on student progress, the harmful misconceptions held by developmental students often can mistake remediation for college-level coursework or create the assumption they are incapable of being successful in college because of required remediation (Goldrick-Rab, 2007).

Although some additional findings were contradictory to conclusions from extant literature, the results may provide some further illumination on the context of this study. Though the interaction between part-time status and completing 80% of attempted courses was negative, this also could be related to our decision to operationalize part-time status as students who are enrolled part-time for 51% of their college career. Categorizing students who are part-time for the entirety of their enrollment period with those who are full-time for 49% of the time may have grouped students with different behaviors, goals, and limitations causing this result to be less than representative of the true part-time student population. The associate degree interactions also revealed a negative relationship between adult learners and summer enrollment, which is particularly unexpected since summer enrollment produced such a large positive effect in the other regression models. Though one-fifth of the adult students took fewer than the minimum hours recommended by Adelman (2006) to yield positive results, this may not represent a critical mass to influence the results. Another explanation could be that adult learners are more likely to take courses in the summer based on personal interest (i.e., culinary or photography courses) or for continuing education credits for employment skills, such as computer literacy courses.

The interactions run for certificate completion yielded two contrasting results: (1) a positive and significant relationship between completing College Writing during the first year and English language learners and (2) a negative but significant relationship between degree-seeking intentions and completing College Writing in the first year. At Nashville State, 92% of ELL students require some form of writing remediation (79% of these students started at basic writing—the lowest level of remediation) compared to only 30% of the

overall student population. Taking a College Writing course may provide some added benefits for ELL students who could continue to develop basic skills or self-efficacy based on their success in such a class. However, degree-seeking students are less likely to complete a certificate if they complete College Writing during their first year of enrollment. Interestingly, none of NSCC's technical certificate programs require College Writing to complete the program requirements, so it is perplexing why students registered for this course. This could be demonstrative of students who are misinformed about degree requirements or who transferred into associate degree programs after completing this gateway course.

These findings open the door to reveal actionable recommendations that will be presented later in this report. Though the results from these study questions have provided some illuminating observations, it is important to temper these findings within the context of our study's design and limitations. Despite this caveat, it is clear there are some important trends in students' academic decisions. In addition, identifying and understanding key subpopulations can prove invaluable in Nashville State's efforts to improve student outcomes.

## Limitations

It is important to address our findings in light of several study limitations, as these limitations serve to temper any conclusions and recommendations drawn from the findings. The limitations must be considered applicable to all three study questions addressed in this report**.** First, Nashville State is a very unique institution in its location and demographics. NSCC is located in an urban setting with a high proportion of at-risk student subpopulations (e.g., low-income, English language learners, underrepresented minorities, etc.). Thus, although our study sample is highly generalizable to the Nashville State population, it may be difficult to generalize our findings to other community colleges in Tennessee or institutions across the country.

A second limitation involves the data that we were able to secure from Nashville State. Specifically, the data was collected by Nashville State officials and not the researchers. Thus, we were restricted to the paradigms dictated by Sungard Banner (the institution's primary data management software system) and the institution's record keeping practices. For example, in the data set, non-remedial students were classified as not having completed remedial/developmental courses in the first year, one of our milestone variables. Thus, this particular finding may not give an accurate depiction of remedial course completion status at Nashville State. Also, some of the data was self-reported by students. For example, students simply checked a box on the enrollment application as to whether they were an English language learner. Enrollment status (i.e., part-time vs. full-time) and identification as a first generation student were self-reported in a similar fashion.

Third, the way we operationalized specific variables could also be considered a limitation, particularly for academic preparation, low-income status, part-time status, and adult learners. For our study, academic preparation was operationalized by using COMPASS placements for Math, Reading, and Writing. We had hoped to use high school GPA and SAT/ACT scores as indicators of academic preparation. However, Nashville State does not collect high school GPA scales with the students' GPAs. In other words, it was unknown whether a 3.6 GPA was out of a 4.0 scale, 5.0 scale, or a 6.0 scale. For this reason, we did not utilize the high school GPA for analysis. In addition, students' SAT and ACT scores were not used in the study simply because of the low number of students who actually took these exams. In addition, the low-income student population was operationalized by student eligibility to receive the Pell Grant. This was not a holistic way to view socioeconomic status. The ability to access Internal Revenue Service records or other data regarding student/family income may have given us a more accurate representation of socioeconomic status. Also, the way that

part-time status was determined could have limited our results. For the study, students were designated to be attending Nashville State on a part-time basis if they were part-time during 51% of their enrolled semesters. In other words, a student who was enrolled at Nashville State for three semesters (two on a part-time basis) would be considered a part-time student. A student who was enrolled at Nashville State for two semesters (one on a part-time basis) would be designated a full-time student. Because community college student enrollment is often transient, moving back and forth between full-time and part-time status, our study may have not represented part-time students in the most appropriate manner. Finally, the way adult learners were operationalized in the study could be a limitation. Focusing exclusively on age for this variable, the study did not take into account other factors that could impact program completion for older students (e.g., relationship status, employment, number of kids/dependents, etc.).

Fourth, from an outcomes perspective, the study was primarily interested in determining associate degree completion and certificate program completion. However, one outcome variable not included was transfer rates from Nashville State to four-year institutions. These transfer rates indicate a positive academic objective and are included in the Tennessee outcome-based funding formula for higher education institutions. In our study, for example, a degree-seeking student, who is two courses short of an associate degree but transferred to a four-year institution, would be considered the same (i.e., an individual who does not complete an associate degree) as a degree-seeking student who dropped out of Nashville State after one semester, never to pursue higher education again. Thus, the fact that we did not track transfer rates for the students may limit the implications of our findings.

Finally, the present study was not able to include independent variables that address the impact of the community college experience on academic program completion. However, theory postulates positive associations between student decisions to persist in community colleges and the following factors: (1) institutional commitment to student welfare, (2) institutional integrity, (3) academic and intellectual development, and (4) support from significant others (Braxton, Hirschy, & McClendon, 2004). Although the current study did not include college experience in the analysis, it is important to acknowledge that several of these college experience factors may have played a significant role in whether students completed an associate degree or certificate program at Nashville State.

# Conclusions and Implications

## Conclusions

The nature of higher education is changing. State and federal governments are increasingly concerned with improving postsecondary degree attainment and workforce training. Enrollment at colleges and universities has skyrocketed in response to the 2008 recession and the growing emphasis on higher education as the singular location for workforce training. Students are no longer 18 years old and fresh out of high school but more likely to be employed, at least part-time, with more students representing underrepresented minority groups (Engle & Lynch, 2009). These shifts in the higher education landscape have particularly impacted community colleges that are very often the destination of choice for students who previously enrolled in postsecondary programs at lower rates (i.e., low-income students, minorities, language minorities, and academically underprepared students) (Engle & Lynch, 2009). Given the historically variable mission of community colleges, it becomes imperative for these institutions to focus on: 1) what does our student population look like; and 2) what is the best method for recognizing the new emphasis on degree attainment in the context of multiple missions (i.e., vocational/technical programs, associate degree, remediation, transfer to bachelor's degree programs, etc.) (Engle, Yeado, Brusi, & Cruz, 2012).

In 2010, the state of Tennessee adopted the Complete College Tennessee Act which includes an outcomes-based funding formula linking specific quantitative performance measures to state appropriations. On several of the measures (graduation rates showing the largest discrepancy), Nashville State Community College has been producing less than promising numbers (Tennessee Higher Education Commission, 2011-2012). Through participating in the Access to Success Initiative, NSCC identified several measures that could shed more light on why students are not completing associate degrees more often, how to identify the non-completers, and what interventions may prove effective in addressing this issue. From that and other extant literature, 17 independent variables were identified in two distinct categories: key subpopulations and academic milestones. This study's design focused on the importance of academic milestones as an important data analysis tool for community colleges to track student outcomes, in lieu of focusing only on the first-time, full-time freshmen cohort (Dellow & Romano, 2002).

To best understand the population at NSCC, this study's design includes a random sample of student data from seven years (Fall 2005 through Fall 2011). Using a logistic regression model, the data revealed three subpopulations at-risk for non-completion of associate degree programs: Black students, part-time students, and

English language learners. Reviewing descriptive percentages for these at-risk groups from the study's sample reveals some important comparisons (See Appendix D). A larger percentage of part-time students are age 25 or older; while this may be an expected result, it can provide insight on how best to support these subpopulations. Another observation: Though a higher percentage of part-time students take summer classes as compared to the sample, less are able to complete key gateway classes including developmental courses, College Math, or College Writing. In this context, it is possible that summer enrollment is not being used to its full potential.

The descriptive data on English language learners is even more illuminating. In the sample, only 35.4% of students are considered low-income while over half of ELL students fall into this category. Over three-fourths of ELL students are categorized as in need of remediation compared to 55% of students in the overall sample. A breakdown of COMPASS placement scores shows 64% of English language learners in need of Math remediation. Additionally approximately *nine out of ten* ELL students in need of reading **AND** writing remediation; less than one-third of students in the overall sample need the same level of remediation. In our final subpopulation, 70% of Black students are taking developmental courses compared to only 55% in the overall sample (56.6% in Math remediation vs. 71.4% of Black students in Math remediation). More Black students also fail to complete 80% of their attempted first year courses: About 60% of students in the sample fall into this category while only 44.4% of Black students achieve this milestone. This could signal that students in this demographic withdraw from or fail courses at a disproportionately higher rate.

Interestingly, being an adult student or a remedial student was shown to have a significantly positive impact on associate degree completion. This is particularly salient given the parameters of the CCTA funding formula: Campuses are awarded a premium rate for graduating adult students and are also required to report pass rates for remedial and developmental coursework. English language learners were also found to be statistically less likely to complete a certificate program, identifying the ELL subpopulation at NSCC as one of these predominantly at-risk student groups on campus. Conversely, low-income students, another population that is a focal point of the CCTA, were shown to be *more likely* to complete a certificate program.

When examining the results from the regression evaluating the academic milestones, the variables of summer enrollment and completing 80% of courses attempted in the first year were found to have a statistically significant and positive impact on completing both an associate degree and a certificate program. Both of these factors are ideal areas of opportunity for Nashville State to consider new institutional policies or to design

programming to target students who may chronically withdraw from courses, fail a high ratio of classes on the first attempt because of poor attendance or preparation, or are unable to take more hours because of external factors. Continuous enrollment showed a statistically significant negative relationship with completing an associate degree or certificate. Since continuous enrollment usually facilitates timely degree completion, these results may reveal students who do not follow the curriculum or shift programs repeatedly which delays graduation. A number of other factors, including academic preparation (i.e., COMPASS Math placement and COMPASS writing placement) and completing College Math during the first year, positively influenced associate degree attainment again highlighting the complexity of understanding degree completion.

The final study question examining the relationship between the statistically significant subpopulations and the statistically significant academic milestones was designed to provide a nuanced look at how variables can impact specific groups. English language learners and part-time students improved the likelihood of completing a degree by enrolling in summer classes. Both groups also had key gateway courses contribute to positive outcomes: developmental coursework for ELL students and College Math for part-time students. English language learners are again the subpopulation of focus for certificate completion; however, for students in these programs, completing College Writing during their initial year of enrollment is the only factor that yielded positive and statistically significant results. These results from the interactions within the model are especially important for brainstorming new interventions to strategically target at-risk populations to achieve more concentrated improvements or for more cost-effective strategies (i.e., the programming may focus on one subpopulation while still resulting in improvements to the overall population).

## Implications for Further Study at Nashville State

In a focused effort to make improvements to NSCC, administrators should make a commitment to continuing to explore data to better understand who their students are and what their goals are in postsecondary education. Although the CCTA does not label any other community colleges in the state as one of NSCC's peers, it would be beneficial for the administrators to consider using data on other community colleges considered their demographic peers to assist in establishing benchmarks for improving outcome measures or researching best practices used at other institutions. For example, a list of institutional peers, including Chattanooga State Community College, with similar full-time and part-time enrollments is detailed in Appendix E; their corresponding data on number of degrees conferred and graduation rates is listed. Examining performance measures from other similar institutions is an effective method to help

institutions set reasonable goals for improvement.

Since part-time students are a considerable subpopulation of interest, further research should include a qualitative component to explore why students make the academic decision not to enroll in full-time hours. While some factors are outside of the institution's locus of control (i.e., family or work obligations), there may be some issues that can be addressed through institutional interventions. If students lack the confidence to take more hours or perceive the schedule to be overwhelming, student support services can design programs or provide information to encourage students to take more hours. For example, Tennessee State University launched a "Take 15" Initiative to educate students about the benefits of taking 15 credit hours per semester to address concerns about student debt loads and graduation rates (Tennessee State University News Service, 2012).

Additional studies that could provide useful information should include successful transfer into bachelor's degree programs as a positive outcome. More recent research on community college outcomes has begun to include this measure as an indication of success. In addition, NSCC is required to include transfer students when reporting data for state performance funding. The Access to Success Initiative also lists date of registration as a potential indication of risk. Since community colleges (NSCC included) have open admissions requirements that often include rolling admissions policies which allow students to register for classes well into the beginning weeks of a semester, exploring this variable using a regression discontinuity design could reveal better admissions policies to improve student success. Finally, since research has shown that community college students have many motivations for enrolling (Burns, 2010; Goldrick-Rab, 2007), it would be beneficial to better understand students' motivation, especially members of the key subpopulations, to improve the type and ways that students receive information. Moving forward, the recommendations section that follows will provide a number of actionable suggestions to consider in light of this study's findings.

# Recommendations for Policy and Practice

Although the results of this study have revealed some important trends in Nashville State's student population, there still remains the important step of converting these results into actionable suggestions. The formation of the Access to Success Initiative was intended to bring about best practices for shifting policy focus from improving access to higher education to providing resources to better ensure completion (Engle & Lynch, 2009). Participating in this initiative is intended to encourage institutions in "assessing and building capacity, managing and leveraging costs and resources, and using data" (Engle & Lynch, 2009, p. 13). The recommendations outlined consider these guidelines as well as using suggestions found in research to target the specific needs at Nashville State.

The findings from Study Question 1 indicate that enrolling in summer courses, completing College Math during the first year of enrollment, and completing 80% of courses attempted during the first year are positively related to degree completion. Additionally, students in certificate programs were more successful in completing their programs when they enrolled during the summer and completed 80% of courses attempted in the first year. Regarding the subpopulations, results from Study Question 2 showed that part-time students, English language learners, and Black students were less likely to earn an associate degree. English language learners were also less likely to complete certificate programs.

Key themes from the interaction findings in Study Question 3 revealed several relationships between our subpopulations and the milestone variables:

- Part-time students showed improved completion rates in associate degree programs with summer enrollment as well as completing College Math or being classified as a remedial/developmental student;
- Degree-seeking students who are also first generation or remedial/developmental students are less likely to be associate degree completers BUT benefit from being continuously enrolled;
- Adult students showed a negative impact on associate degree completion with summer enrollment; and
- Completing College Writing during the first year has a positive impact on certificate completion for English language learners but a negative impact on those classified as degree-seeking.

Using these findings as a framework, the following recommendations explore research-driven practices from current literature on student success.

**Research on Best Practices in Student Success**

In the book "Student Success in College: Creating Conditions that Matter", Kuh and others (2005) described six guiding principles for improving student success by evaluating the best practices at various two-year and four-year higher education institutions. These guidelines are (p. 24):

- A "living" mission and "lived" educational philosophy;
- An unshakeable focus on student learning;
- Environments adapted for educational enrichment;
- Clearly marked pathways to student success;
- An improvement oriented ethos; and
- Shared responsibility for educational quality and student success.

Although every institution is different with respect to enrollment numbers, access to resources, and student characteristics, there are methods that allow each of the 20 institutions profiled by Kuh and others (2005) to embrace these strategies in ways that yield positive improvements in student outcomes. At Nashville State, the results from this study seemed to recommend a focus on three of these six areas.

**Table 17**

**Major Practice Recommendations Derived from Literature**

| Recommendation from Kuh et al. (2005) | Recommended Practices at Nashville State Community College |
|---|---|
| Improvement Oriented Ethos | Make Data-Driven Decisions |
| Clearly Marked Pathways to Student Success | Provide Students Better Access to Clear, Relevant, and Actionable Information: Target Services to Specific Student Populations and Needs |
| Shared Responsibility for Educational Quality and Student Success | Prioritize Using Multiple Methods to Facilitate Student Engagement to Increase Commitment to College |

**Recommendation #1:**
**Make Data-Driven Decisions**

A central component in establishing an institutional environment that supports and cultivates innovation is the *systematic* use of data to make decisions (Kuh et al., 2005). However, using data is not simply assessing progress; it is about understanding what your institution's mission is as well as who and where your students are. Policies and programs that are most beneficial to student success seem to find ways "to meet students where they are" (Goldrick-Rab, 2007, p. 25). Too much data from postsecondary schools focus on understanding the first-time, full-time freshman cohort group instead of an inclusive profile of all students enrolled at their institution (Dellow & Romano, 2002). The ability to identify student needs early allows administrators to allocate resources to departments and programs that can have the highest impact on student success (Porchea et al., 2010). Two key best practices for using data are described next.

***Track Course Enrollment Data to Assist Scheduling: Focus on Summer***

Results from Study Question 1 exploring the impact of certain academic milestones at Nashville State showed the positive impact that summer enrollment has on certificate as well as associate degree completion. Unfortunately, more academically prepared students seem to enroll in summer than those who are at-risk (Attewell et al., 2012). The courses available in the summer can be used as a tool to increase the academic momentum of students who are at-risk because: a) they are only enrolled part-time; b) they have failed or withdrawn from courses; or c) they are required to take non-degree based coursework first, such as remedial or English as a Second Language (ESL) classes. If there are classes that a high percentage of students do not complete (such as developmental courses or General Biology), NSCC would benefit from giving students an additional opportunity to take the course in the summer. In addition, certain gateway courses like College Writing or College Math, which were shown to be beneficial for NSCC's at-risk populations such as part-time or ELL students, could be particularly beneficial as summer offerings. Course enrollment data can also help academic departments ensure courses are delivered in methods the students need them (i.e., on campus vs. online or day vs. evening sessions). Increasing course completion through summer enrollment or more responsive scheduling can help students meet important benchmarks like completing 80% of courses within the first year—another key milestone shown as significant in Study Question 1.

***Create a Culture that Views Assessment as a Tool not a Threat: Introducing the Institutional Dashboard***

The Community College Survey on Student Engagement (CCSSE) defines a "culture of evidence" as one that "regularly collects systematic, timely, useful and user-

friendly information…and makes it readily available" (2006, p. 6). Additional data is consistently used in the creation of policies and procedures, resource allocation, and the assessment of institutional progress (CCSSE, 2006). The creation of an institutional dashboard is an excellent method to transition from simply providing data to facilitating departments and administrators in using data. One of the major obstacles to making data-driven decisions is the inability to provide timely information in a format that is easy to interpret (Kuh et al., 2005). Community college campuses serve such diverse students that it can often be seen as an insurmountable challenge to provide interventions that can benefit all students. However, making data available allows administrators to implement targeted interventions towards high-risk populations. For example, since results from Study Question 2 show part-time, Black, and ELL students as subpopulations at-risk for failing to earn an associate degree, it is important to see how those specific groups perform in key areas when compared to one another.

**Figure 1**

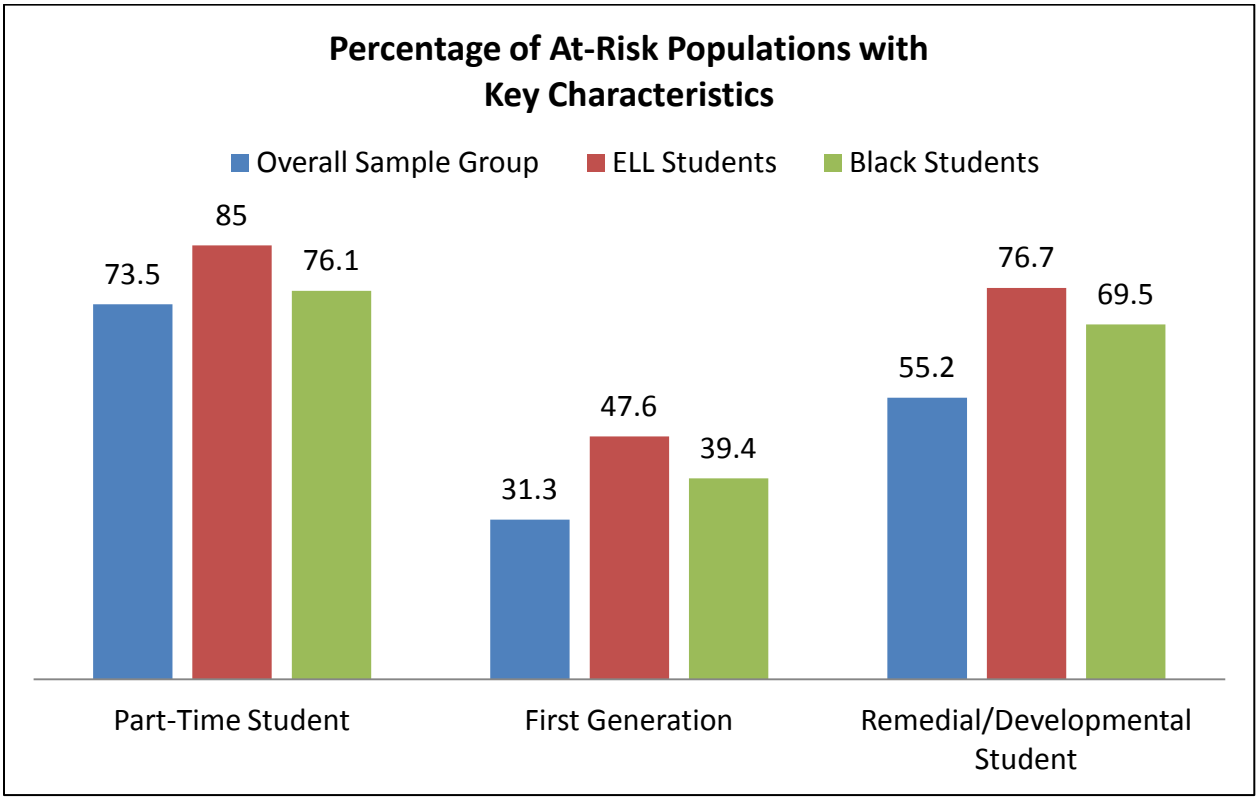


**Figure 2**

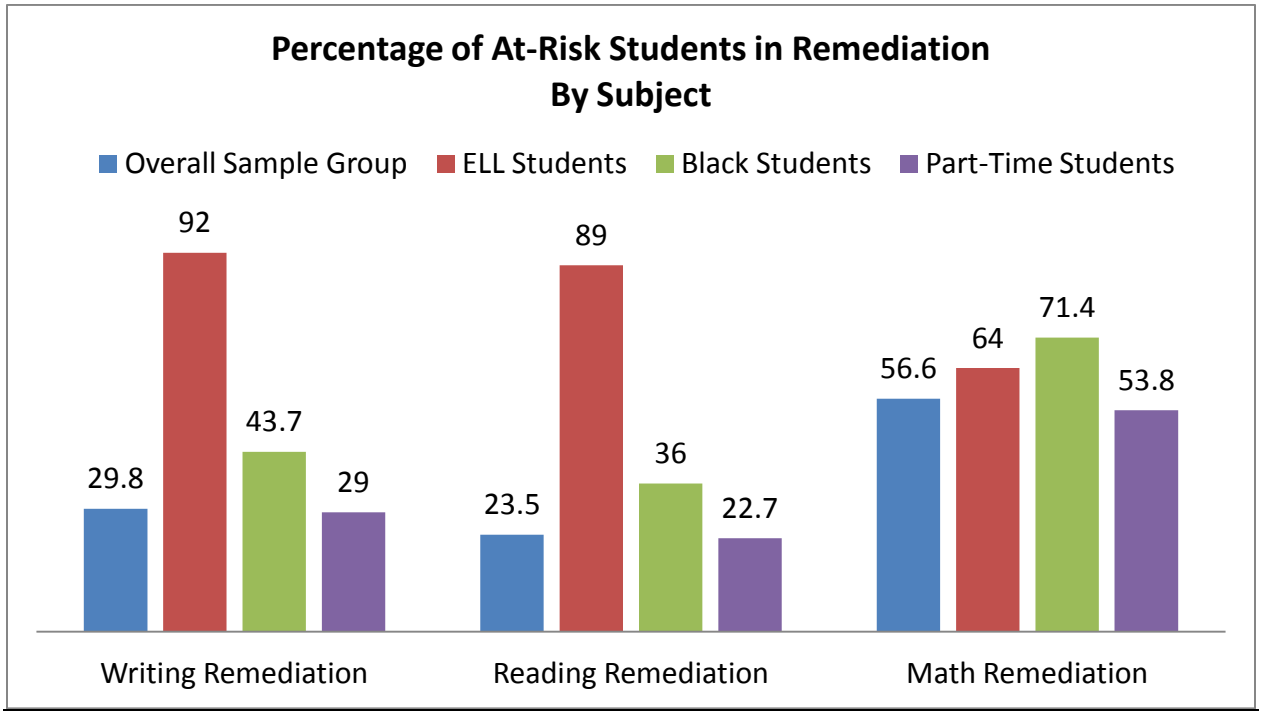
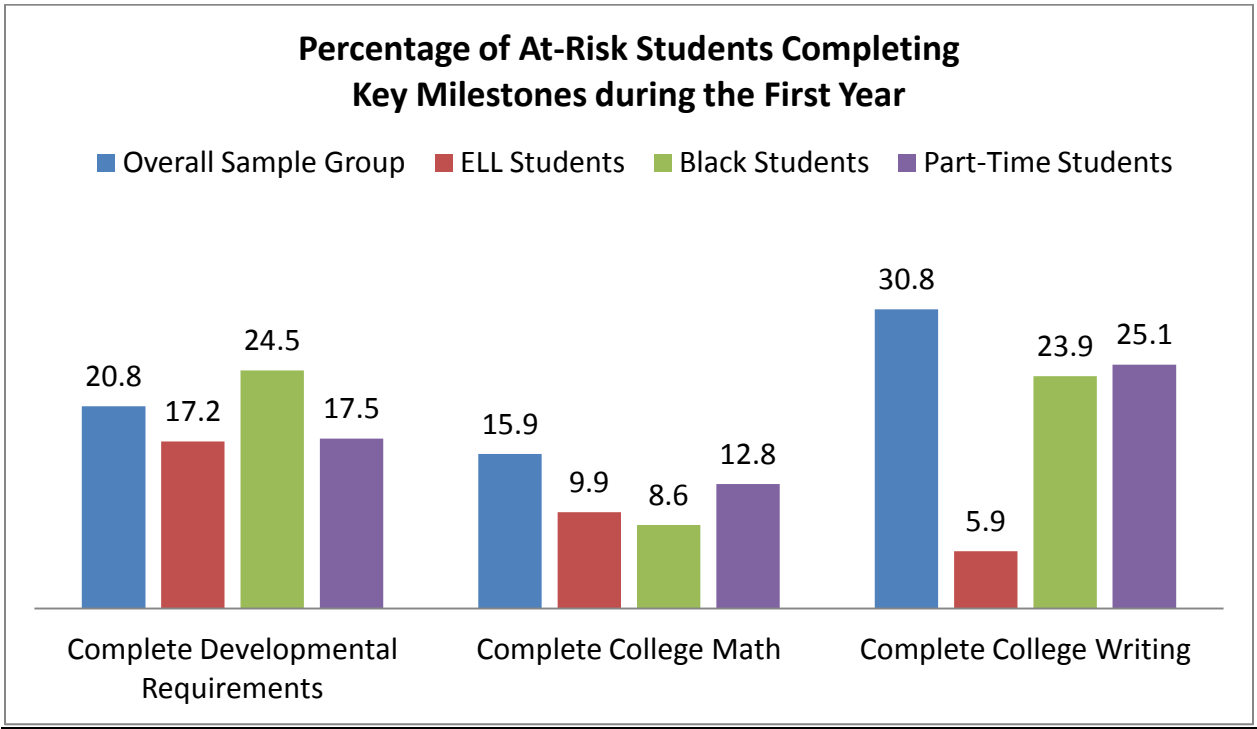



**Figure 3**



With an institutional dashboard, campus faculty and staff can initiate interventions specific to these areas of weakness. Administrators can use a dashboard to systematically track problem areas, measure the effectiveness of initiatives, and give faculty, staff, and students the opportunity to provide feedback. The sample dashboard (included in Appendix F) is designed to respond to the results of this study by providing an overview of all enrolled students and specific data on the at-risk populations identified in Study Question 2 (i.e., part-time, ELL, and Black students). Additionally it allows administrators to establish short-term goals, or benchmarks, for improvement that can be tracked by all institutional departments.

Benchmarking is an essential mechanism for understanding and improving institutional performance (CCSSE, 2006). The CCSSE recommends methods for benchmarking such as: 1) comparisons to the national averages; 2) comparisons to aspirational peer groups; 3) comparing the overall population to at-risk groups; or 4) comparing the status quo to future goals (CCSSE, 2006). Appendix D of this report provides an example that compares the overall sample used in this study to the at-risk subpopulations revealed in Study Question 2. As a starting point, Appendix E also includes a brief list of potential peer institutions based on key demographics to use for comparison retrieved from the IPEDS database. These strategies can give Nashville State a systematic method to set realistic and measurable goals using targeted institutional strategies while assessing progress towards these goals on a regular basis.

***Align Data Collection Methods with Principles of Data-Driven Decision-Making***

Finally it is essential that any data collected on students, particularly at their initial date of entry, is an accurate representation of the student population and relevant to the institution's mission (CCSSE, 2006). It is likely that a full-time, traditional age student would need or want different services than a single parent who works forty hours every week; without knowing who their students are, how can institutions deliver the right type and amount of services to their student population? To better facilitate early intervention with at-risk populations, Nashville State can adjust data collection methods to consider:

- Better identification of English Language Learners based on multiple methods of assessment instead of self-reporting or a singular test score;
- Improving student records on high school GPA and feeder high schools for more diverse information on academic preparation for more accurate placement into remediation; and
- Disaggregating degree-seeking students into those interested in degree and certificate completion as

well as those planning to transfer into bachelor's degree programs before completing a degree.

**Recommendation #2:**
**Provide Students Better Access to Clear, Relevant, and Actionable Information**

When discussing the best practices that schools use to establish "clearly marked pathways to student success", Kuh and others (2005) focus on two key central tenets: (1) teaching students how to be successful and where to find the resources to aid achievement and (2) making the right resources available to students when and how they need them. It is important that students know how to be successful in college, and it is equally important that individual institutions are explicit about how students can be successful within their specific institution. Here are some key strategies to that end.

***Change the Focus of Academic Support: From "All" Information to the "Right" Information***

This strategy is intimately tied to increasing the use of data in decision-making: By better identifying and understanding students, administrators can ensure that specific students are directed towards high-impact strategies to meet their individualized needs. Providing students with information on all services available can be overwhelming, especially for those in at-risk populations, such as first generation or academically underprepared students, and cause students to underutilize resources they could truly benefit from using. Nashville State has a significant number of part-time students enrolled but no specific programming or resources to support their success. This is also true for English language learners and Black students as well. Since findings from Study Questions 2 and 3 identified these subpopulations as particularly at-risk at Nashville State, Table 18 introduces some focused services that could be beneficial.

**Table 18**
**Recommendations Targeted to Specific Subpopulations**

| Subpopulation | Targeted Support Programs & Strategies |
|---|---|
| Part-Time Students | • Diversify course scheduling to include evening, weekend, and/or online options for core requirements to accommodate work and family obligations (Braxton, Hirschy, & McClendon, 2004).<br>• Advisement towards multiple options for increasing course load (i.e., online, evening, weekends, etc.) (Offenstein et al., 2010)<br>• Limiting course withdrawals through early intervention (Offenstein et al., 2010)<br>• Advocating summer enrollment (Attewell et al., 2012) |

| | |
|---|---|
| Black Students | • Peer Mentoring /Advisement programs (Goldrick-Rab, 2007)<br>• Building affinity groups with learning communities or major- specific student success courses (Goldrick-Rab, 2007) |
| English Language Learners | • Better identify ELL students early (Strawn, 2011)<br>• Building affinity groups with learning communities or major-specific student success courses (Goldrick-Rab, 2007)<br>• Provide a central contact/support person for ELL students who need assistance with resources (Strawn, 2011) |

Knowing your students' needs can better ensure that students are provided access to resources that are the most likely to improve outcomes. The impact of these and other strategies targeting these groups can be tracked in the institutional dashboard and adjusted as the results deem necessary.

***Shore Up the "Quality" Instead of Relying on "Quantity"***

Nashville State has information available online, through on-campus and online orientations, at their "One Stop Shop" and from faculty advisors. However, in student services, it is important to caution against "information dumping" and focus on creating systematic processes for providing information (Burns, 2010). Students deluged with lots of emails and flyers may choose to ignore them in lieu of sifting through all the information to find what they need. Goldrick-Rab (2007) noted that:

> "the formal provision of student services…has been found to be more effective in changing student outcomes than more informal models which rely on individual faculty personal 'commitment' and attention in lieu of more formal procedures and practices" (p. 24).

These areas include academic advising, orientation, and tutoring services. In addition, some students may inadvertently not have access to equitable services because of their enrollment status (i.e., part-time or weekend students) and feel less support from the institution (Burns, 2010). Creating a more formalized infrastructure can allow for better diversification within student services that broadens its reach to provide resources that may otherwise only be used by the traditional age, full-time student population.

Though student services offices often have limited fiscal and staffing resources (especially at community colleges), some methods to incorporate more formalized practices into student services are:

- *Peer Mentoring Programs*: Create a peer mentoring program (including training and compensation such as work-study funds) that recruits high-performing students to provide tutoring and advisement to at-risk students.
- *Advisement in Student Success Courses*: Incorporate time for mandatory one-on-one academic planning meetings into the curriculum of student success courses.
- Ensure students have access to and use information about course sequencing and prerequisites.
- Consider mandatory enrollment in student success courses for students in degree-seeking or transfer pathway programs.
- Consider mandatory participation in orientation and/or academic advising for students, especially if they are degree-seeking students or in at-risk populations identified in Study Questions 2 and 3.

***Better Utilize the Reach and Functionality of Technology***

Innovations in technology can be one of the most useful tools in ensuring that students have access to the information that they need when they need it; however, it is vital to use electronic tools like social media and student databases to "supplement not substitute" for face-to-face contact with faculty and staff (Kuh et al., 2005). Nashville State has different technologies in use on campus but could benefit from expanding how they are utilized. For example, NSCC provides an online option for orientation; however, the large part-time student population (again one of the at-risk student groups as indicated in our results) at Nashville State Community College may be unable to participate in other events like career services seminars, academic support sessions, or civic engagement opportunities. It would be beneficial to use technology to archive any workshops or seminars in a NSCC YouTube account or upload podcasts that students can listen to at any time. Creating a **Part-Time Student Clearinghouse** online as part of the Student Services Office website could act as a depository for useful information that is accessible 24 hours a day/7 days a week.

Social media is another mechanism for building connections with students. Tools like Twitter and blogs can provide important information while still engaging students. Many institutions will "follow" students on Twitter as a way to respond to questions or get an immediate "pulse-check" on what their students are saying about the institution. Another example is running the degree evaluation in MyNSCC: While the information is readily available through technology, students would undoubtedly benefit from the opportunity to discuss how the information benefits them, either by taking classes more effectively or graduating sooner. To increase how technology is used, finding

paraprofessionals (i.e., student workers) who are in technology programs or more familiar with social media can be cost-effective and facilitate building meaningful connections between students (Kuh et al., 2005).

**Recommendation #3:**
**Prioritize Using Multiple Methods to Facilitate Student Engagement to Increase Commitment to College**

Results from Study Question 3 showed promoting continuous enrollment for degree-seeking students (i.e., students enrolled in associate degree or certificate programs) had a positive impact on completion. Improving continuous enrollment or "retaining" students, is directly linked to student engagement (Kuh et al., 2005). Kuh and others (2005) define the relationship between successful postsecondary outcomes and student engagement using two criteria: 1) how much do students invest in academic and extracurricular activities related to success and 2) how does the institution encourage and support involvement in both types of activities?

Failure to connect with the campus community, especially with faculty members, is a strong contributing factor to voluntary withdrawal (Barbatis, 2010). Institutions that invest in resources that improve the college experience will create environments where students are more involved academically and integrated into the campus climate (Kuh et al., 2005). It is important to encourage strong collaboration between academic affairs and student services to develop co-curricular options for students (Barbatis, 2010; Burns, 2010). For part-time students and commuter campuses especially, it is particularly beneficial to use the classroom as a mechanism for cultivating engagement (Tinto, 2000).

***Co-curricular experiences*** interlink learning opportunities into extracurricular events or tie student life activities to the classroom (Barbatis, 2010). This strategy can be particularly important for part-time students: If they are not engaged in the classroom, these students are less likely to look outside the classroom for additional academic or social engagement (Tinto, 2000). In addition, high-risk populations like Black students can benefit from associating with positive affinity groups in co-curricular activities (Goldrick-Rab, 2007), or English language learners improve when basic skills education is linked to program-specific content (Strawn, 2011). Research on commuter colleges recommends on-campus work opportunities as a method to help alleviate external stressors like limited income or commuting (Braxton et al., 2004). Connecting the work environment with the learning environment can also help clarify the relevance of course requirements while allowing students to accumulate valuable work experience. Evidence on learning communities shows higher levels of student engagement and improved perceptions of support from the institution (Burns, 2010) while student success courses improve

integration within the campus community (Offenstein et al., 2010). Additionally, faculty advisors and faculty responsible for teaching program-specific content can encourage participation in clubs or organizations to build affinity groups between students with common interests. Examples of academic environments with co-curricular options are presented in Table 19.

**Table 19**

**List of Opportunities for Co-Curricular Program Implementation**

| Program Type | Co-Curricular Implementation |
|---|---|
| Learning Communities | • Organize content learning communities to reflect content/professional goals (i.e., Allied Health, Liberal Arts/Transfer Pathways, STEM, etc.)<br>• Have students required to take multiple developmental courses enroll in cohort groups<br>• Co-teach or combine ESL courses with a course from degree/certificate program<br>• Advise part-time students into learning communities to create peer/study groups |
| Student Success courses | • Create a student success course specifically for ELL or remedial students<br>• Organize content in student success courses to reflect content/professional goals (i.e., Allied Health, Liberal Arts/Transfer Pathways, STEM, etc.)<br>• Incorporate professionally-related service opportunities into curriculum requirements |
| Work-For-Credit Program | • Create requirements and a process for requesting credit for prior work experience in eligible certificate programs<br>• Establish on-campus work experiences for students to earn college credit in addition to a stipend in career/technical fields such as:<br>○ Administrative Assistant (Cert)<br>○ Horticulture (Cert/AAS)<br>○ Computer Information Systems (AAS)<br>○ Computer Networking Systems (AAS)<br>○ Office Administration (AAS)<br>○ Hire tutors from students in A.S. transfer pathways programs such as Biology, Chemistry, Math, History, English, and other social/behavioral science fields |

The recommendations focus on improving outcomes for the student subpopulations identified as at-risk through our study questions. Our intention is to provide a number of different approaches designed to increase student engagement, and subsequently student outcomes, without incurring additional strain on fiscal or human resources. Although using multiple interventions would be beneficial, it is not necessary to implement every suggestion included in this report. However, a few well-implemented and supported initiatives will likely do more to improve the institution than multiple programs with limited resources or poor execution. Just as Nashville State must assess student needs to determine the best methods for improving their students' college completion rates, it is equally important to thoroughly assess which recommendations are feasible and cost effective (i.e., worthwhile given the necessary initial costs) before moving forward with any plans.

# Closing Thoughts

The project team wishes to acknowledge Dr. Kimberly Estep, Vice President of Nashville State Community College and Mr. Ted M. Washington, Associate Vice President for Planning and Assessment at Nashville State Community College, for their time and efforts in providing the project team with much needed context and the data required to complete this study. The team also wishes to thank Professor John M. Braxton for his mentorship and invaluable feedback, without which successful completion of this project would not have been possible. Finally, the team is grateful to Ms. Jungmin Lee, Ph.D. candidate in the Department of Leadership, Policy, and Organization at Vanderbilt University's Peabody College of Education and Human Development, for her guidance on the intricacies of logistic regression.

The project team undertook this study in an effort to provide Nashville State Community College with answers to the following study questions:

1.) Which milestones have a significant impact on program completion at NSCC?
2.) Are specific subpopulations less likely to complete a program based on certain attributes?
3.) Does the impact of these milestones vary by specific subpopulations?

While limited in scope and though all the practical reasons for the answers to these questions are not known, we believe this project succeeds in providing Nashville State with clear guidance on the factors contributing to its graduation rates and offers key insight on some initial steps that can be taken toward sustaining improved academic outcomes for all its students.

# References

Adelman, C. (2006). The toolbox revisited: Paths to degree completion from high school through college. Washington, D.C.: U.S. Department of Education.

Alfonso, M., Bailey, T.R., & Scott, M. (2005). The educational outcomes of occupational sub-baccalaureate students: Evidence from the 1990s. *Economics of Education Review*, *24*, 197-212.

Anderson, D.R., Burnham, K.P., Gould, W.R., & Cherry, S. (2001). Concerns about finding effects that are actually spurious. *Wildlife Society Bulletin*, *29*(1), 311-316.

Andrews, R.L. (2007). Multicollinearity in multiple linear regression using ordinary least squares. Retrieved from www.people.vcu.edu/~randrews/mgmt643/multicollinearity_ information_2-2007.doc.

Attewell, P., Heil, S., & Reisel, L. (2012). What is academic momentum? And does it matter? *Educational Evaluation and Policy Analysis*, *34*(1), 27-44.

Bailey, T.R., Jenkins, D., & Leinbach, T. (2005). *What we know about community college low-income and minority student outcomes: Descriptive statistics from national surveys*. New York: Columbia University, Teachers College, Community College Research Center.

Barbatis, P. (2010). Underprepared, ethnically diverse community college students: Factors contributing to persistence. *Journal of Developmental Education*, *33*(3), 14-24.

Braxton, J.M., Hirschy, A.S., & McClendon, S.A. (2004). *Understanding and reducing college student departure*. In A.J. Kezar (Ed.), ASHE-ERIC Higher Education Report (Vol. 30, No. 3). Hoboken, NJ: Wiley Periodicals, Inc.

Brint, S. (2003). Few remaining dreams: Community colleges since 1985. *Annals of the American Academy of Political and Social Sciences*, *586*, 16-37.

Burns, K. (2010). At issue community college student success variables: A review of literature. *The Community College Enterprise*, 33-61.

Calcagno, J.C., Crosta, P., Bailey, T., & Jenkins, D. (2007). Stepping stones to a degree: The impact of enrollment pathways and milestones on community college student outcomes. *Research in Higher Education*, *48*(7), 775-801.

Capps, R. (2012). Supporting adult student persistence in community college. *Change: The Magazine of Higher Learning*, *44*(2), 38-44.

Choy, S. (2002). *Nontraditional undergraduates: Findings from the condition of education, 2002*. Washington, DC: National Center for Education Statistics. Retrieved from http://www.gpo.gov/fdsys/pkg/ERIC-ED471077/pdf/ERIC-ED471077.pdf.

College Board. (2012). The completion arch: Measuring community college student success. Retrieved from http://advocacy.collegeboard.org/sites/default/files/10b-3074_Completion_Arch_Web_120410.pdf.

Community College Survey of Student Engagement. (2006) Act on Fact: Using Data to Improve Student Success. Retrieved from http://www.ccsse.org/center/resources/docs/publications/CCSSENationalReport2006.pdf.

Complete College Tennessee Act of 2010, Tenn. Code Ann. §§49-7-202 et seq. (2010).

Complete College Tennessee. (2011, January 26). *The Complete College Tennessee Act one year later: Moving forward*. Complete College Tennessee Master Steering Committee Forum. Retrieved from http://tn.gov/thec/complete_college_tn/ccta_files/moving_forward/Full%20Materials.PDF.

Craig, A.J., & Ward, C.V.L. (2008). Retention of community college students: Related student and institutional characteristics. *Journal of College Student Retention*, *9*(4), 505-517.

Crews, D.M., & Aragon, S.R. (2004). Influence of community college developmental education writing course on academic performance. *Community College Review*, *23*, 1-18.

Crisp, G., & Nora, A. (2010). Hispanic student success: Factors influencing the persistence and transfer decisions of Latino community college students enrolled in developmental education. *Research in Higher Education*, *51*, 175-194.

Dayton, E. (2005). Factors that influence adult success at community college. *The Community College Enterprise*, *11*(1), 45-60.

Dellow, D.A., & Romano, R.M. (2002). Measuring outcomes: Is the first-time, full-time cohort appropriate for the community college? *Community College Review*, *30*(2), 42-54.

Engle, J., & Lynch, M. (2009). *Charting a necessary path: The baseline report of the Access to Success Initiative*. Washington, DC: The Education Trust.

Engle, J., Yeado, J., Brusi, R., & Cruz, J.L. (2012). Replenishing opportunity in America: The 2012 midterm report of public higher education systems in the Access to Success Initiative. Washington, D.C.: The Education Trust.

Evelyn, J. (2002). Community colleges start to ask, where are the men? *The Chronicle of Education*. Retrieved from https://chronicle.com/article/Community-Colleges-Start-to/16519/.

Fike, D.S., & Fike, R. (2008). Predictors of first-year student retention in the community college. *Community College Review*, *36*(2), 68-88.

Ganzach, Y. (1997). Misleading interactions and curvilinear terms*. Psychological Methods*, *2*(3), 235-247.

Goldrick-Rab, S. (2007). *Promoting academic momentum at community colleges: Challenges and opportunities*. CCRC Working Paper No. 5. New York: Community College Research Center.

Harbour, C.P., Middleton, V., Lewis, C., & Anderson, S.K. (2003). Naming the other: How dominant culture privilege and assimilation affect selected underrepresented populations at the community college. *Community College Journal of Research and Practice*, *27*, 829-842.

Hawley, T. & Harris, T. (2005-2006). Student characteristics related to persistence for first-year community college students**.** *Journal of College Student Retention*, *7*(1-2), 117-142.

Haycock, K. (2006). *Promise abandoned: How policy choices and institutional practices restrict college opportunities*. (Education Trust Report) Retrieved December 27, 2012 from the Education Trust website: http://www.edtrust.org/dc/publication/promise-abandoned-how-policy-choices-and-institutional-practices-restrict-college-opp.

Hoachlander, G., Sikora, A.C., & Horn, L. (2003). Community college students: Goals, academic preparation, and outcomes. *Education Statistics Quarterly*, *5*(2), 121-128.

Hoyt, J.E. (1999). Remedial education and student attrition. *Community College Review*, *27*, 51-73.

Jacobs, J.A., & King, R.B. (2002). Age and college completion: A life history analysis of women aged 15-44. *Sociology of Education*, *75*(3), 211-230.

Jacobson, L., & Mokher, C. (2009). *Pathways to boosting earnings of low-income students by increasing their educational attainment*. Prepared for the Bill & Melinda Gates Foundation by The Hudson Institute and CNA. Retrieved January 12, 2013 from http://www.hudson.org/files/publications/Pathways%20to%20Boosting.pdf.

Jenkins, D., & Weiss, M.J. (2011). *Charting pathways to completion for low-income community college students* (Working Paper No. 34). Community College Research Center. New York, NY: Teachers College.

Johnson, J., Rochkind, J., Ott, A. N., & DuPont S. (n.d.). *With their whole lives ahead of them: Myths and realities about why so many students fail to finish college*. A Public Agenda Report for the Bill & Melinda Gates Foundation. Retrieved from http://www.publicagenda.org/files/pdf/theirwholelivesaheadofthem.pdf.

Karp, M. & Bork, R. (2012). *"They never told me what to expect, so I didn't know what to do": Defining and clarifying the role of a community college student* (Working Paper No. 47). Columbia University, New York, NY: Community College Research Center.

Karp, M., O'Gara, L., & Hughes, K. L. (2008). Do support services at community colleges encourage student success or reproduce disadvantage? An exploratory study of students in two year colleges (Working Paper No. 10). Columbia University, New York: Community College Research Center. Retrieved January 8, 2013 from http://ccrc.tc.columbia.edu/Publication.asp?uid=571.

Kuh, G.D., Kinzie, J., Schuh, J.H., Whitt, E.J., & Associates (2005). *Student success in college: Creating conditions that matter*. San Francisco, CA: Jossey-Bass.

Leinbach, D. T., & Jenkins, D. (2008). U*sing longitudinal data to increase community college student success: A guide to measuring milestone and momentum point attainment*. New York, NY: Community College Research Center.

McClenney, K., & Waiwaiole, E. (2005). Focus on student retention: Promising practices in community colleges. *Community College Journal*, *75*(6), 36-41.

Mullin, C.M. (2011, October). *The road ahead: A look at trends in the educational attainment of community college students* (Policy Brief 2011-04PBL). Washington, DC: American Association of Community Colleges.

Nashville State Community College. (2012, December 20). *About Nashville State Community College*. Retrieved from http://nscc.edu/about/.

National Center for Educational Statistics. (2011). *Fall 2009 compendium tables*. Retrieved from http://nces.ed.gov/das/library/tables_listings/Fall2009.asp.

National Center for Education Statistics. (2012). *The condition of education 2012*. Retrieved from http://nces.ed.gov/fastfacts/display.asp?id=72.

Nunez, A. M., & Cuccaro-Alamin, S. (1998). *First-generation students: Undergraduates whose parents never enrolled in postsecondary education*. NCES 1999-082. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Offenstein, J., Moore, C., & Shulock, N. (2010). *Advancing by degrees: A framework for increasing college completion.* Sacramento, CA: Institute for Higher Education Leadership and Policy & The Education Trust.

Patthey-Chavez, G., Dillon, P., & Thomas-Spiegel, J. (2005). How far do they get? Tracking students with different academic literacies through community college remediation. *Teaching English in the Two Year College*, *32*(3), 261-277.

Pope, M. (2002). Community college mentoring: Minority student perception. *Community College Review*, *30*(3), 31-45.

Porchea, S.F., Allen, J., Robbins, S., & Phelps, R.P. (2010). Predictors of long-term enrollment and degree outcomes for community college students: Integrating academic, psychosocial, socio-demographic and situational factors. *The Journal of Higher Education*, *81*(6), 680-708.

Rhoda, R. (2011, February 18). Guest column: Educating Tennessee work force is job 1. *The Commercial Appeal*. Retrieved from http://www.commercialappeal.com/news/2011/feb/18/guest-column-educating-tennessee-work-force-is-1/.

Sparks, D., & Malkus, N. (2013). *First-year undergraduate remedial coursetaking: 1999-2000, 2003-2004, 2007-2008*. National Center for Educational Statistics. Retrieved from http://nces.ed.gov/pubs2013/2013013.pdf.

Strawn, J. (2011). *Farther, faster: Six promising programs show how career pathways bridges help basic skills students earn credentials that matter*. Retrieved from http://www.clasp.org/admin/site/publications/files/Farther-Faster.pdf.

Sum, A., Fogg, N., Harrington, P., Khatiwada, I., Palma, S., Pond, N., & Tobar, P. (2003). *The growing gender gaps in college enrollment and degree attainment in the U.S. and their potential economic and social consequences*. Center for Labor Market Studies. Retrieved from http://ovcaa-iro.org/ovcafo_archive/vcafo%20bulletins/gender_gap.pdf.

Sweet, S.A., & Grace-Martin, K. (2008). *Data analysis with SPSS*. Boston, MA: Pearson Education, Inc.

Tennessee Higher Education Commission. (2011). *Complete College Tennessee Act Summary*. Nashville: TN. Tennessee Higher Education Commission. Retrieved from http://tn.gov/thec/complete_college_tn/ccta_summary.html.

Tennessee Higher Education Commission (2011-2012). *Tennessee Higher Education Factbook*. Retrieved from http://www.tn.gov/thec/Legislative/Reports/2012/2011-%202012%20Fact%20Book%20for%20Web%20(13.1.9).pdf.

Tennessee Higher Education Commission. (2012). *Higher Education Profiles and Trends*. Nashville, TN: Tennessee Higher Education Commission. Retrieved from http://www.tn.gov/thec/Legislative/Reports/2012/Profiles--Trends-2012_w_cover_page.pdf.

Tinto, V. (2000). Linking learning and leaving: Exploring the role of the college classroom in student departure. In J.M. Braxton (Ed.), *Reworking the Student Departure Puzzle* (1st ed., pp. 81-94). Nashville, TN: Vanderbilt University Press.

Tonge, C. (2011). *Predicting the in-term persistence of community college English-as-a-second language students*. (Doctoral dissertation). Florida International University, Miami, FL.

Tennessee State University News Service. (2012, December 17). *University to keep students on 4-year graduation track with "Take 15" initiative*. Retrieved from http://tnstatenewsroom.com/archives/8390.

Wang, W., & Parker, K. (2011). *Women see value and benefits of college; Men lag on both fronts, survey finds*. Pew Research Center: Social & Demographic Trends. Retrieved from http://www.pewsocialtrends.org/files/2011/08/Gender-and-higher-ed-FNL-RPT.pdf.

# Appendices

# Appendix A: Variable Operationalization

## INDEPENDENT VARIABLES

**Subpopulations**

**First Generation Students** (Binary variable): Students whose parents never attended college – Students are classified as (1) first generation students or (2) not first generation students.

**Adult Learners** (Binary variable): Students who are 25 years of age or older during the respective Fall enrollment period – Students are classified as (1) adult learners (age 25 or older) or (2) not adult learners (age 24 or younger).

**Race** (Binary variable): For sampling procedures, students self-reported into one of nine IPEDS categories: (1) Resident Alien, (2) Black Non-Hispanic, (3) American Indian/Alaskan Native, (4) Asian, (5) Hispanic, (6) White Non-Hispanic, (7) Unknown, (8) Pacific Islander, and (9) Two Races or More – For data analysis purposes, the Race variable was reclassified into the following six categories: (1) Resident Alien; (2) Black Non-Hispanic; (3) Hispanic; (4) Asian; (5) White Non-Hispanic; and (6) Other Races, which combined American Indian/Alaskan Native, Unknown, Pacific Islander, and Two Races or More.

**Low-Income Students** (Binary variable): Students who are eligible to receive the Pell Grant – Students are classified as (1) low-income students (eligible for Pell) or (2) not low-income students (not eligible for Pell).

**Part-Time Status** (Binary variable): Students who have attended 51% of semesters at Nashville State as a part-time student – Students are classified as (1) part-time students or (2) full-time students.

**English Language Learners** (Binary variable): Students who self-report that English is not their native language on the Nashville State entrance application – Students are classified as (1) English language learners or (2) not English language learners.

**Remedial/Developmental Students** (Binary variable): Students who require remedial or developmental courses upon admission to Nashville State based on ACT, SAT, or COMPASS scores – Students are classified as (1) remedial/developmental students or (2) not remedial/developmental students.

**Gender** (Binary variable): Students are classified as (1) female or (2) male.

**Degree-Seeking Students** (Binary variable): Students who self-select as degree-seeking or non degree-seeking during initial enrollment term as an indication of academic intention – Students are classified as (1) degree-seekers or (2) non degree-seekers.

## Milestones

**Academic Preparation** (Ordinal variable): Students are classified based on COMPASS score placement for Math, Reading, and Writing – For Math placement, students could be placed in (1) Basic Mathematics, (2) Elementary Algebra, (3) Intermediate Algebra, and (4) College Math – For Reading placement, students could be placed in (1) Basic Reading, (2) Developmental Reading, and (3) College Reading – For Writing placement, students could be placed in (1) Basic Writing, (2) Developmental Writing, and (3) College Writing.

**Continuous Enrollment** (Binary variable): Students who are continuously enrolled in at least one class from their first initial semester including summer – Students are classified as (1) having been continuously enrolled or (2) having not been continuously enrolled.

**Summer Enrollment** (Binary variable): Students who have ever taken courses in the summer – Students are classified as (1) having taken summer courses or (2) having not taken summer courses.

**Remedial/Developmental Course Completion in 1st Year** (Binary variable): Students who completed all remedial/developmental coursework in their 1st year – Students are classified as (1) completing remedial/developmental coursework in their 1st year or (2) not completing remedial/developmental coursework in their 1st year

**Completion of College Math in 1st Year** (Binary variable): Students who completed College Math coursework in their 1st year – Students are classified as (1) completing College Math in their 1st year or (2) not completing College Math in their 1st year

**Completion of College Writing in 1st Year** (Binary variable): Students who completed College Writing coursework in their 1st year – Students are classified as (1) completing College Writing in their 1st year or (2) not completing College Writing in their 1st year

**Completion of Student Success Course in 1st Year** (Binary variable): Students who completed a student success course in their 1st year - Students are classified as (1) completing a student success course in their 1st year or (2) not completing a student success course in their 1st year

**Completion of 80% of Coursework in 1st Year** (Binary variable): Students who completed 80% of coursework in their 1st year – Students are classified as (1) completing 80% of coursework in their 1st year or (2) not completing 80% of their coursework in their 1st year

## OUTCOME VARIABLES

**Earned Associate Degree** (Binary variable): Students who have earned any type of associate degree at Nashville State – Students are classified as (1) earning an associate degree or (2) not earning an associate degree

**Earned Certificate** (Binary variable): Students who have earned any type of certificate at Nashville State – Students are classified as (1) earning a certificate or (2) not earning a certificate

# Appendix B: Collinearity Tests

***Appendix B.1: Linear Regression Collinearity Test – Associate Degree Completion***

| ANOVA Test for Collinearity - Associate Degree Completion | | | | | |
|---|---|---|---|---|---|
| **Model** | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| **Regression** | 185.881 | 29 | 6.410 | 54.635 | 0.000 |
| **Residual** | 951.578 | 8111 | 0.117 | | |
| **Total** | 1137.460 | 8140 | | | |

| Model Summary - Associate Degree Completion | | | | |
|---|---|---|---|---|
| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error of the Estimate** |
| 1 | 0.404 | 0.163 | 0.160 | 0.343 |

| Linear Regression Model Test for Collinearity - Associate Degree Completion | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Unstandardized Coefficients** | | **Standardized Coefficients** | | | **Collinearity Statistics** | |
| **Model** | **B** | **Std. Error** | **Beta** | **t** | **Sig.** | **Tolerance** | **VIF** |
| **(Constant)** | 0.045 | 0.032 | | 1.408 | 0.159 | | |
| **First Generation Student** | 0.020 | 0.009 | 0.026 | 2.244 | 0.025 | 0.791 | 1.265 |
| **Adult Learner** | 0.040 | 0.008 | 0.054 | 4.798 | 0.000 | 0.812 | 1.231 |
| **Black** | -0.041 | 0.009 | -0.049 | -4.306 | 0.000 | 0.803 | 1.246 |
| **Hispanic** | -0.001 | 0.023 | 0.000 | -0.024 | 0.981 | 0.966 | 1.036 |
| **Asian** | -0.013 | 0.023 | -0.006 | -0.535 | 0.593 | 0.911 | 1.098 |
| **Resident Alien** | 0.027 | 0.040 | 0.007 | 0.675 | 0.500 | 0.923 | 1.084 |
| **Other Races** | -0.046 | 0.016 | -0.031 | -2.847 | 0.004 | 0.895 | 1.117 |
| **English Language Learner** | -0.067 | 0.019 | -0.047 | -3.596 | 0.000 | 0.597 | 1.676 |
| **Low Income Student** | 0.019 | 0.010 | 0.024 | 1.922 | 0.055 | 0.649 | 1.541 |
| **Part-Time Student** | -0.099 | 0.009 | -0.119 | -10.766 | 0.000 | 0.844 | 1.184 |
| **Remedial/Developmental Student** | 0.014 | 0.012 | 0.019 | 1.222 | 0.222 | 0.427 | 2.345 |
| **Gender** | -0.012 | 0.008 | -0.016 | -1.525 | 0.127 | 0.948 | 1.055 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Degree-Seeking Status** | 0.109 | 0.012 | 0.106 | 9.432 | 0.000 | 0.816 | 1.226 |
| **COMPASS Math Placement** | 0.008 | 0.005 | 0.022 | 1.480 | 0.139 | 0.485 | 2.062 |
| **COMPASS Reading Placement** | -0.001 | 0.006 | -0.003 | -0.183 | 0.855 | 0.414 | 2.417 |
| **COMPASS Writing Placement** | 0.008 | 0.005 | 0.024 | 1.521 | 0.128 | 0.415 | 2.410 |
| **Continuous Enrollment** | -0.066 | 0.008 | -0.087 | -8.261 | 0.000 | 0.923 | 1.083 |
| **Summer Enrollment** | 0.160 | 0.008 | 0.214 | 19.625 | 0.000 | 0.871 | 1.149 |
| **Completing College Math in 1st Year** | 0.040 | 0.011 | 0.040 | 3.587 | 0.000 | 0.820 | 1.220 |
| **Completing College Writing in 1st Year** | 0.004 | 0.009 | 0.005 | 0.440 | 0.660 | 0.775 | 1.291 |
| **Completing Student Success Course in 1st year** | -0.034 | 0.026 | -0.014 | -1.325 | 0.185 | 0.862 | 1.159 |
| **Completing at least 80% of Courses Attempted in 1st Year** | 0.131 | 0.009 | 0.173 | 15.410 | 0.000 | 0.817 | 1.224 |
| **Completing Remedial/Developmental Courses in 1st Year** | -0.038 | 0.011 | -0.042 | -3.565 | 0.000 | 0.737 | 1.357 |
| **2006** | -0.035 | 0.014 | -0.033 | -2.537 | 0.011 | 0.595 | 1.682 |
| **2007** | -0.050 | 0.014 | -0.047 | -3.526 | 0.000 | 0.579 | 1.728 |
| **2008** | -0.064 | 0.015 | -0.059 | -4.391 | 0.000 | 0.580 | 1.723 |
| **2009** | -0.103 | 0.015 | -0.095 | -7.046 | 0.000 | 0.572 | 1.748 |
| **2010** | -0.140 | 0.015 | -0.130 | -9.534 | 0.000 | 0.553 | 1.808 |
| **2011** | -0.184 | 0.015 | -0.172 | -12.273 | 0.000 | 0.528 | 1.895 |

***Appendix B.2: Linear Regression Collinearity Test – Certificate Completion***

| ANOVA Test for Collinearity - Certificate Completion | | | | | |
|---|---|---|---|---|---|
| **Model** | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| **Regression** | 16.611 | 29 | 0.573 | 11.716 | 0.000 |
| **Residual** | 348.580 | 7130 | 0.049 | | |
| **Total** | 365.191 | 7159 | | | |

| Model Summary - Certificate Completion | | | | |
|---|---|---|---|---|
| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error of the Estimate** |
| **1** | 0.213 | 0.045 | 0.042 | 0.221 |

| Linear Regression Model Test for Collinearity - Certificate Completion | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Unstandardized Coefficients** | | **Standardized Coefficients** | | | **Collinearity Statistics** | |
| **Model** | **B** | **Std. Error** | **Beta** | **t** | **Sig.** | **Tolerance** | **VIF** |
| **(Constant)** | -0.01 | 0.022 | | -0.474 | 0.635 | | |
| **First Generation Student** | -0.011 | 0.006 | -0.023 | -1.792 | 0.073 | 0.789 | 1.268 |
| **Adult Learner** | 0.010 | 0.006 | 0.023 | 1.789 | 0.074 | 0.817 | 1.224 |
| **Black** | -0.009 | 0.006 | -0.018 | -1.379 | 0.168 | 0.797 | 1.255 |
| **Hispanic** | 0.021 | 0.016 | 0.015 | 1.296 | 0.195 | 0.965 | 1.036 |
| **Asian** | 0.011 | 0.016 | 0.008 | 0.698 | 0.485 | 0.917 | 1.090 |
| **Resident Alien** | 0.007 | 0.029 | 0.003 | 0.230 | 0.818 | 0.924 | 1.083 |
| **Other Races** | 0.018 | 0.011 | 0.020 | 1.605 | 0.109 | 0.894 | 1.118 |
| **English Language Learner** | -0.055 | 0.013 | -0.065 | -4.350 | 0.000 | 0.602 | 1.661 |
| **Low Income Student** | 0.023 | 0.007 | 0.050 | 3.452 | 0.001 | 0.638 | 1.567 |
| **Part-Time Student** | -0.006 | 0.006 | -0.012 | -0.927 | 0.354 | 0.840 | 1.191 |
| **Remedial/Developmental Student** | -0.019 | 0.008 | -0.042 | -2.391 | 0.017 | 0.435 | 2.298 |
| **Gender** | -0.002 | 0.005 | -0.004 | -0.329 | 0.742 | 0.947 | 1.056 |
| **Degree-Seeking Status** | 0.051 | 0.008 | 0.084 | 6.413 | 0.000 | 0.780 | 1.282 |
| **COMPASS Math Placement** | 0.003 | 0.003 | 0.014 | 0.859 | 0.390 | 0.498 | 2.008 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **COMPASS Reading Placement** | 0.000 | 0.004 | 0.000 | 0.024 | 0.980 | 0.414 | 2.414 |
| **COMPASS Writing Placement** | 0.000 | 0.003 | -0.002 | -0.095 | 0.924 | 0.413 | 2.421 |
| **Continuous Enrollment** | -0.042 | 0.006 | -0.092 | -7.666 | 0.000 | 0.920 | 1.087 |
| **Summer Enrollment** | 0.042 | 0.006 | 0.092 | 7.485 | 0.000 | 0.880 | 1.137 |
| **Completing College Math in 1st Year** | -0.008 | 0.008 | -0.013 | -1.012 | 0.312 | 0.826 | 1.211 |
| **Completing College Writing in 1st Year** | -0.017 | 0.006 | -0.034 | -2.597 | 0.009 | 0.782 | 1.278 |
| **Completing Student Success Course in 1st year** | -0.035 | 0.017 | -0.026 | -2.094 | 0.036 | 0.857 | 1.167 |
| **Completing at least 80% of Courses Attempted in 1st Year** | 0.044 | 0.006 | 0.098 | 7.642 | 0.000 | 0.812 | 1.231 |
| **Completing Remedial/Developmental Courses in 1st Year** | -0.005 | 0.007 | -0.010 | -0.735 | 0.462 | 0.733 | 1.365 |
| **2006** | -0.012 | 0.010 | -0.018 | -1.188 | 0.235 | 0.582 | 1.718 |
| **2007** | -0.010 | 0.010 | -0.015 | -0.944 | 0.345 | 0.563 | 1.775 |
| **2008** | 0.005 | 0.010 | 0.008 | 0.515 | 0.607 | 0.558 | 1.791 |
| **2009** | 0.026 | 0.010 | 0.040 | 2.525 | 0.012 | 0.534 | 1.873 |
| **2010** | 0.026 | 0.010 | 0.042 | 2.578 | 0.010 | 0.506 | 1.975 |
| **2011** | 0.022 | 0.010 | 0.035 | 2.092 | 0.037 | 0.474 | 2.110 |

# Appendix C: Logistic Regression Models

***Appendix C.1: Logistic Regression – Associate Degree Completion (Study Questions 1 and 2)***

| Omnibus Tests of Model Coefficients - Associate Degree Completion | | | |
|---|---|---|---|
| | **Chi Square** | **df** | **Sig.** |
| **Step** | 1553.902 | 29 | 0.000 |
| **Block** | 1553.902 | 29 | 0.000 |
| **Model** | 1553.902 | 29 | 0.000 |

| Logistic Regression Model - Associate Degree Completion | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | **95% C.I. for Exp (B)** | |
| | **B** | **Std. Error** | **Wald** | **df** | **Sig.** | ***OR*** | **Lower** | **Upper** |
| **First Generation Student** | 0.187 | 0.078 | 5.818 | 1 | 0.016 | 1.206 | 1.036 | 1.405 |
| **Adult Learner** | 0.447 | 0.076 | 34.916 | 1 | 0.000 | 1.563 | 1.348 | 1.813 |
| **Black** | -0.409 | 0.086 | 22.555 | 1 | 0.000 | 0.664 | 0.561 | 0.786 |
| **Hispanic** | -0.006 | 0.205 | 0.001 | 1 | 0.977 | 0.994 | 0.666 | 1.485 |
| **Asian** | -0.059 | 0.196 | 0.092 | 1 | 0.762 | 0.942 | 0.642 | 1.384 |
| **Resident Alien** | 0.229 | 0.333 | 0.471 | 1 | 0.493 | 1.257 | 0.654 | 2.416 |
| **Other Races** | -0.372 | 0.137 | 7.334 | 1 | 0.007 | 0.690 | 0.527 | 0.902 |
| **English Language Learner** | -0.481 | 0.167 | 8.262 | 1 | 0.004 | 0.618 | 0.445 | 0.858 |
| **Low Income Student** | 0.140 | 0.083 | 2.874 | 1 | 0.090 | 1.150 | 0.978 | 1.353 |
| **Part-Time Student** | -0.902 | 0.079 | 128.919 | 1 | 0.000 | 0.406 | 0.347 | 0.474 |
| **Remedial/Developmental Student** | 0.235 | 0.107 | 4.787 | 1 | 0.029 | 1.265 | 1.025 | 1.562 |
| **Gender** | -0.086 | 0.069 | 1.525 | 1 | 0.217 | 0.918 | 0.801 | 1.052 |
| **Degree-Seeking Status** | 1.004 | 0.112 | 80.017 | 1 | 0.000 | 2.729 | 2.190 | 3.401 |
| **COMPASS Math Placement** | 0.140 | 0.048 | 8.595 | 1 | 0.003 | 1.150 | 1.047 | 1.262 |
| **COMPASS Reading Placement** | 0.005 | 0.052 | 0.009 | 1 | 0.924 | 1.005 | 0.908 | 1.113 |
| **COMPASS Writing Placement** | 0.099 | 0.044 | 5.070 | 1 | 0.024 | 1.104 | 1.013 | 1.203 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Continuous Enrollment** | -0.697 | 0.076 | 84.930 | 1 | 0.000 | 0.498 | 0.430 | 0.578 |
| **Summer Enrollment** | 1.496 | 0.078 | 371.494 | 1 | 0.000 | 4.463 | 3.833 | 5.196 |
| **Completing College Math in 1st Year** | 0.284 | 0.089 | 10.162 | 1 | 0.001 | 1.328 | 1.116 | 1.582 |
| **Completing College Writing in 1st Year** | 0.054 | 0.077 | 0.493 | 1 | 0.483 | 1.056 | 0.907 | 1.229 |
| **Completing Student Success Course in 1st year** | -2.434 | 1.013 | 5.777 | 1 | 0.016 | 0.088 | 0.012 | 0.638 |
| **Completing at least 80% of Courses Attempted in 1st Year** | 1.202 | 0.081 | 220.511 | 1 | 0.000 | 3.326 | 2.838 | 3.897 |
| **Completing Remedial/Developmental Courses in 1st Year** | -0.312 | 0.094 | 11.016 | 1 | 0.001 | 0.732 | 0.608 | 0.880 |
| **2006** | -0.317 | 0.107 | 8.708 | 1 | 0.003 | 0.728 | 0.590 | 0.899 |
| **2007** | -0.396 | 0.111 | 12.762 | 1 | 0.000 | 0.673 | 0.541 | 0.836 |
| **2008** | -0.510 | 0.117 | 18.907 | 1 | 0.000 | 0.601 | 0.477 | 0.756 |
| **2009** | -0.864 | 0.124 | 48.403 | 1 | 0.000 | 0.422 | 0.331 | 0.538 |
| **2010** | -1.273 | 0.138 | 84.701 | 1 | 0.000 | 0.280 | 0.214 | 0.367 |
| **2011** | -1.829 | 0.160 | 130.627 | 1 | 0.000 | 0.161 | 0.117 | 0.220 |
| **Constant** | -3.752 | 0.302 | 154.095 | 1 | 0.000 | 0.023 | | |

***Appendix C.2: Logistic Regression – Certificate Completion (Study Questions 1 and 2)***

| Omnibus Tests of Model Coefficients - Certificate Completion | | | |
|---|---|---|---|
| | **Chi Square** | **df** | **Sig.** |
| **Step** | 341.336 | 29 | 0.000 |
| **Block** | 341.336 | 29 | 0.000 |
| **Model** | 341.336 | 29 | 0.000 |

| Logistic Regression Model - Certificate Completion | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | **95% C.I. for Exp (B)** | |
| | **B** | **Std. Error** | **Wald** | **df** | **Sig.** | ***OR*** | **Lower** | **Upper** |
| **First Generation Student** | -0.200 | 0.124 | 2.622 | 1 | 0.105 | 0.818 | 0.642 | 1.043 |
| **Adult Learner** | 0.198 | 0.122 | 2.643 | 1 | 0.104 | 1.219 | 0.960 | 1.548 |
| **Black** | -0.208 | 0.137 | 2.305 | 1 | 0.129 | 0.812 | 0.620 | 1.062 |
| **Hispanic** | 0.310 | 0.291 | 1.138 | 1 | 0.286 | 1.364 | 0.771 | 2.411 |
| **Asian** | 0.197 | 0.322 | 0.375 | 1 | 0.541 | 1.218 | 0.648 | 2.287 |
| **Resident Alien** | -0.484 | 1.033 | 0.220 | 1 | 0.639 | 0.616 | 0.081 | 4.668 |
| **Other Races** | 0.259 | 0.200 | 1.673 | 1 | 0.196 | 1.295 | 0.875 | 1.918 |
| **English Language Learner** | -1.085 | 0.297 | 13.350 | 1 | 0.000 | 0.338 | 0.189 | 0.605 |
| **Low Income Student** | 0.454 | 0.130 | 12.126 | 1 | 0.000 | 1.574 | 1.219 | 2.032 |
| **Part-Time Student** | -0.128 | 0.137 | 0.864 | 1 | 0.353 | 0.880 | 0.673 | 1.152 |
| **Remedial/Developmental Student** | -0.311 | 0.170 | 3.365 | 1 | 0.067 | 0.733 | 0.525 | 1.022 |
| **Gender** | -0.034 | 0.113 | 0.091 | 1 | 0.762 | 0.966 | 0.774 | 1.207 |
| **Degree-Seeking Status** | 1.205 | 0.217 | 30.915 | 1 | 0.000 | 3.338 | 2.182 | 5.105 |
| **COMPASS Math Placement** | 0.078 | 0.072 | 1.172 | 1 | 0.279 | 1.082 | 0.938 | 1.247 |
| **COMPASS Reading Placement** | 0.011 | 0.085 | 0.016 | 1 | 0.898 | 1.011 | 0.856 | 1.193 |
| **COMPASS Writing Placement** | -0.006 | 0.073 | 0.006 | 1 | 0.938 | 0.994 | 0.862 | 1.147 |
| **Continuous Enrollment** | -0.993 | 0.131 | 57.014 | 1 | 0.000 | 0.371 | 0.286 | 0.480 |
| **Summer Enrollment** | 0.866 | 0.118 | 53.873 | 1 | 0.000 | 2.378 | 1.887 | 2.997 |
| **Completing College Math in 1st Year** | -0.108 | 0.156 | 0.478 | 1 | 0.489 | 0.897 | 0.660 | 1.220 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Completing College Writing in 1st Year** | -0.278 | 0.132 | 4.447 | 1 | 0.035 | 0.758 | 0.585 | 0.981 |
| **Completing Student Success Course in 1st year** | -0.872 | 0.527 | 2.743 | 1 | 0.098 | 0.418 | 0.149 | 1.173 |
| **Completing at least 80% of Courses Attempted in 1st Year** | 0.944 | 0.129 | 53.528 | 1 | 0.000 | 2.571 | 1.997 | 3.312 |
| **Completing Remedial/Developmental Courses in 1st Year** | -0.150 | 0.160 | 0.874 | 1 | 0.350 | 0.861 | 0.629 | 1.178 |
| **2006** | -0.297 | 0.257 | 1.329 | 1 | 0.249 | 0.743 | 0.449 | 1.231 |
| **2007** | -0.099 | 0.240 | 0.169 | 1 | 0.681 | 0.906 | 0.566 | 1.450 |
| **2008** | 0.187 | 0.234 | 0.637 | 1 | 0.425 | 1.206 | 0.762 | 1.909 |
| **2009** | 0.549 | 0.220 | 6.207 | 1 | 0.013 | 1.732 | 1.124 | 2.668 |
| **2010** | 0.559 | 0.221 | 6.384 | 1 | 0.012 | 1.748 | 1.133 | 2.696 |
| **2011** | 0.522 | 0.222 | 5.543 | 1 | 0.019 | 1.685 | 1.091 | 2.602 |
| **Constant** | -4.893 | 0.498 | 96.447 | 1 | 0.000 | 0.007 | | |

***Appendix C.3: Logistic Regression – Associate Degree Completion Interactions (Study Question 3)***

| Omnibus Tests of Model Coefficients - Associate Degree Interactions | | | |
|---|---|---|---|
| | **Chi Square** | **df** | **Sig.** |
| **Step** | 1796.834 | 91 | 0.000 |
| **Block** | 1796.834 | 91 | 0.000 |
| **Model** | 1796.834 | 91 | 0.000 |

| Logistic Regression Model - Associate Degree Completion Interactions | | | | | | |
|---|---|---|---|---|---|---|
| | **B** | **Std. Error** | **Wald** | **df** | **Sig.** | ***OR*** |
| **First Generation Student** | 1.115 | 0.325 | 11.750 | 1 | 0.001 | 3.050 |
| **Adult Learner** | 1.055 | 0.326 | 10.469 | 1 | 0.001 | 2.872 |
| **Black** | -7.610 | 0.392 | 3.773 | 1 | 0.052 | 0.467 |
| **Hispanic** | -0.034 | 0.199 | 0.029 | 1 | 0.866 | 0.967 |
| **Asian** | -0.150 | 0.198 | 0.569 | 1 | 0.451 | 0.861 |
| **Resident Alien** | 0.228 | 0.347 | 0.430 | 1 | 0.512 | 1.256 |
| **Other Races** | -0.391 | 0.135 | 8.431 | 1 | 0.004 | 0.676 |
| **English Language Learner** | -2.131 | 1.220 | 3.051 | 1 | 0.081 | 0.119 |
| **Low Income Student** | 0.115 | 0.080 | 2.100 | 1 | 0.147 | 1.122 |
| **Part-Time Student** | -1.675 | 0.342 | 24.003 | 1 | 0.000 | 0.187 |
| **Remedial/Developmental Student** | 0.304 | 0.329 | 0.852 | 1 | 0.356 | 1.355 |
| **Gender** | -0.075 | 0.068 | 1.227 | 1 | 0.268 | 0.928 |
| **Degree-Seeking Status** | 0.670 | 0.392 | 2.923 | 1 | 0.087 | 1.954 |
| **COMPASS Math Placement** | 0.119 | 0.047 | 6.373 | 1 | 0.012 | 1.126 |
| **COMPASS Reading Placement** | -0.030 | 0.051 | 0.350 | 1 | 0.554 | 0.971 |
| **COMPASS Writing Placement** | 0.121 | 0.043 | 8.057 | 1 | 0.005 | 1.129 |
| **Continuous Enrollment** | -2.113 | 0.349 | 36.698 | 1 | 0.000 | 0.121 |
| **Summer Enrollment** | 1.250 | 0.316 | 15.706 | 1 | 0.000 | 3.492 |
| **Completing College Math in 1st Year** | -0.715 | 0.333 | 4.609 | 1 | 0.032 | 0.489 |
| **Completing College Writing in 1st Year** | 0.002 | 0.077 | 0.001 | 1 | 0.976 | 1.002 |
| **Completing Student Success Course in 1st year** | -15.991 | 12219.743 | 0.000 | 1 | 0.999 | 0.000 |
| **Completing at least 80% of Courses Attempted in 1st Year** | 1.254 | 0.299 | 17.547 | 1 | 0.000 | 3.504 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Completing Remedial/Developmental Courses in 1st Year** | -13.822 | 40191.665 | 0.000 | 1 | 1.000 | 0.000 |
| **2006** | -0.259 | 0.107 | 5.848 | 1 | 0.016 | 0.772 |
| **2007** | -0.328 | 0.110 | 8.972 | 1 | 0.003 | 0.720 |
| **2008** | -0.416 | 0.116 | 12.907 | 1 | 0.000 | 0.659 |
| **2009** | -0.749 | 0.120 | 38.695 | 1 | 0.000 | 0.473 |
| **2010** | -1.164 | 0.133 | 76.359 | 1 | 0.000 | 0.312 |
| **2011** | -1.661 | 0.149 | 124.815 | 1 | 0.000 | 0.190 |
| **1st Gen x Continuous** | -0.082 | 0.164 | 0.252 | 1 | 0.616 | 0.921 |
| **1st Gen x Summer** | -0.311 | 0.167 | 3.481 | 1 | 0.062 | 0.733 |
| **1st Gen x College Math 1st Yr** | 0.263 | 0.176 | 2.224 | 1 | 0.136 | 1.300 |
| **1st Gen x Success Course 1st Yr** | -16.359 | 2790.459 | 0.000 | 1 | 0.995 | 0.000 |
| **1st Gen x 80% Course Completion 1st Yr** | -0.016 | 0.162 | 0.009 | 1 | 0.922 | 0.984 |
| **1st Gen x Rem/Dev Courses 1st Yr** | 0.192 | 0.185 | 1.073 | 1 | 0.300 | 1.212 |
| **Adult x Continuous** | 0.120 | 0.159 | 0.575 | 1 | 0.448 | 1.128 |
| **Adult x Summer** | -0.332 | 0.164 | 4.118 | 1 | 0.042 | 0.718 |
| **Adult x College Math 1st Yr** | -0.133 | 0.178 | 0.561 | 1 | 0.454 | 0.875 |
| **Adult x Success Course 1st Yr** | -15.429 | 3367.403 | 0.000 | 1 | 0.996 | 0.000 |
| **Adult x 80% Course Completion 1st Yr** | -0.199 | 0.162 | 1.498 | 1 | 0.221 | 0.820 |
| **Adult x Rem/Dev Courses 1st Yr** | 0.371 | 0.192 | 3.729 | 1 | 0.053 | 1.450 |
| **ELL x Continuous** | -0.002 | 0.319 | 0.000 | 1 | 0.996 | 0.998 |
| **ELL x Summer** | 0.872 | 0.532 | 2.683 | 1 | 0.101 | 2.392 |
| **ELL x College Math 1st Yr** | -3.740 | 0.389 | 0.923 | 1 | 0.337 | 0.688 |
| **ELL x Success Course 1st Yr** | -16.345 | 8438.146 | 0.000 | 1 | 0.998 | 0.000 |
| **ELL x 80% Course Completion 1st Yr** | 0.023 | 0.405 | 0.003 | 1 | 0.955 | 1.023 |
| **ELL x Rem/Dev Courses 1st Yr** | 0.524 | 0.351 | 2.226 | 1 | 0.136 | 1.689 |
| **PT x Continuous** | 0.327 | 0.168 | 3.814 | 1 | 0.051 | 1.387 |
| **PT x Summer** | 0.438 | 0.168 | 6.787 | 1 | 0.009 | 1.549 |
| **PT x College Math 1st Yr** | 0.738 | 0.180 | 16.748 | 1 | 0.000 | 2.092 |
| **PT x Success Course 1st Yr** | -15.489 | 2751.769 | 0.000 | 1 | 0.996 | 0.000 |
| **PT x 80% Course Completion 1st Yr** | -0.646 | 0.173 | 13.991 | 1 | 0.000 | 0.524 |
| **PT x Rem/Dev Courses 1st Yr** | -0.352 | 0.197 | 3.198 | 1 | 0.074 | 0.703 |
| **Degree-Seeking x Continuous** | 1.097 | 0.317 | 11.960 | 1 | 0.001 | 2.994 |
| **Degree-Seeking x Summer** | 0.060 | 0.294 | 0.042 | 1 | 0.838 | 1.062 |
| **Degree-Seeking x College Math 1st Yr** | 0.448 | 0.312 | 2.064 | 1 | 0.151 | 1.565 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Degree-Seeking x Success Course 1st Yr** | - | - | - | - | - | - |
| **Degree-Seeking x 80% Course Completion 1st Yr** | 0.366 | 0.262 | 1.959 | 1 | 0.162 | 1.442 |
| **Degree-Seeking x Rem/Dev Courses 1st Yr** | -0.379 | 0.357 | 1.122 | 1 | 0.289 | 0.685 |
| **Black x Continuous** | 0.237 | 0.178 | 1.758 | 1 | 0.185 | 1.267 |
| **Black x Summer** | 0.285 | 0.211 | 1.828 | 1 | 0.176 | 1.330 |
| **Black x College Math 1st Yr** | 0.172 | 0.229 | 0.562 | 1 | 0.454 | 1.188 |
| **Black x Success Course 1st Yr** | -14.717 | 2715.333 | 0.000 | 1 | 0.996 | 0.000 |
| **Black x 80% Course Completion 1st Yr** | 0.009 | 0.174 | 0.003 | 1 | 0.959 | 1.009 |
| **Black x Rem/Dev Courses 1st Yr** | -0.427 | 0.222 | 3.704 | 1 | 0.054 | 0.652 |
| **Black x Adult** | 0.181 | 0.181 | 0.993 | 1 | 0.319 | 1.198 |
| **Black x 1st Gen** | -0.039 | 0.168 | 0.053 | 1 | 0.818 | 0.962 |
| **Black x PT** | 0.251 | 0.199 | 1.594 | 1 | 0.207 | 1.285 |
| **Black x ELL** | 0.293 | 0.337 | 0.757 | 1 | 0.384 | 1.341 |
| **Black x Degree-Seeking** | -0.202 | 0.288 | 0.493 | 1 | 0.482 | 0.817 |
| **PT x ELL** | -0.585 | 0.364 | 2.586 | 1 | 0.108 | 0.557 |
| **PT x 1st Gen** | -0.024 | 0.162 | 0.022 | 1 | 0.881 | 0.976 |
| **PT x Adult** | -0.022 | 0.160 | 0.019 | 1 | 0.891 | 0.978 |
| **PT x Degree-Seeking** | 0.447 | 0.299 | 2.238 | 1 | 0.135 | 1.563 |
| **ELL x Adult** | -0.284 | 0.309 | 0.845 | 1 | 0.358 | 0.752 |
| **ELL x 1st Gen** | -0.112 | 0.280 | 0.161 | 1 | 0.689 | 0.894 |
| **ELL x Degree-Seeking** | -0.445 | 0.426 | 1.094 | 1 | 0.296 | 0.641 |
| **1st Gen x Adult** | -0.192 | 0.155 | 1.545 | 1 | 0.214 | 0.825 |
| **1st Gen x Degree-Seeking** | -0.795 | 0.263 | 9.119 | 1 | 0.003 | 0.452 |
| **Degree-Seeking x Adult** | -0.143 | 0.252 | 0.322 | 1 | 0.571 | 0.867 |
| **Rem/Dev Status x Continuous Enrollment** | 0.289 | 0.156 | 3.441 | 1 | 0.064 | 1.334 |
| **Rem/Dev Status x Summer** | 0.187 | 0.162 | 1.334 | 1 | 0.248 | 1.206 |
| **Rem/Dev Status x College Math 1st Yr** | 0.131 | 0.176 | 0.552 | 1 | 0.458 | 1.140 |
| **Rem/Dev Status x Success Course 1st Yr** | 15.813 | 12219.743 | 0.000 | 1 | 0.999 | 7371561.957 |
| **Rem/Dev Status x 80% of Courses 1st Yr** | 0.189 | 0.163 | 1.349 | 1 | 0.245 | 1.208 |
| **Rem/Dev Status x Rem/Dev Courses 1st Yr** | 13.840 | 40191.665 | 0.000 | 1 | 1.000 | 1024925.811 |
| **Black x Rem/Dev Status** | 0.056 | 0.192 | 0.084 | 1 | 0.771 | 1.057 |
| **ELL x Rem/Dev Status** | 1.853 | 1.045 | 3.145 | 1 | 0.076 | 6.381 |
| **PT x Rem/Dev Status** | 0.566 | 0.189 | 8.989 | 1 | 0.003 | 1.762 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **1st Gen x Rem/Dev Status** | 0.096 | 0.171 | 0.313 | 1 | 0.576 | 1.100 |
| **Adult x Rem/Dev Status** | -0.171 | 0.176 | 0.945 | 1 | 0.331 | 0.843 |
| **Degree-Seeking x Rem/Dev Status** | -0.872 | 0.261 | 11.163 | 1 | 0.001 | 0.418 |
| **Constant** | -3.060 | 0.483 | 40.125 | 1 | 0.000 | 0.047 |

***Appendix C.4: Logistic Regression – Certificate Completion Interactions (Study Question 3)***

| Omnibus Tests of Model Coefficients - Certificate Completion Interactions | | | |
|---|---|---|---|
| | **Chi Square** | **df** | **Sig.** |
| **Step** | 362.612 | 42 | 0.000 |
| **Block** | 362.612 | 42 | 0.000 |
| **Model** | 362.612 | 42 | 0.000 |

| Logistic Regression Model - Certificate Completion Interactions | | | | | | |
|---|---|---|---|---|---|---|
| | **B** | **Std. Error** | **Wald** | **df** | **Sig.** | ***OR*** |
| **First Generation Student** | -0.209 | 0.124 | 2.842 | 1 | 0.092 | 0.812 |
| **Adult Learner** | 0.204 | 0.123 | 2.755 | 1 | 0.097 | 1.226 |
| **Black** | -0.215 | 0.138 | 2.428 | 1 | 0.119 | 0.807 |
| **Hispanic** | 0.350 | 0.293 | 1.430 | 1 | 0.232 | 1.419 |
| **Asian** | 0.188 | 0.324 | 0.339 | 1 | 0.560 | 1.207 |
| **Resident Alien** | -0.658 | 1.072 | 0.377 | 1 | 0.539 | 0.518 |
| **Other Races** | 0.251 | 0.201 | 1.562 | 1 | 0.211 | 1.286 |
| **English Language Learner** | -1.122 | 0.897 | 1.563 | 1 | 0.211 | 0.326 |
| **Low Income Student** | 0.383 | 0.278 | 1.900 | 1 | 0.168 | 1.467 |
| **Part-Time Student** | -0.132 | 0.138 | 0.912 | 1 | 0.340 | 0.877 |
| **Remedial/Developmental Student** | -0.303 | 0.171 | 3.139 | 1 | 0.076 | 0.739 |
| **Gender** | -0.026 | 0.114 | 0.051 | 1 | 0.821 | 0.975 |
| **Degree-Seeking Status** | 0.819 | 0.562 | 2.126 | 1 | 0.145 | 2.269 |
| **COMPASS Math Placement** | 0.075 | 0.073 | 1.049 | 1 | 0.306 | 1.077 |
| **COMPASS Reading Placement** | -0.010 | 0.085 | 0.014 | 1 | 0.904 | 0.990 |
| **COMPASS Writing Placement** | 0.003 | 0.073 | 0.001 | 1 | 0.969 | 1.003 |
| **Continuous Enrollment** | -2.457 | 0.743 | 10.936 | 1 | 0.001 | 0.086 |
| **Summer Enrollment** | 0.949 | 0.436 | 4.732 | 1 | 0.030 | 2.582 |
| **Completing College Math in 1st Year** | -0.103 | 0.157 | 0.427 | 1 | 0.513 | 0.902 |
| **Completing College Writing in 1st Year** | 0.595 | 0.418 | 2.021 | 1 | 0.155 | 1.812 |
| **Completing Student Success Course in 1st year** | -0.926 | 0.528 | 3.073 | 1 | 0.080 | 0.396 |
| **Completing at least 80% of Courses Attempted in 1st Year** | 0.371 | 0.461 | 0.650 | 1 | 0.420 | 1.450 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Completing Remedial/Developmental Courses in 1st Year** | -0.171 | 0.161 | 1.125 | 1 | 0.289 | 0.843 |
| **2006** | -0.319 | 0.258 | 1.528 | 1 | 0.216 | 0.727 |
| **2007** | -0.126 | 0.241 | 0.276 | 1 | 0.600 | 0.881 |
| **2008** | 0.166 | 0.236 | 0.497 | 1 | 0.481 | 1.181 |
| **2009** | 0.528 | 0.222 | 5.673 | 1 | 0.017 | 1.696 |
| **2010** | 0.540 | 0.223 | 5.886 | 1 | 0.015 | 1.716 |
| **2011** | 0.481 | 0.223 | 4.653 | 1 | 0.031 | 1.617 |
| **ELL x Continuous** | -0.079 | 0.608 | 0.017 | 1 | 0.897 | 0.924 |
| **ELL x Summer** | 0.234 | 0.663 | 0.124 | 1 | 0.725 | 1.263 |
| **ELL x College Writing 1st Yr** | 1.934 | 0.730 | 7.012 | 1 | 0.008 | 6.914 |
| **ELL x 80% Course Completion 1st Yr** | -0.497 | 0.671 | 0.548 | 1 | 0.459 | 0.608 |
| **Low Income x Continuous** | 0.221 | 0.266 | 0.689 | 1 | 0.406 | 1.247 |
| **Low Income x Summer** | 0.204 | 0.234 | 0.760 | 1 | 0.383 | 1.226 |
| **Low Income x College Writing 1st Yr** | 0.041 | 0.248 | 0.027 | 1 | 0.868 | 1.042 |
| **Low Income x 80% Course Completion 1st Yr** | -0.157 | 0.255 | 0.376 | 1 | 0.540 | 0.855 |
| **Degree-Seeking x Continuous** | 1.450 | 0.763 | 3.609 | 1 | 0.057 | 4.263 |
| **Degree-Seeking x Summer** | -0.222 | 0.458 | 0.236 | 1 | 0.627 | 0.801 |
| **Degree-Seeking x College Writing 1st Yr** | -1.006 | 0.443 | 5.156 | 1 | 0.023 | 0.366 |
| **Degree-Seeking x 80% Course Completion 1st Yr** | 0.740 | 0.482 | 2.354 | 1 | 0.125 | 2.096 |
| **ELL x Low Income** | 0.113 | 0.566 | 0.040 | 1 | 0.841 | 1.120 |
| **Constant** | -4.424 | 0.690 | 41.054 | 1 | 0.000 | 0.012 |

# Appendix D: Comparison of Descriptives from Key Subpopulations

| Comparison of Descriptives from Key Subpopulations [1] | | | | |
|---|---|---|---|---|
| | **Overall Sample** | **Part-Time Students** | **ELL Students** | **Black Students** |
| **First Generation Student** | 31.3% | 29.0% | 47.6% | 39.4% |
| **Adult Learner** | 50.8% | 58.4% | 62.1% | 55.6% |
| **Low-Income** | 35.4% | 30.9% | 54.4% | 49.8% |
| **Part-Time Status** | 73.5% | ~~~~~ | 85.0% | 76.1% |
| **ELL Status** | 7.4% | 8.6% | ~~~~ | 6.2% |
| **Remedial/Developmental Status** | 55.2% | 50.8% | 76.7% | 69.5% |
| **Degree-Seeking Status** | 81.6% | 77.3% | 83.7% | 87.9% |
| **COMPASS Math Placement** | Basic Math: 10.6%; Elem Algebra: 27.2% Int Algebra: 18.8% | Basic Math: 11.0% Elem Algebra: 25.5% Int Algebra: 17.3% | Basic Math: 22.6% Elem Algebra: 24.9% Int Algebra: 16.5% | Basic Math: 19.3% Elem Algebra: 34.1% Int Algebra: 18.0% |
| **COMPASS Reading Placement** | Basic Reading: 7.0% Dev Reading: 16.5% | Basic Reading: 8.2% Dev Reading: 14.5% | Basic Reading: 67.4% Dev Reading: 21.6% | Basic Reading: 8.4% Dev Reading: 27.6% |
| **COMPASS Writing Placement** | Basic Writing: 14.2% Dev Writing: 15.6% | Basic Writing: 14.9% Dev Writing: 14.1% | Basic Writing: 79.0% Dev Writing: 13.0% | Basic Writing: 21.3% Dev Writing: 22.4% |
| **Continuously Enrolled** | 41.5% | 42.3% | 35.9% | 43.1% |
| **Summer Enrollment** | 48.5% | 52.1% | 66.7% | 52.1% |
| **Complete Remedial/Developmental courses in 1st Year** | 20.8% | 17.5% | 17.2% | 24.5% |
| **Complete College Math in 1st Year** | 15.9% | 12.8% | 9.9% | 8.6% |
| **Complete College Writing in 1st Year** | 30.8% | 25.1% | 5.9% | 23.9% |
| **Complete Student Success Course in 1st Year** | 2.3% | 1.6% | 1.6% | 4.6% |
| **Complete 80% of Attempted Courses in 1st Year** | 59.5% | 62.2% | 73.4% | 44.4% |
| **Earned Certificate** | 6.1% | 6.3% | 3.9% | 5.3% |
| **Earned Associate Degree** | 16.0% | 13.7% | 14.0% | 12.2% |

**[1] Percentages reflect the number of students who are classified as "yes" in response to the question**

# Appendix E: Comparisons with Peer Institutions

## Data from 2011

| UnitID | Institution Name | Estimated undergraduate enrollment total (EFEST2011) | Estimated undergraduate enrollment full time (EFEST2011) | Estimated undergraduate enrollment part-time (EFEST2011) | Number completed a degree/certificate within 100% of normal time (GR200_11) | Graduation rate - degree/certificate within 100% of normal time (GR200_11) | Number completed a degree/certificate within 150% of normal time (GR200_11) | Graduation rate - degree/certificate within 150% of normal time (GR200_11) | Number completed a degree/certificate between 150% and 200% of normal time (GR200_11) | Number completed a degree/certificate within 200% of normal time (GR200_11) | Graduation rate - degree/certificate within 200% of normal time (GR200_11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 219824 | Chattanooga State Community College | 10440 | 4776 | 5664 | 81 | 8 | 81 | 8 | 71 | 152 | 15 |
| 198534 | Fayetteville Technical Community College | 10398 | 5200 | 5198 | 53 | 7 | 102 | 13 | 50 | 152 | 19 |
| 101505 | Jefferson State Community College | 9955 | 3815 | 6140 | 22 | 2 | 67 | 7 | 30 | 97 | 11 |
| 157711 | Somerset Community College | 9378 | 4408 | 4970 | 98 | 12 | 197 | 25 | 29 | 226 | 28 |

| UnitID | Institution Name | Estimated undergraduate enrollment total (EFEST2011) | Estimated undergraduate enrollment full time (EFEST2011) | Estimated undergraduate enrollment part-time (EFEST2011) | Number completed a degree/certificate within 100% of normal time (GR200_11) | Graduation rate - degree/certificate within 100% of normal time (GR200_11) | Number completed a degree/certificate within 150% of normal time (GR200_11) | Graduation rate - degree/certificate within 150% of normal time (GR200_11) | Number completed a degree/certificate between 150% and 200% of normal time (GR200_11) | Number completed a degree/certificate within 200% of normal time (GR200_11) | Graduation rate - degree/certificate within 200% of normal time (GR200_11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 221184 | Nashville State Community College | 9876 | 3313 | 6563 | 55 | 9 | 55 | 9 | 26 | 81 | 13 |

*Source: IPEDS Data Center - [http://nces.ed.gov/ipeds/datacenter/](http://nces.ed.gov/ipeds/datacenter/)*

## Data from 2010

| UnitID | Institution Name | Estimated undergraduate enrollment total (EFEST2010) | Estimated undergraduate enrollment full time (EFEST2010) | Estimated undergraduate enrollment part-time (EFEST2010) | Number completed a degree/certificate within 100% of normal time (GR200_10_RV) | Graduation rate - degree/certificate within 100% of normal time (GR200_10_RV) | Number completed a degree/certificate within 150% of normal time (GR200_10_RV) | Graduation rate - degree/certificate within 150% of normal time (GR200_10_RV) | Number completed a degree/certificate between 150% and 200% of normal time (GR200_10_RV) | Number completed a degree/certificate within 200% of normal time (GR200_10_RV) | Graduation rate - degree/certificate within 200% of normal time (GR200_10_RV) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 219824 | Chattanooga State Community College | 10275 | 4677 | 5598 | 26 | 3 | 74 | 7 | 49 | 123 | 12 |
| 198534 | Fayetteville Technical Community College | 10502 | 4900 | 5602 | 15 | 2 | 48 | 7 | 93 | 141 | 21 |
| 101505 | Jefferson State Community College | 9961 | 4107 | 5854 | 33 | 4 | 62 | 7 | 35 | 97 | 11 |
| 157711 | Somerset Community College | 9200 | 4497 | 4703 | 159 | 17 | 269 | 29 | 50 | 319 | 35 |

| UnitID | Institution Name | Estimated undergraduate enrollment total (EFEST2010) | Estimated undergraduate enrollment full time (EFEST2010) | Estimated undergraduate enrollment part-time (EFEST2010) | Number completed a degree/certificate within 100% of normal time (GR200_10_RV) | Graduation rate - degree/certificate within 100% of normal time (GR200_10_RV) | Number completed a degree/certificate within 150% of normal time (GR200_10_RV) | Graduation rate - degree/certificate within 150% of normal time (GR200_10_RV) | Number completed a degree/certificate between 150% and 200% of normal time (GR200_10_RV) | Number completed a degree/certificate within 200% of normal time (GR200_10_RV) | Graduation rate - degree/certificate within 200% of normal time (GR200_10_RV) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 221184 | Nashville State Community College | 9853 | 3506 | 6347 | 17 | 3 | 57 | 9 | 21 | 78 | 12 |

*Source: IPEDS Data Center - [http://nces.ed.gov/ipeds/datacenter/](http://nces.ed.gov/ipeds/datacenter/)*

# Appendix A: Sample Institutional Dashboard

**Nashville State Community College Dashboard**

**Key Performance Indicators**


No Significant Change: +/- 1 standard deviation (SD) from prior year


Positive Change: +2 or more SD from prior year


Negative Change: -2 or more SD from prior year

**Accumulated 12 credits in 1st Year**

| | Fall 2011 | Fall 2012 | Benchmark Progress? |
|---|---|---|---|
| Overall Enrolled Population | | | |
| Part-Time Students | | | |
| Black Students | | | |
| English Language Learners | | | |

**Completed 80% of Attempted Hours in 1st Year**

| | Fall 2011 | Fall 2012 | Benchmark Progress? |
|---|---|---|---|
| Overall Enrolled Population | | | |
| Part-Time Students | | | |
| Black Students | | | |
| English Language Learners | | | |

**Accumulated 24 credits in 2nd Year**

| | Fall 2011 | Fall 2012 | Benchmark Progress? |
|---|---|---|---|
| Overall Enrolled Population | | | |
| Part-Time Students | | | |
| Black Students | | | |
| English Language Learners | | | |

**Fall to Spring Retention Rate**

| | Fall 2011 | Fall 2012 | Benchmark Progress? |
|---|---|---|---|
| Overall Enrolled Population | | | |
| Part-Time Students | | | |
| Black Students | | | |
| English Language Learners | | | |

**Accumulated 36 credits in 3rd Year**

| | Fall 2011 | Fall 2012 | Benchmark Progress? |
|---|---|---|---|
| Overall Enrolled Population | | | |
| Part-Time Students | | | |
| Black Students | | | |
| English Language Learners | | | |

**Earned Certificate**

| | Fall 2011 | Fall 2012 | Benchmark Progress? |
|---|---|---|---|
| Overall Enrolled Population | | | |
| Part-Time Students | | | |
| Black Students | | | |
| English Language Learners | | | |

**Completed Remedial/Developmentals in 1st Year**

| | Fall 2011 | Fall 2012 | Benchmark Progress? |
|---|---|---|---|
| Overall Enrolled Population | | | |
| Part-Time Students | | | |
| Black Students | | | |
| English Language Learners | | | |

**Earned Associate Degree**

| | Fall 2011 | Fall 2012 | Benchmark Progress? |
|---|---|---|---|
| Overall Enrolled Population | | | |
| Part-Time Students | | | |
| Black Students | | | |
| English Language Learners | | | |