INFLUENCES ON COMMUNITY COLLEGE TRANSFER STUDENT PERSISTENCE AT AN URBAN PUBLIC UNIVERSITY: DEVELOPING AND VALIDATING A PREDICTIVE MODEL USING STUDENT DEMOGRAPHIC DATA AND TRANSCRIPT DATA

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ABSTRACT

In recent years, more students have opted to begin their collegiate career at the community college. Rising tuition rates, coupled with a declining economy in the United States, make the community college’s lower cost, convenient location and flexible class schedules even more attractive, if not necessary, for many students (Cohen & Brawer, 2003, 2008). According to Cejda and Kaylor (2001), enrollment numbers at the community college are not just increasing in general, but these institutions are also experiencing an increase in the number of traditional college-aged students (18-24) enrolled, leading to an increase in the number of potential transfer students. However, only an average of 22% of community college students ever make the transfer to a four-year institution, even with interest or intent to transfer averages around 70% (Romano, 2004). The purpose of this study was to identify predictive factors of retention and persistence to graduation for in-state community college transfer students at a four-year public research university through the use of existing institutional student data. Demographic and transcript data were analyzed using logistic regression analysis to develop and validate a predictive model. Results of the analyses found that pre- and post-transfer grade point average (GPA), number of transfer hours, course withdrawals, grades of F at the four-year site institution, age at time of enrollment, academic major, and the number of community colleges attended were predictive within the three models of post-transfer outcomes of graduated at any time, graduated in two years, and graduated in four years.
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Completing my doctoral degree program and dissertation has taught me almost as much about myself, as it has about the content area of my study. There were many moments along the way that the idea of quitting became very tempting. Most of those times occurred when I was trying to do it all without asking for help, or more accurately, when trying to avoid committee review of my work. Thankfully, after many failed attempts to make progress without assistance, I learned that not only were my committee members there to improve my work through critique, but that I would not succeed without their help. I am very grateful to my committee members for their efforts to challenge me as a student and for their thoughtful feedback throughout the process. I am proud to have my work associated with such an esteemed group of scholars.

Dr. David E. Hardy served as my committee chair, but his contribution to my life goes far beyond the successful completion of this degree. Dr. Hardy has always encouraged me to strive for more and to be confident in my abilities. Dr. Hardy meets challenges with great energy and excitement to learn, which I will always admire. His own work is impeccable, not because he never makes an error, but because he takes pride in everything that he does and makes time to deliver only the best. These are lessons that Dr. Hardy did not directly teach in the classroom but are lessons that I will take with me for a lifetime. I value his opinion above most and am honored to have had him as my dissertation chair and advisor.

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CHAPTER I:
INTRODUCTION

More than 200 years after establishing our country’s first institutions of higher education, modeled after England’s Oxford and Cambridge, and over a 100 years ago, America created a new pathway to higher education with the establishment of the first junior college, Joliet Junior College in 1901 (Cohen & Brawer, 1996, 2003, 2008). The community college, successor to the junior college, provides an open-access starting point for students who, for a variety of reasons, did not begin at a four-year institution. Although young in comparison to the four-year institution, the community college has experienced a great deal of transition. In its inception, the junior college provided academic preparation for students planning to transfer to the senior four-year institution. Over time the community college, as indicated by its name, has become more focused on serving the multitude of needs in the surrounding community. Cohen and Brawer (1989) identified five basic functions of the modern community college: (a) general education or transfer preparation; (b) technical, occupational, or vocational education; (c) developmental education; (d) continuing education; and (e) community service. Today, economic and workforce development could easily be added to the list of functions (Cohen & Brawer, 2003, 2008).

Cohen and Brawer (2003, 2008) described the emergence of community colleges in the early twentieth century as an extension of the American desire to offer more citizens a sense of legitimacy through an established educational institution. However, in the beginning, the open-access democratic mission often associated with today’s community colleges was not readily
apparent. Cohen and Brawer (2003) explained that our country was rapidly becoming more industrialized and was in great need of more skilled workers, skills which technical colleges could offer at a convenient location and fair price. Since not all young people (primarily only white men at that time) were financially or academically prepared to attend a traditional four-year university, the junior college offered a viable alternative for those with less education and financial means. Whether intentional or not, the community college, during that time, did somewhat redirect students’ educational or career paths, a phenomenon later described by Burton Clark (1960, 1965, 1980) as “cooling-out,” in that it redirected some students off of the path to baccalaureate degree attainment, thus cooling their aspirations.

Most community colleges today offer a comprehensive curriculum, inclusive of both career or technical programs and academic transfer preparation (Cohen & Brawer, 2008). Additionally, the community college provides other services, such as workforce and economic development, adult continuing and developmental education. The comprehensive community college has faced some difficulty in defining a clear mission and establishing a balance of resources for each of its program types. While some curricular overlap may occur, career and technical programs and transfer preparation programs often have different end goals, i.e., either preparing a student for immediate entrance into the workforce or for transfer to a four-year baccalaureate institution (Cohen & Brawer, 2008; Dougherty & Townsend, 2006).

Described as “alone” and “unique” in its mission, the community college is the only type of postsecondary institution that purposefully trains students for transfer to another institution (Townsend & Wilson, 2006, p. 33). Outside of the primary transfer mission, the community college has traditionally offered adult education, as well as vocational and technical training. However, over time, more students have enrolled in vocational and technical programs,
comprised of courses that are typically not transferrable to a four-year university. Instead, most vocational and technical programs are designed to prepared students to directly enter the workforce (Townsend & Wilson, 2006).

In recent years, more students have opted to begin their collegiate career at the community college. Rising tuition rates, coupled with a declining economy in the U.S., make the community college’s lower cost, convenient location and flexible class schedules even more attractive, if not necessary, for many students (Cohen & Brawer, 2003, 2008). Wyner (2006) reported that of the six million (and increasing) community college students, 75% are between 18 and 24 years old, and are not older, non-traditional students. Still, incoming transfer student enrollments have decreased by more than 50% in the last 20 years at selective private institutions, and selective public institutions are not much better, with transfer enrollment rates at 4% or less. Assumptions made about the limited preparedness of community college students are even less true. With a growing emphasis placed on increasing the enrollment of low-income students at highly selective institutions, Wyner suggested that the community college was an untapped resource. Wyner explained that students at the community college are “precisely the sort of exceptional achievers that elite colleges seek,” (2006, p. B6). More students are choosing the community college for financial reasons, regardless of academic ability, and the graduation rates of transfer students at selective institutions are comparable to native students, i.e., those who begin at the four-year university. In an effort to convey the economics of the matter, Wyner (2006) pointed out that, even if transfer students need financial aid, it costs less to finance them for two years than the four years it takes to increase enrollments of lower-income students through freshman recruitment and retention.
While some four-year institutions have realized the advantages of recruiting and enrolling community college transfer students, such as the shorter-term investment of resources with a more immediate return in two years instead of four, community college students are still met with numerous obstacles to admissions and transition to life on the four-year campus. Vaughan (2006) described the unique nature of the American public higher education system as a balance of the “elite and egalitarian,” (p. 28) with the community college operating as the equity inroad for many students from lower-income backgrounds, racial/ethnic minorities, female students and first-generation college students. Vaughan explained that the transfer function was on the rise again after a decline in the 1980s, which he attributed to the emphasis on vocational and technical education during that time. While community college enrollments are increasing, the transfer process has improved but is not seamless. According to Vaughan, one source of the problem is acceptance of credit upon transfer. For the most part, transfer of credit has improved, but a 2004 study by the American Association of Community Colleges (AACC) and the American Association of State Colleges and Universities (AASCU) revealed that general education credits accepted by the college are sometimes not accepted by the academic departments as credit toward the major. The transition from a community college to a university was also considered problematic for many students, especially those moving from a small, rural community college to a larger university (Vaughan, 2006).

To avoid credit transfer issues, Vaughan (2006) recommended that in addition to development of the best transfer agreements and resources possible, students should be encouraged to select an academic major early and not only a major, but that major within a certain senior institution. Students who do so are likely to increase the number of credit hours transferred and applied to toward their degree in that major. However, as more four-year
institutions add course prerequisites that are not in line with articulation agreements, students who transfer as juniors may still be delayed an extra year or two. Once a student does transfer, there is also the issue of social integration. Vaughan recommended that transfer students be given the opportunity to live on campus to avoid feelings of isolation sometimes experienced by transfer students. A greater emphasis should be placed on the transfer of students and their success—academically, socially and emotionally—and not just on the transfer of credits (Vaughan, 2006).

Handel (2007) lamented the lack of resources available to transfer students and sought advice from academic counselors in the field. Handel found that the lack of information available on transfer from a community college to a four-year institution was often attributable to the complicated nature of transfer, such as specific admissions criteria for different majors. Handel also found that the idea of the older, non-traditional community college students has allowed excuses to be made about their lack of interest in transfer, particularly to any institution that would require relocation. However, Handel, like Wyner (2006), noted the decrease in the average age of community college students, with the majority in the traditional age range of 18 to 24 years old. Additionally, close to half of those in this growing population are the first in their families to attend college, so they have limited guidance from their family and are in need of accurate and readily available information (Handel, 2007).

**Statement of the Problem and Purpose of the Study**

Today, community colleges enroll more than half of all students in higher education, and the percentage is likely to continue to increase as the economy in the United States suffers, the value of the high school diploma continues to drop, and tuition costs keep rising (Cejda, 1997; Cohen & Brawer, 2008; Laanan, 2004, 2007; Townsend 2000, 2001, 2002). According to Cejda
and Kaylor (2001), enrollment numbers at the community college are not just increasing in general, but these institutions are also experiencing an increase in the number of traditional college-aged students (18-24) they serve. An increase of students in the 18 to 24 age group leads to an increase in the number of potential transfer students. However, transfer rates of students from two-year community colleges to four-year baccalaureate degree granting institutions declined in the 1970s and have never completely recovered (Cohen & Brawer, 2003, 2008). In the United States, an average of 22% of two-year community college students transfer to a four-year institution (Cohen & Brawer, 2008). Transfer student rates are much lower in the state of this study with an average of only 4% of community college students transferring to a four-year institution (Katsinas, ACTAC Eval 2008, 2009). It is important to note that while only an average of 22% of community college students ever make the transfer to a four-year institution, research has shown that the interest or intent to transfer averages around 70% for all students enrolled at the community college (Romano, 2004). The disparity between this high level of interest in transfer, and ultimately baccalaureate degree completion, and the low rate of transfer are problematic and necessitate further investigation of what encourages, or deters, community college students from transferring to a four-year institution and successful completion of the baccalaureate degree.

The purpose of this study is to identify factors that are predictive of retention and persistence to graduation for in-state community college transfer students at a four-year public research university through the use of existing institutional student data. Demographic and transcript data were analyzed using logistic regression analysis to develop and validate a predictive model. Similar work was completed by Hagedorn, Cabrera, and Prather (2010) in the development of *The Community College Transfer Calculator®* (CCTC), which guided the
development of the following research questions. The sample for this study included in-state community college transfer students who had transferred to the site institution during the 2007-2008 academic year.

Research Questions

1. What are the demographic characteristics of the students in this study, and how do these characteristics differ between those who graduated and those who did not?

2. What are the course-taking characteristics of the students in this study, and how do these characteristics differ between those who graduated and those who did not?

3. To what degree do the following demographic and academic factors influence the likelihood of persistence to *graduation two years post-transfer, four years post-transfer* or at *any time post-transfer*:
   a. Number of credits transferred from the community college.
   b. Earning an associate degree.
   c. Number of community colleges attended prior to enrollment at the four-year university.
   d. Cumulative transfer grade point average (GPA) at time of transfer to the four-year university.
   e. Current or final cumulative GPA at the four-year university.
   f. Number of semesters enrolled at the four-year university.
   g. Number of hours earned at the four-year university.
   h. Number of course withdrawals at the four-year university.
   i. Number of Fs received for coursework at the four-year university.
   j. Number of no-progresses for coursework at the four-year university.
k. Gender
l. Race
m. Academic major
n. Age at time of enrollment at the community college
o. Age at time of enrollment at the four-year university

4. Using GPA as the measure of academic performance pre- and post-transfer, does having a community college and/or four-year institution GPA in the bottom 25<sup>th</sup> percentile for the sample impact graduation rates?

**Significance of the Study**

Research on community college transfer students has identified a number of reasons that the transition from the two-year to the four-year institution can be difficult (Cejda, 1997; Eggleston & Laanan, 2001; Laanan, 1996, 2000, 2001, 2003, 2004, 2007; Laanan & Starobin, 2004). Transfer students often lose credits upon entrance to the four-year university or, if counted, the credits may not necessarily be applied toward the student’s academic major (Cejda, Rewey, & Kaylor, 1998; Vaughan, 2006). Another common issue with transfer of credit is the need to take additional prerequisite courses to continue, or to enter the academic major of choice (Cejda et al., 1998; Vaughan, 2006). Credit transfer issues of this type not only delay a student’s time-to-degree, but add costs to fulfill the prerequisites and costs associated with continued enrollment and delayed entry into the workforce.

Students who transfer from a community college to a four-year university often experience academic, social, and psychological issues. “Transfer shock,” a phenomenon first defined by Hills in 1965, describes the slight dip in a student’s grade point average (GPA) after transferring. Beyond the academic transition, transfer students sometimes experience a culture
shock as they move from a smaller two-year college to a large four-year university (Cejda, 1997; Davies & Casey, 1999; Laanan, 2000, 2001, 2003). Transfer students also need to become connected or involved on the four-year campus to increase their likelihood of persistence (Astin, 1984; Tinto, 1975). Yet, the paths to involvement for transfer students are not always made clear to students or in some cases, such as living on campus, may be limited due to their transfer student status (Astin, 1984; Cejda, 1997; Laanan, 2000, 2001, 2003).

If variables predictive of community college transfer student success (i.e., retention and graduation) can be identified through this study, perhaps the gaps in the transition can be reduced. Areas of need could also be addressed with the development of new services and support mechanisms for transfer students in the way that has become expected among native, first-time freshman students, leading to improved transfer student performance, retention and persistence, while also lowering overall monetary costs and time toward baccalaureate degree attainment (Eggleston & Laanan, 2001). Additionally, identification of aspects that facilitate or impede transfer student success will allow faculty and administrators to better serve their students. The ultimate goal would be to provide a predictive model that will assess a transfer student’s likelihood for successful degree completion post-transfer. Understanding the risk factors for transfer students presents opportunities for intervention by faculty and student services staff at the four-year.

**Assumptions**

This study is based upon the following *a priori* assumptions:

1. The institution’s academic records are complete and accurately report students’ enrollment periods, coursework, and grades earned;
2. The randomly selected sample, stratified for race and gender, of students who meet the criteria for inclusion in the study will be representative of the underlying student population; and

3. The researcher also makes the *a priori* assumption that students entering the baccalaureate institution during the 2007-2008 academic year were fundamentally like students who entered at any other time, so that results of data analyzed in this study can be generalized to future cohorts of community college transfer students at the site institution.

**Limitations**

In conducting this study, the researcher acknowledges, *a priori*, the following potential limitations:

1. The data received may be incomplete and/or inaccurate for some students in the study population;

2. As a study of a single institution, the generalizability of the findings of the study to other populations will be limited;

3. Additionally, sample size is inherently reduced compared to studies using multiple institutions, which impacts the statistical validity of results of the data analyses (Field, 2009; Gall, Gall, & Borg, 2007);

4. Data derived from transcripts cannot account for the varying levels of academic rigor from one community college to another or for the variability among courses and academic majors at the site institutions;
5. Examination of the number of hours taken at the community college or four-year institution are not equal across the student sample, since the students were at different points of college matriculation; and

6. Also, using only transcript data without collecting additional information from the students in the sample will allow the researcher to determine what did occur but will not necessarily shed light on why it occurred.

**Delimitations**

In conducting this study, the researcher set the following *a priori* delimitations:

1. Only undergraduate students who transferred to the site institution from a public comprehensive community college within the same state during the 2007-2008 academic year will be included in the study population and sample;

2. Students who matriculated at the community college for more than 5 years will be excluded from the study;

3. Students who have attended a four-year baccalaureate degree-granting institution will be excluded from this study;

4. Students who only transfer in college credit from an in-state community college earned through dual enrollment, while the student was still in high school, will be excluded from the study; and

5. Only demographic and transcript data, which is available in the institution's electronic student information system, and institutional characteristics warehoused in the National Center for Educational Statistics’ Integrated Postsecondary Education Data System (IPEDS) will be used in conducting this study.
Summary

This chapter has provided an introduction to the current study and the research question: What factors derived from student transcript data are predictive of retention and persistence to graduation for in-state community college transfer students at a four-year public research university? It included a brief introduction to the history of the community college and evolution of its missions. Current trends in community college enrollment were reported, along with issues and barriers that exist for students who begin at the two-year college and transfer to the four-year institution. The purpose of the current study is to identify factors that are predictive of retention and persistence to graduation for in-state community college transfer students at a four-year public research university through the use of existing institutional student data. Chapter II presents the literature related to community college transfer and persistence to graduation and is organized in the following way: the community college, impact of community college attendance, review of studies of student attrition, persistence, and retention, transfer student experience, and the use of transcript analysis. The third chapter presents the methodology of the current study including the conceptual framework, site and participant selection, the data source, data collection and analysis. In Chapter IV, the data analysis process is explained and results of the analyses are presented. Chapter V relates the data findings back to the relevant literature and describes how the results can impact higher education policy and practice. Recommendations for future research are also made in Chapter V.
CHAPTER II:
REVIEW OF THE LITERATURE

The Community College

Establishment of the first junior college, Joliet Junior College, in 1901, provided the first two years of college coursework to students who theoretically could then transfer to the University of Chicago. University of Chicago’s president, William Rainey Harper and the local superintendent, J. Stanley Brown led the development of Joliet. While the new junior college option did allow students to begin college without leaving home and at a lower cost, Rainey and Brown’s endeavor was not completely altruistic (Cohen & Brawer, 2003, 2008). By providing an alternative path from high school to college, the University of Chicago was relieved of the responsibility to educate students at all levels of ability. With Joliet there to educate those from lower income families or the less academically prepared student, the University could focus on educating the junior and senior level students and spend more time doing scholarly research, and less time teaching remedial or introductory courses. Still, regardless of why Joliet was created, it was the beginning of a new and uniquely American type of higher education that has more than survived the test of time. Over the years, the community college has experienced a steady growth in enrollment and expansion of its original transfer preparation mission (Cohen & Brawer, 2003, 2008). Transfer or the “collegiate function” (p. 345), as described by Cohen and Brawer (2008), was the early mission of the junior college, now more commonly known as the community college. Higgins and Katsinas (1999) defined transfer as, “a function of the comprehensive community college that facilitates the movement of students to four-year colleges and universities for baccalaureate degree attainment,” (p. 1).
As noted in chapter one, the evolution of the junior college to today’s comprehensive community college has not occurred without its troubles. Changes in the needs of the public have often shaped or shifted the mission of education. In this case, the changes to the mission and purpose of the junior or technical college were from the academic transfer-only function or the technical education function to a combination of the two, and toward the workforce development projects often found in connection with the community college (Cohen & Brawer, 2008). The following chapter will review the changes in missions and perceptions of the community college’s purpose since its inception and how attendance at a community college can impact a student’s academic goals and movement through the postsecondary system.

Although the community college has struggled to fulfill its multiple missions of transfer preparation, vocational and technical training, as well as continuing education, it is still an open access point into the higher education system for most non-traditional students, many minority students, and students of lower socioeconomic status (Johnson, 2006). Therefore, it is necessary that the community college and its students continue to be examined in an effort to improve the retention of these students and increase their rates of transfer. It is necessary not only to provide an equal educational opportunity for students, but as our world has become more educated and technologically advanced, the benefits of a college education are beginning to expand from being valuable to being imperative.

Townsend (2001) reviewed the history of the community college mission from its start in 1901 as a transfer-up, mobility track from the junior to senior college, to the criticisms made by Clark (1960) and Brint and Karabel (1989) focused on the low rates of transfer and the cooling-out, or lowering of academic aspirations (Clark, 1960, 1965). Community colleges have also been criticized on the performance of the transfer students, who when compared to students who
began at the four-year institution, were not as likely to complete the baccalaureate degree (Pascarella & Terenzini, 1991). One issue with the criticisms of transfer rates is the varying ways to define transfer and/or calculate rates of transfer and explained that transfer is an action by a student (Banks, 1990). The definition of a transfer student may be based upon whether or not the two-year associate’s degree is earned prior to transferring to a four-year institution. However, a student may also be considered as a transfer student after earning a certain number of credits at the two-year community college prior to transfer, but without an earned associate’s. The determination of transfer rates and ratios are not done in a standardized way across states, or even colleges within a state, which, according to Banks (1990), diminishes the value of comparisons within and across states. Additionally, Banks pointed to the increasing demand for two-year community colleges to demonstrate the effectiveness of their primary functions, such as transfer. Without a standard process for assessing the transfer function, states and their colleges increase the risk of scrutiny and even possible negative repercussions in regards to funding and resources from the state and federal governments.

With the increased focus on the community college’s role in the facilitation of transfer and how to assess the success of the function, Piland (1995) conceded that issues existed but, like Banks (1990), questioned the methods for measuring transfer rates. In many cases, the students who transfer from a two-year college are compared to students who began at the four-year institution, despite the differences that often exists between the groups of students in regards to age, classification status and courses taken in the first two years. These issues would be of little or no concern if they were not so often used to devalue the role of the two-year college by scholars like Brint and Karabel (1989) who, according to Piland, used skewed transfer rate data.
to support the negative impact that enrollment in a community college can have on the student’s likelihood for bachelor degree completion (Piland, 1995).

In addition to the measurement issues related to rates of transfer, Katsinas (2003) expressed the need for a better classification system for community colleges to allow for a more accurate comparison by institutional type. Katsinas summed up the importance of an accurate system saying, “…classifications help frame how we know what we know,” (p. 19). In regards to transfer, Katsinas explained that calculations of transfer rates did not provide enough specificity to compare the effectiveness of one institution to another. Due to the complicated enrollment patterns of today’s community college students and lack of viable data sources, accurately measuring rates of transfer is far from simple (Higgins & Katsinas, 1999). Higgins and Katsinas conducted an exploratory study to determine if a relationship exists between specific environmental conditions and transfer rates of students from a group of selected rural community colleges. Conditions evaluated were the density of the service area’s population, the median family income, state articulation agreements, the number of full-time faculty, full-time enrollment, racial and gender characteristics. Results of a multiple regression analyses of the conditions and transfer rates indicated a positive relationship between transfer rates and the number of younger students in the service area along with the number of adults with high school degrees. Higher expenditures per FTE were found to have a negative relationship with transfer rates (Higgins & Katsinas, 1999). In 2001, the Transfer Assembly Project, a biannual assessment of national transfer rates created by the Center for the Study of Community Colleges, determined the national transfer rate to be up to 25.2% (Szelenyi, 2002). However, Szelenyi noted that rates ranged from 17.1% to 39.1% among the responding states. Higher rates were
found for states in which the community college operates more like a branch campus of the four-year institution.

**Impact of Community College Attendance: Cooling-Out and Diverting the Dream**

Questioning the original transfer mission given for establishing Joliet Junior College and continued proliferation of community colleges, Burton Clark (1960, 1965), as well as, Karabel (1972) presented concerns regarding the negative mission, or unintentional side effect of diverting students from lower-income families from attendance at the four-year institutions. In 1960, Burton Clark first examined the issues related to the open-door access policy of the public two-year colleges in American higher education. Clark characterized the time spent at the two-year college as a “cooling-out” for many students, or a delay or denial of the inevitable result of not earning a baccalaureate degree. Clark (1960) referred to this phenomenon as a means-ends disjuncture, though he acknowledged that some academically underprepared students rise above and succeed, earning a baccalaureate degree. Still, most of those who are underprepared for college-level work would fail to achieve the goal of a baccalaureate degree. Clark criticized the contemporary democratic interpretation of equal opportunity. To Clark, equal opportunity should not exclude consideration of a person’s abilities, or lack thereof. Policies that afford unlimited access to higher education shifted the public’s perspective from viewing college as a next step in educational and professional advancement to a right for all students, regardless of past academic performance. Clark contrasted the goal of high-quality American colleges and universities to produce high-quality citizens with the community college’s open-door policy, which allows lower quality students to enroll, and thereby works against the stated goal of greater quality.
The steps taken at a two-year college to cool-out students are described by Clark (1960) as: (a) pre-entrance testing—placing low-achieving students in remedial/developmental courses, (b) meeting with a counselor/advisor before each semester—students are gradually led toward courses more appropriate for their skill-level and often towards terminal, non-transfer, degree programs, (c) reorienting the student through a mandatory Orientation Course taught by counselors/advisors, who lead students through self-assessment testing of skills, interests, and aptitudes, which are applied to the education plan developed by each student in class. Step four, low grades and/or notice of need for improvement are received—notice are recorded in the student’s file, and the onus is placed on him/her to seek out means for improvement, and (5) the student is placed on academic probation—a period of probation that affords the student more time to identify an educational goal that he/she can achieve. Clark described the effect of probation in the cooling-out process as the “…slow killing-off of the lingering hopes of the most stubborn latent terminal student” (1960, p. 574). Clark saw no need to disguise the cooling-out function. Instead, he saw a need to present the role of the two-year college as not only preparing students for transfer and awarding terminal degrees, but as a place for all students to explore their educational and career opportunities. Cooling-out is a gradual and gentle process of minimizing stress on the individual who is being redirected to a more suitable goal. The result, according to Clark, is a society in which students are encouraged to aim high and dream big, denying aptitude or ability of the student.

Jerome Karabel (1972) parallels the expansion of the community college with the changing economy of the time. Although the community college opens access to higher for more students, in particular those from less affluent social classes, Karabel believes that the equal access does not necessarily result in equality. He explains that the community college
instead becomes the cooling out station disguised as a pathway to the egalitarian American dream. To Karabel, the guise leads students who do not succeed at the community college to believe that they had an equal chance, and therefore, have no one to blame but themselves. When, according to Karabel, students who are from lower socioeconomic classes and/or families with less education are disadvantaged from the start and ultimately, the community college perpetuates existing social strata. Opting for vocational education, instead of an associate’s to baccalaureate degree route, requires the student to recognize such existing social limitations for educational advancement. Ultimately, Karabel acknowledges the community colleges’ difficult position in higher education to be all things to all people, when he believes that the goal of a more egalitarian society must first reach beyond efforts in education and start in the U.S. economic and business world (Karabel, 1972).

In 1975, Kathryn McDaniel Moore interviewed 62 women at three New York two-year colleges in an effort to reexamine Clark’s (1960; 1965) cooling-out function from the perspective of women who, at that time, were obtaining higher grades and test scores than men, but were entering four-year colleges and graduate schools at lower rates. Prior to selection for this study, the women completed a questionnaire, which allowed Moore to target women who indicated traditional and non-traditional career goals. Non-traditional careers were described as jobs that were held mostly by men, with only 40% or less held by women. Some of the non-traditional fields included were law, medicine, business administration, and electronics. Conversely, traditional careers, such as nursing, elementary education, and secretarial work were those held primarily by women, at a rate of 60% or greater (Moore, 1975). For the purposes of this study, Moore redefined Clark’s cooling-out process, which involved the reorientation of students from transfer to a terminal degree, as a redirecting of female students away from non-traditional career
paths to more traditional ones. Moore explained that, often, women interested in a non-traditional career were also on track to transfer, but the two were not mutually exclusive. Still, Moore decided that, like the cooling-out described by Clark, the lowering of career aspirations among female students and possibly deterring transfer to a four-year institution had a similar effect.

Results of Moore’s (1975) study presented four “agents” (p. 580) of cooling-out: (a) parents, (b) uncontrollable circumstances, (c) counselors, and (d) the two-year institution. Moore (1975) subdivided the second cooling-out category of uncontrollable circumstances into three subgroups: money, competition, and being a woman. Money-related concerns were often present, such as a parent’s refusal to continue paying for the education, but many of these concerns were future-oriented. Women who had chosen a costly career or anticipated a lack of funds in the future had a contingency plan. Moore provided the example of a participant who was earning a two-year secretarial degree to allow her to work as she pursued an undergraduate, and later, a law degree.

Admittedly, Moore (1975) did not directly inquire as to the participants’ view of the role of the two-year college, however, some of the comments made by the women were linked to Clark’s cooling-out function. The women in the study viewed the two-year college as a vehicle through which to reach their educational/career goals. Moore described the two-year institutions in this study as passively or unconsciously reinforcing traditional career paths for women through the courses and programs most often enrolled in by women, such as secretarial science and child study. Furthermore, the counselors and administrative staff did not seem to actively promote the enrollment of women in more non-traditional degree programs, such as engineering or animal science (Moore, 1975). Moore explained that the results of this study provided more
support for Karabel’s (1972) perspective than Clark’s (1960, 1965), as the women tended to be redirected to more traditional programs, and thereby maintaining the status quo.

In their 1989 book, *The Diverted Dream*, Steven Brint and Jerome Karabel examined the emergence of the junior college, or community college, within America’s post-secondary education system. Establishing a context for their argument, Brint and Karabel (1989) reviewed the history of U.S. higher education in the nineteenth and twentieth centuries and periods of growth and change relative to expansion by way of the community college. According to Brint and Karabel, growth in big corporations and industries following the Civil War also led to the decline of the opportunity for the common man to work his way to the top. As the divide between the rich and poor expanded, American citizens called for more opportunities for the working man to rise and compete with wealthier and more educated men. From Brint and Karabel’s perspective, this call for equal opportunity for all men reflected America’s expectation of democracy. Unlike any other major country at that time, Brint and Karabel explained that America was committed to the democratic idea and expressed it by providing elementary and high school education through the common school and later with the addition of the junior college to the higher education system.

From its inception, the community college’s democratic mission has appealed to the American people, growing from less than ten thousand students enrolled in the 1920s to more than four million in the 1980s (Brint & Karabel, 1989). However, Brint and Karabel believe that despite its popularity, the community college’s service would be outweighed by the limits of the country’s economic ability to accommodate the increasing number of college-educated citizens. Due to the disparity between education and labor market needs, Brint and Karabel believe that strategies to “manage ambition,” (1989, p. 7) emerged and reconciled the idealist ideology of the
American dream of equality and opportunity for all. Similar to Clark’s (1960, 1965) cooling-out perspective, Brint and Karabel assert that the community college provides management of student ambition and diverts their aspirations.

From the start in 1901 with Joliet Junior College, the role of community college was, at least in part, to serve students who wanted a baccalaureate degree but were often less academically prepared or financially able to attend a four-year university (Brint & Karabel, 1989). In more recent years, the community college has expanded its functions beyond transfer-only to also include vocational and technical education increasing opportunities for more students. Proponents of the community college view the open-access enrollment policies and multiple career pathways as evidence of the institution’s democratic, not diverting, role (Brint & Karabel, 1989). The move away from a transfer-only curriculum and the addition of vocational and technical curricula has been explained from two theoretical perspectives. One, the rationale-choice theory places the emphasis on the individual and two, a variation of Marx’s instrumentalist theory, which emphasizes the influence of major business on social systems, such as education (Brint & Karabel, 1989).

According to Brint and Karabel (1989), the rational-choice theory supports the consumer-choice model that attributes the community college’s curricular changes to the student’s requests or demands for degree programs more directly linked to a job or career. On the other hand, the business-dominance model explains the curricular changes as a response to the labor market demands and requests from businesses (Brint & Karabel, 1989). Either model would be appropriate if the curricular changes had not begun in the 1930s when students and business showed little to no interest in vocational degree programs but instead in the 1970s when the marketability of a college degree declined (Brint & Karabel, 1989). To account for the forty-
year jumpstart, Brint and Karabel put forth a new theory, the institutional model. Brint and Karabel’s (1989) institutional model purports the idea that the community college did not respond to demands from students or business, that in fact, they shifted their mission in an effort to stay relevant and establish a market niche. Brint and Karabel (1989) used national level data from sources such as the U.S. Department of Education and Census Bureau to expose the true market-driven purpose of the community college. Additional support for their institutional model was obtained through a case study of the Massachusetts post-secondary education system (Brint & Karabel, 1989).

As a follow-up to Brint and Karabel’s 1989 assessment of the community college in *The Diverted Dream*, Steven Brint (2003) examined the current state of the community college within the American postsecondary system and deemed it not improved, but perhaps worse. Brint and Karabel (1989) described the community college not as a democratic open-access option for students at all levels of academic preparation and income, but instead as an effort by elite four-year universities to *divert* these students away from their institutions (Brint, 2003). Brint recounted other conclusions that he and Karabel drew in their original work, such as the mission purported by the community colleges to serve in response to the need of their constituents. Brint explained that the vocational education touted as an alternative route to success for community college was not established in response to industry and business needs, but instead vocational curricula were advanced to provide financial stability for the colleges. This vie of vocational education reinforces Brint and Karabel’s (1989) belief that the community college as the bottom of the higher education ladder that did not lead students onward and upward but diverted them away from achieving the baccalaureate degree (Brint, 2003). According to Brint, he and Karabel believed that the community college did, as Clark
(1960, 1965) had said, cool-out students’ educational and occupational aspirations, particularly students from lower income and/or underrepresented ethnic groups.

Brint (2003) explained that now there is much more known about the community college and the students that attend, but that otherwise, little has changed. In fact, he suggested an increased concern in certain areas. Brint organized his analysis of current research and literature according to three theoretical perspectives: human capital economics, sociological contradictions analysis and the new structural critics. Economists have conducted comparisons of return on education investment not only between two-year and four-year college students but among high school graduates with some college, high school drop-outs, two-year students with an associate’s degree or without in an effort to provide a more comprehensive result. Results of these comparisons, primarily based on data collected through the National Longitudinal Study of the High School Class of 1972 and the National Longitudinal Study of Youth, have shown that students with baccalaureate degrees often earn more than twice than students with an associate’s degree and associate’s degree holders earn more than four-year college dropouts. However, two-year college students do not always use a human capital approach in deciding whether or not they will complete a degree. Instead, the students make decisions based more upon their personal assessment of whether or not they have what it takes to be successful in college. Brint believed this to be particularly true for students enrolled in business or health-related vocational programs, gaining greater return than students with high school only education and some academic transfer-track programs. These pro-vocational education returns on investment supported the earlier assertions that he and Karabel made that students enrolled in vocational/technical education programs at the community college may actually be more motivated, despite the terminal nature of the degree programs (Brint, 2003).
Using the work of Kevin Dougherty, Brint (2003) explained the sociological contradictions analysts view, which takes issue with the multiple, and sometimes competing, missions, of community college education. Dougherty’s (1994) work, *The Contradictory College*, compares the community colleges’ academic transfer-prep programs and the vocational/technical education programs, concluding that the two missions are more contradictory than compatible, perhaps to the determent of the community college student. Similar to Karabel and Brint’s (1989) take on the contrasting goals of academic and vocational/technical education at the community college, Dougherty also believed that the community college should focus on vocational/technical education or only on academic transfer preparation as an affiliate to a nearby four-year institution (Brint, 2003).

The new structural views put forth by Regina Deil-Amen and James E. Rosenbaum at the 2001 annual meeting of the American Sociological Association were described by Brint (2003) as “bleaker,” (p. 24), discounting the knowledge gained at the community college with the belief that credentials and not skills are awarded to students at two-year college. Deil-Amen and Rosenbaum (2001) criticized the deficiencies within the academic counseling offered to students at the community college, describing it as focused on improvement of student self-esteem rather than appropriate career or academic counseling based on the students’ abilities. Brint (2003) contrasts the views of Deil-Amen and Rosenbaum (2001) with that of his and Karabel’s which does promote appropriate counseling, but not without efforts to “heat up” (p. 25) the students capable of persistence to completion of the baccalaureate degree.

**Heating-Up and Enrollment Increases**

Arguments made in the 1960s,’70s and ‘80s by Clark, Karabel, and Brint, about the cooling-out effect that community college attendance has on students’ educational aspirations
were described as “polemical,” or polarizing, by Romano (2004, p. 311). Romano explained that more recent studies have found the cooling out effect to be much less apparent or imminent for students who attend a community college. Romano acknowledged that students who attend a community college right out of high school with plans to get a baccalaureate degree often ultimately end up with lower educational expectations. In 2004, Romano’s study sought to uncover the unknown aspects of educational intentions through analyses of student survey data collected during the 1970s, ‘80s, and ‘90s, measuring the strength of students’ educational aspirations at a single institution, Broome Community College (BCC) in Binghamton, New York. BCC’s students were surveyed beginning in 1985 using a survey instrument that was originally administered to high school students in Binghamton by Richard Rehberg in the 1970s. A series of three questions were used in an effort to obtain the most accurate measure of BCC students’ educational aspirations:

Question #44 ‘SUPPOSING you had the necessary time, money, and ability, how far would you really LIKE TO GO in school?’ Question #45 ‘CONSIDERING the time available to you, your financial situation, and your ability, how far do you actually EXPECT TO GO in school?’ and Question #46 ‘What would you say are your chances of actually going as far in your schooling as you answered to question #45 above?’ (Romano, 2004, p. 315)

Similar to earlier findings that critics of the community have used, 73% of students indicated a desire for a bachelor’s degree in response to Question #44. When the students responded to Question #45, which required a more realistic assessment of their situation, the percentage dropped to 50%. Additionally, students who indicated lower degree expectations in Question #45 reported a higher rate of believing they would be actually achieving their goal in Question #46 than those with higher expectations (Romano, 2004).

Romano (2004) also reported responses to a supplemental American College Testing Service (ACT) question aimed at measuring the degree of cooling out and/or heating-up of BCC
students’ educational aspirations for 1991, 1994, and 1997. Assuming that the question was valid, 33% of the students’ aspirations were heated up in all three administrations of the ACT and only 2.5% were cooled-out. While the ability to measure students’ intentions was not necessarily increased, Romano provided support for the notion that without this knowledge the cooling out effect cannot be accurately measured. At the very least, Romano suggested that critics, who based their assessment on less than certain data have overestimated the cooling out effect.

In addition to heating-up effects, enrollments have continued to increase at the community college due to open-access enrollment and lower tuition costs. Laanan (2000) compared community college students’ attitudes and perceptions concerning career and educational goals by ethnicity. Laanan was most interested in the views of students from a minority ethnicity, or underrepresented group, since many of these students begin their postsecondary education at a community college. Laanan explained that ethnic minority students are often attracted to the open-access policy of the community college and the options of academic and vocational education. Laanan delimited ethnic minority to African American, Asian American, Hispanic/Latino, and Native American students. Laanan noted limitations of past studies, which were each single institution students. Also, that some analyses of larger data sets by the American Association of Community Colleges (AACC) and American Council on Education (ACE) did not examine differences between white and ethnic minority students. (Laanan, 2000).

Data collected by the Cooperative Institutional Research Program (CIRP) were used in this study, which included Student Information Form (SIF) data from 10,638 students at 51 public community colleges in the Fall of 1996 (Laanan, 2000). Results of the descriptive data analyses showed that more than half of both white and nonwhite students chose to attend the
community college. Few of them, about 10%, were primarily interested in associate’s degree attainment. More often, students reported interest in obtaining the bachelor or master’s degree, which indicated a decision by the students to complete their first two years at the community college prior to transferring to the four-year institution. Low tuition costs at the community college, close proximity to the students’ home and the belief that graduates receive good jobs were indicated as “very important” reasons for choosing to begin at the community college, for both white and nonwhite students (Laanan, 2000, p. 28). More general reasons for attending given by both groups were to get a better job, earn more money, and learning (Laanan, 2000).

While many studies have documented the impact of institutional type or control (public or private) on student degree attainment, few of these studies have examined these aspects in the two-year college sector (Laanan, 2003). Laanan compared the educational aspirations of these students and determined what factors were predictive of their aspirations using survey data from 13,000 respondents to the 1996 Cooperative Institutional Research Program (CIRP) Student Information Form (SIF). Earlier research by Clark in the 1960s and Karabel (1972), Brint and Karabel (1989), and Brint (2003) suggested that the community college attendance had a cooling-out function, with the tracking of students from low-income or ethnic minority groups away from the academic transfer curricula and towards vocational education. More recent studies have found that rates of persistence to baccalaureate degree attainment are generally comparable for community college transfer students and native students, who begin at the four-year institution (Laanan, 2003).

Laanan (2003) used two theoretical frameworks for this study: status attainment and undergraduate socialization. Status attainment theory, originated by Blau and Duncan (1967), supports the notion that the educational backgrounds and types of employment held by parents
and family are perpetuated by the next generation, so a student from a higher income and/or business class family would have higher aspirations than someone from a working class and/or low income family. Consideration of the impact of internal and external influences and interpersonal and intrapersonal skills on the student’s educational aspirations or social outcomes were applied by using Weidman’s (1989) theory of undergraduate socialization. Results of the descriptive and regression analyses found one primary difference between students attending either a public or private two-year college; those at the privates were more likely to be farther from home and lived on-campus. Students attending the private two-year colleges also tended to be from families with a higher income and educational level than those who attended the public two-year colleges. When asked about their degree attainment plans, a quarter of the students reported aspirations to obtain the bachelor’s and the master’s degree. At the public two-year college being a younger nonwhite female student was positively related to higher degree aspirations. Younger students, in general, also were more likely to have higher educational aspirations. Additionally, certain courses taken at the high school level, such as foreign language, mathematics, and biological sciences, along with a positive self-concept about academic and intellectual ability were predictive of higher degree aspirations for students at both types of two-year colleges. Having a desire to be an expert in one’s field and impact the political structure were also positively predictive of higher aspirations for students at both the private and public two-year colleges (Laanan, 2003).

The reasons, found by Laanan in 2000, for increased enrollments at the community college were also noted by Cejda and Kaylor (2001) as why more traditional-aged students (18-24) were enrolling at the community college. However, the traditional 2+2 path of earning an associate’s degree and then transferring to a four-year university to obtain the baccalaureate
degree had declined, with less than 10% of the transfer students having completed the associate’s
degree. Still, Cejda and Kaylor sought to understand more about why community college
students did not complete the associate’s and made an early decision to transfer to the four-year
institution. To answer this question, Cejda and Kaylor employed a qualitative case study method
in which they interviewed 103 community college transfer students at a public state
university. Early transfer was defined as transfer without completing the associate’s degree
and/or without completing 60 credit hours at the community college (Cejda & Kaylor, 2001).

Five themes were identified in the data analysis: (a) Student Intention, (b) Community
College Faculty Interaction, (c) Personal Factors, (d) Educational Others, and (e) Perceived
Problems (Cejda & Kaylor, 2001). Tree diagrams were created to illustrate each of the five
themes. Sixty-five percent of the participants mentioned intention as a factor in their decision to
transfer with five branching intentions: to complete general education courses, to take harder
classes, to save money, to allow time to decide on a major, and to complete prerequisites for their
academic major. Close to half (48%) of the students noted the importance of interaction with
community college faculty. Many also credited the faculty with their decision to continue their
education at a four-year institution, an example of heating up student interest. Some students
indicated that the faculty had also influenced their decision to transfer earlier, based on good
grades or positive feedback received that increased their self-confidence. The third theme,
personal factors, encompassed changes in family status (through marriage, divorce, birth, death
or other changes), level of family support, and financial considerations. The degree of support or
understanding from the family was related to the students’ decision to either remain at the
community college or transfer to the four-year university. Students who felt supported were
more likely to transfer, and those who did not were more likely to stay at the community college
longer than originally intended. Influential actors named in more than 35% of the interviews were grouped in theme four as educational others: fellow community college students, staff, university students, and university faculty. After students had a positive interaction with an educational other at the four-year university, they transferred from the community college within two semesters of the experience. Students identified elements of the fifth theme, perceived problems or barriers, such as issues with course credit transfer and the possibility of being behind in their major if they waited longer to transfer (Cejda & Kaylor, 2001).

As a result of this study and in acknowledgement of the shift away from the 2+2 pathway, Cejda and Kaylor (2001) recommended that more studies of student intentions to transfer be conducted. Also, community college faculty were found to have great influence on a student’s decision to transfer early or at all. Therefore, Cejda and Kaylor recommended that faculty be made aware of this and that new faculty be given information about transfer as a part of their orientation. One prevalent finding that was not placed into a theme was the lack of perceived value of the associate’s degree among participants (Cejda & Kaylor, 2001).

**Relevant Studies of Attrition, Persistence, and Retention**

Tinto (1975) discussed issues related to the lack of a clear definition and understanding of student departure and the policy implications that can stem from inaccurate assessments, such as an inability to determine who should be included in the dropout population and therefore, which services should be provided at the institution and state levels. Most institutions at that time, and perhaps somewhat still today, assessed rates of departure in a lump form of “dropout” instead of teasing out the variations in cause or reason for students leaving. In some cases, students who do not return may have transferred to another institution, which would not categorize them as a dropout, neither would it for students who are dismissed due to academic issues or who had to
leave due to financial limitations. Tinto stated the need for a theoretical synthesis of studies of student attrition by explaining the limitations of recent studies, which for the most part, related calculated rates of attrition to individual and institutional characteristics. While results of such studies offer some value in predicting the likelihood of a student’s departure according to their characteristics and the institution that they attend, the results are unable to account for the impact of the characteristics on the process of dropping out. According to Tinto (1975), a longitudinal model would be necessary to link the characteristics and the dropping out process to fully understand student departure.

The theoretical longitudinal model presented by Tinto (1975) is based on Durkheim’s (1961) theory of suicide, which found that individuals who are less connected or integrated into their community were more likely to commit suicide. In particular, individuals who lacked a sense of belonging or shared values were at a greater risk. Tinto likened the campus community to the public society of Durkheim’s theory and the lack of integration described as similar to the disconnected student who does not feel a strong commitment to the institution and are therefore more likely to leave. Tinto (1975) also recognized the work of Spady (1970) who noted two areas of integration or adaptation for a college student, the social and the academic.

Initially, Tinto’s (1975) theory of student departure acknowledged characteristics and experiences that students have prior to enrollment in higher education; he presented these in three groups: family background, pre-college schooling, and individual attributes. Once the student enters the college or university, he/she will establish a level of goal commitment as related to academics and institutional commitment relative to the social aspects of the campus. After the initial commitment, the student’s ability to perform academically and access a
healthy social life interact, resulting in varying levels of social and academic integration, and ultimately shaping the student’s decision to stay or leave the institution.

Before delving into the elements of his theory of student involvement, Astin (1984) offered a reasonable explanation for development of the theory: a desire to simplify the existing research on student development in higher education. Astin described his theory as easy to understand, useful to both administrators and researchers, and inclusive of most research on the impact of environmental influences on student development. Astin presented an action-oriented definition of the term involvement. While admittedly similar to concepts from existing learning theory, such as effort or time-on-task, Astin described involvement as behavioral; something one does within their environment, not a thought or feeling.

There are five postulates in Astin’s (1984) theory of student involvement. One, time and energy exerted by a student on a task or object; the term object is not necessarily concrete in this case, such as a student’s experience. Two, involvement occurs on a continuum and varies greatly dependent upon the student and/or the object. Three, the degree of involvement can be measured quantitatively or qualitatively; for example, count hours on tasks or determine knowledge gained through the task. Four, the principle of getting out of an object what one puts into it, so the quality and quantity of involvement is related to the student’s actions on the object. Five, policies and practices by the institution are only as effective as their ability to increase student involvement.

In Astin’s (1984) assessment of current theories guiding educational policy and practices, he found that there was an area of explanation missing from the equation of student input to the output of academic measures, like the GPA or standardized test scores. Three categories of existing theories were reviewed by Astin: (a) Subject-Matter Theory, (b) Resource Theory, and
(c) Individualized (Eclectic) Theory. Astin explained that subject-matter theory places students in a more passive role in which the professor bestows knowledge or content upon them, and they either learn or do not learn. Resource theory is based upon the belief that more or better facilities, staff, technology, faculty, and students will increase learning and development. In particular, Astin explained that it is often believed that recruitment of better faculty and students will improve overall learning. However, the limited number of these better persons available can lead to an imbalance in the energy and expense expended on such recruitment efforts. Furthermore, resource theory lacks much consideration for the effective use of the accumulated resources. Lastly, Astin discussed the individualized or eclectic theory which posits that no one approach to student learning and development should be applied, but that, efforts should be made to create an individualized learning plan and experience for each student. The idealistic nature of the individualized theory makes it difficult to implement, and the different styles or techniques that could be employed or needed by individual students are difficult to determine and somewhat limitless.

Astin (1984) proposed that his theory of student involvement provided a link, connecting all three of the other types of theories (subject-matter, resource, and individualized), and filled the void between the input of teaching to the output of student achievement. The theory of student involvement increases the emphasis on the student’s needs and actions, as opposed to the content, resources or pedagogical technique. Astin noted the relationship between the idea of involvement to the psychological state of motivation. He explained that, while motivation can be difficult to observe or measure, involvement, as conceptualized in this theory, is a behavior, and the theory is aimed at facilitation of student involvement or action. In practice, the theory of student involvement is constrained by a student’s available time and energy. Therefore, Astin
suggested that efforts to facilitate involvement must also consider the multiple areas of a student’s life that are also competing for time and energy, such as family, friends, and jobs.

Astin (1984) conducted analyses of longitudinal data of more than 200,000 students looking at the effects of certain types of involvement: place of residence, honors programs, academic involvement, student-faculty interaction, athletic involvement, involvement in student government, and research on cognitive development. He concluded that whether positive or negative, factors that impacted student departure were related to involvement, such as the positive effects of living on campus, involvement in Greek life, student organizations, athletics, and almost any extracurricular activity. Part-time employment on-campus was positively related to retention; whereas, off-campus full-time employment had a negative impact, as it took away from time on campus and participation in student activities. Rates of retention at a community college were lower than at a four-year institution, which Astin attributed to less interaction between faculty and students, as well as the higher number of commuter and part-time students at the two-year college. Personal “fit” for a student at a college also impacted retention (p. #).

Although not specific to transfer or community college students, Bean and Metzner (1985) presented an attrition model for nontraditional undergraduate students, who are often also community college students. Bean and Metzner provided a chronological account of the growth in the number of community colleges and the number of nontraditional students and the overlap of the two. Beginning post-World War II, quick growth in the number of the community colleges—600 added since 1960—to the continuing education and vocational training missions of the community colleges afforded more opportunities for nontraditional students, along with numerous other legislative acts, like the Truman’s Commission on Higher Education of 1947 which stated that education should be for all Americans, the G.I. Bill in 1944, the National
Defense Education Act of 1958, the Higher Education Act of 1965, the Basic Educational opportunity Grants and Higher Education Act amendments of 1972 and then the Pell Grants.

Bean and Metzner (1985) believed that the cooling-out view of the community college was no longer relevant since the associate’s degree had become a more acceptable means for career advancement or entry into a new field. Bean and Metzner’s conceptual model of nontraditional student attrition contained four sets of variables (a) poor academic performance, (b) intent to leave the college, (c) background characteristics—primarily high school grades and educational aspirations, and (d) environmental variables. Tinto’s (1975) model, and others like it—Spady (1970), Pascarella (1980)—focused on social processes, social integration and were meant for use with residential, traditional students (Bean & Metzner, 1985).

In a study of transfer student persistence, Johnson (1987) noted the difficulties that transfer students have in comparison to native four-year students. According to Johnson, transfer students can sometimes be less confident in their own abilities to succeed socially and academically, less motivated, and less likely to desire a degree higher than the baccalaureate. Johnson described transfer students as being more career-focused in their reason for pursuing a baccalaureate degree. A prior study by Higgerson (1985) identified dissatisfaction with an academic program and unclear career objectives and educational goals as the primary reasons that transfer students withdrew from the four-year college or university. Johnson (1987) reported attrition rates among transfer students as 22% to 35%, compared to the lower rates for native students of 14% to 27%. Higher rates of attrition and the increasing numbers of transfer students give cause to increase understanding of the factors that affect the transfer student experience.
Johnson (1987) collected survey data from 497 recent community college transfer students at a large, urban, commuter university in the Southwest. Data were analyzed using the linear structural relations (LISREL VI) technique to assess the relationship between academic factors and persistence for transfer students and whether or not sex and/or classification had any impact the relationship. Results of the analyses found that the perception of the academic major as conducive to career achievement had more affect than educational aspiration on the intent to persist for the participants. Johnson reported that the results supported the existence of a relationship between the student’s intention to continue enrollment and their actual persistence behaviors.

Moumouris (1997) conducted an exploratory study of community college transfer students who had completed a four-year baccalaureate degree using the following student variables: gender, age, ethnicity/race, number of full-time semesters, part-time semesters, stop-out semesters, whether or not the student had earned the associate’s degree prior to transfer, number of transfer credits, baccalaureate degree major, degree completion rate, GPA pre- and post-transfer. Data were collected from student records and transcripts using a qualitative document analysis approach. Results of the study found that female community college transfer students made up the majority of those who persisted to baccalaureate degree attainment. The women in this study also obtained a higher baccalaureate GPA than the men; however, differences between men and women in rate of degree completion were not significant. Regarding age of the transfer student, Moumouris found a trend of a slower rate of degree completion as the age of the student increased. However, the older transfer students tended to have a higher baccalaureate GPA than their younger counterparts. No significant differences in rate of degree completion or GPA were found among students of different races/ethnicities. Still,
students of color were more likely than White students to obtain the associate’s degree prior to transfer. Approximately 50% of the White students had an associate’s degree, while 70% or more of African American, Hispanic American, and Asian American students did. The number of credit hours that successfully transferred to the four-year institution did positively relate to the student’s rate of degree completion and GPA (Moumouris, 1997). In a similar study, Underwood (1998) conducted a stepwise multiple linear regression analyses to determine if age, ethnicity, gender, GPA, number of transferrable credits, courses taken, and enrollment status (full-time or part-time) had predictive values in regards to the likelihood of a transfer student’s persistence. Only the student’s community college GPA was found to be predictive of the GPA at the four-year institution.

Braxton, Milem, and Sullivan (2000) described Tinto’s interactionalist theory of college student departure as having reached “near-paradigmatic status” (p. 569) based on the numerous dissertations related to the theory and hundreds of citations in articles in books. Among the many studies of Tinto’s (1975) theory was a study of the originally proposed 13 postulates conducted by Braxton, Sullivan, and Johnson (1997), in which they found support for only 5 of the 13. Braxton et al. (2000) noted the higher incidence of student departure from the two-year college, with about one-half leaving after their first year and a quarter of students leaving four-year institutions at that point in matriculation.

**The Community College Transfer Student Experience**

Davies and Dickman (1998) described the increase in the numbers of traditional college-aged students as an “echo” (p. 541) of the baby boom of the post-World War II era. However, the state and federal funding for higher education have not kept pace with the growth. According to Davies and Dickman, improvement of the transfer process is critical to
obtaining the best return on investment of these limited funds. More students are capable of accessing higher education through the community college so, streamlining the transfer process could lead to savings for colleges and universities, as well as the students. To better understand the perspective of students, Davies and Dickman conducted multiple focus group sessions with a selected sample of students. The sessions involved discussions of the students’ experiences with the transfer process at the community college and at the four-year institution. Davies and Dickman organized the results of the focus groups into three content areas. First, there were some general recommendations for improving the transfer process, such as increased cooperation between community colleges and the four-year institutions in regards to transfer credit and the need to provide a mentor/advisor earlier in the process who is familiar with community college programs and the transfer process. Secondly, the need for more accurate information about transfer within the state was noted, as well as, the need for clearer communication of what the four-year institutions faculty and staff expect of incoming transfer students. Thirdly, more accurate information was noted as a good start, but the information provided must also be specific to the post community college options identified by Davies and Dickman, including complete the associate’s degree and continue on to the four-year institution or enter the workforce, and faculty and advisors should be able to explain how different course options fit into each of these plans (Davies & Dickman, 1998).

Recognizing the blurring of the lines between transfer and career/technical-tracts within the community college, Fredrickson (1998) intended to gain a better understanding of transfer students in North Carolina and how their paths of transfer and career/technical coursework overlapped. Fredrickson used North Carolina statewide student data for this study. A sample of 4,753 students was selected from the database primarily based on the classification of the
curriculum: technical, college transfer, vocational, or general education. Fredrickson analyzed 19 variables from the database: demographic information, student employment patterns and enrollment behaviors while enrolled at the community college and upon transfer to the four-year institution. Basic descriptive statistics were used by Fredrickson (1998) to develop profiles of transfer students.

Results of the descriptive data analyses profiled the typical transfer student as a 26-year-old white woman who worked part-time and attended the community college part-time. This typical female student did not complete the associate’s degree prior to transferring but, still persisted through the first full-time semester at the four-year institution. Interestingly, results of the inferential statistical tests were reported as significant for all variables except gender. Fredrickson found that community college students in transfer programs worked more hours at a job for pay than students in the technical programs. While more technical program students completed the associate’s degree, the transfer program students had less of a lag between time at the community college and enrollment at the four-year institution than the technical students. An interesting enrollment pattern discovered by Fredrickson was that, despite the high number of students enrolled part-time at the community college, most of them enrolled full-time upon transfer to the four-year institution (Fredrickson, 1998).

Horn and Ethington (2002) investigated the perceived differences in experience among four ethnic groups’ at a community college and differences based on enrollment status prior to transfer. The reason given for the study was a lack of research on community college student experiences. Selection of the population groups was based on results of research that reported differences in college experiences by ethnic group and a strong relationship between a student’s enrollment status and level of involvement or engagement in the college experience. Data were
sampled from the national Community College Student Experience Questionnaire (CCSEQ) dataset; the four ethnic groups included were Asian/Pacific Islander, Black/African-American, Hispanic/Latino, and Caucasian. Of the 1,424 students in the sample, 178 were full-time students and 178 were enrolled part-time; the sample was delimited to students who reported intention to transfer to a four-year institution (Horn & Ethington, 2002).

Horn and Ethington (2002) then did a multivariate analysis of variance (MANOVA) to identify any differences in perceived gains for the ethnic groups, full-time or part-time students, and whether the differences in gains by ethnicity were related to the status of the student. Tests of the relationship between differences in perceived gains by ethnicity based on enrollment status were not significant. Students enrolled full-time reported greater perceived gains from their time at the community college than the part-time students. Perceived gains were different among the four ethnic groups, but the overall conclusion was that students with a greater deficit were mostly likely to experience greater gains in academic achievement (Horn & Ethington, 2002).

**Transfer Student Transition**

Hills (1965) explained that, as more community colleges were established and transportation to and from the colleges became more readily available, more students would be able to attend a college, presenting the need for more data on the community college transfer student experience. Hills identified the distinct phenomenon of a drop in academic performance, as measured by grade point average (GPA), among community college transfer students upon initial transfer to a four-year institution. Hills called this phenomenon “transfer shock” (1965, p. 202). Hills also noted studies that evidenced a recovery from the shock for most community college students by their second year at the four-year institution, ultimately resulting in very little difference in GPAs between transfer students and native students. A study conducted by
Fichtenbaum (1941) in Texas noted that of the 46 data sets examined for evidence of transfer shock only two sets did not show shock and, in regards to shock recovery, 34 of the 38 sets had evidence of recovery, suggesting that transfer students recovered once they adjusted to university life.

Knoell and Medsker (1965) stated the goals of their study as, “to obtain facts, figures, and opinions leading to a fairly comprehensive evaluation of the junior college transfer function...” (p. 4). Knoell and Medsker explained that the growth and push among states for more postsecondary education options for citizens in the 1960s coincided with increased enrollments at community colleges. Enrollment increases at the two-year colleges were also attributed to four-year institutions becoming more selective and more expensive. Objectives of the study were as follows: (a) to learn about the junior college student, (b) to know their performance at the junior college and after transfer, (c) to compare their performance to that of the native student, (d) to identify student characteristics related to academic success and persistence to graduation in a timely manner, (e) to explore differences in transfer student performance according to institutional type and state, (f) to better understand transfer student attrition, (g) to review the policies, admissions criteria and other requirements in place in 1960-64 that may have impacted transfer student progress, and finally, (h) to assess how two-year and four-year institutions have been working together to improve the transfer process, such as articulation agreements. This study included 7,243 students from 10 states who transferred to 43 different four-year institutions in 1960. The receiving senior institutions were sorted into one of the five following institutional types: major state universities, public institutions with primary emphasis of teacher preparation, other state colleges and universities with multiple functions, private universities, or technical institutions. Once the students and institutions were selected for
participation in study, academic transcripts for students were obtained from the four-year institutions, along with the form used to evaluate the credits transferred from the community college. Knoell and Medsker conducted interviews with 10 students on each of the 43 four-year campuses. Documents such as orientation materials, course catalogs, institutional and state reports were also analyzed (Knoell & Medsker, 1965).

They found that, not unlike the native students at the junior level, the transfer students were mostly 21 years old or younger, white, and Protestant, and that there were more male transfer students than female. Many of the transfer students’ parents were not college-educated and worked lower-paying jobs. Students often indicated financial limitations as the reason for attending the community college, which they could do while living at home and working to finance or save for their education. Regardless of the reasons for attending the community college, students reported satisfaction with the quality of education and services received. Among the transfer student participants, 62% of them graduated within three years of transferring, and according to Knoell and Medsker, the remaining students were likely to graduate eventually. However, less than half of the students graduated in the time of two years like their native junior counterparts. Most of the transfer students also experienced a slight dip in their GPA during their first semester, but most were able to recover and later graduate. When compared to the native students, community college transfer students were able to graduate within the same number of terms of upper-division coursework. By the fourth year, 29% of the community college transfer students had dropped out or been dismissed. While complete accounts of decisions to leave voluntarily were not known, Knoell and Medsker found that many of these students had transferred to another four-year institution and were doing well. In many cases, the decision to leave was attributed to financial issues from poor planning or unexpected
needs, such as family illness. Some students were lured away from college by the appeal of salaries available to them in the job market (Knoell & Medsker, 1965).

In respect to academic aptitude, native students were often found to be more ready for college work and received higher grades in their upper-division courses than community college transfer students (Knoell & Medsker, 1965). Cejda (1997) commented on the backlash of the transfer shock phenomenon, explaining that as a result of this observation some have questioned the academic preparedness of transfer students and are reluctant to encourage two-year students to enroll at the four-year institution. Moreover, Cejda explained that the numerous studies of academic transfer shock have not differentiated among the specific disciplines, so it is unclear if the phenomenon exists consistently through the disciplines. To examine this, Cejda obtained data on 100 students who transferred from a community college to Benedictine College and were delimited to only include students who completed a minimum of 24 hours at the community college and were full-time students at Benedictine.

Cejda (1997) was given information on the students’ declared major, cumulative GPA at the time of transfer, and GPA at the four-year college at the end of the first semester enrolled. As a total sample, the 100 students experienced a decline in their GPA. However, analyses of the students by the categorized academic groups revealed an increase in GPA for students in education, fine arts and humanities, and social sciences; an experience originally described by Nickens (1972) as transfer ecstasy. The students in the math and science and business academic groups did experience a decrease in their GPA, or transfer shock. According to Cejda, results of this study provided sufficient support for the need to assess transfer student shock by the students’ academic disciplines. Cejda (1997) also called upon four-year institutions to take
another look at their community college transfer students by academic discipline to best
determine the areas of need and strength.

Transfer students’ academic difficulties and transition issues at the four-year institution
have also been attributed to a lack of opportunities for social and academic engagement at their
community college of origin (Astin, 1984; Laanan, 1996). Still, Laanan (1996) emphasized the
positive impact that community colleges, and the transfer function, have on increasing access to
higher education for many students. Community colleges operate under an open-door access
policy, which allows students of all academic abilities to begin their post-secondary education
(Cohen & Brawer, 2003, 2008). According to Laanan (1996), the community college student’s
experience is related to whether the student intends to transfer or not. The plan to transfer can
also impact which degree program will be selected by the student and to which institution he/she
plans to transfer. Degree program selection may also be due to the ease, or lack thereof, in
transferring academic credits from the community college to certain programs at the four-year
institution. Many states have attempted to streamline the transfer process through state
articulation agreements (Townsend & Wilson, 2006). Laanan (1996) examined the Transfer
Alliance Program (TAP) offered to California community college honor students who plan to
attend the University of California at Los Angeles (UCLA). Laanan selected a population of
second-year transfer students in California who transferred from a two-year community college
to UCLA. Laanan compared the students who were participants in UCLA’s TAP and those who
did not participate. A Transfer Students’ Questionnaire (TSQ) was sent to 868 students (90 TAP
and 778 non-TAP). The TSQ collected information on the students’ background characteristics,
community college experiences, UCLA experiences, and response to open-ended questions about
their experiences. Descriptive statistical analyses allowed Laanan to determine the grouping of
respondents by age, gender, race/ethnicity, and income level to compare them according to their TAP or non-TAP status. More TAP students (77%) were considered traditional-aged (18-24 years old) at the time of transfer and more non-TAP were non-traditional aged (over age 25). Women were the majority gender for both TAP (61%) and non-TAP (70%) students. White students were the majority race/ethnicity for each group, TAP (50%) and non-TAP (53%). In regards to reported parental or personal income, more non-TAP students reported an income of $29,999 or below, while more TAP students reported a higher income level from $60,000 to over $100,000.

Results of the study did not indicate a statistically significant difference in the GPAs of TAP versus non-TAP students. However, Laanan (1996) noted that curricular differences could account for some of the lack of difference between the two groups, since more of the TAP students were enrolled in honor courses, which would be considered more rigorous and could possibly lead to a lower GPA. Participants in the study also responded to questions about their experiences pre- and post-transfer, such as their interactions with faculty, involvement on campus, hours worked at a job, and academic behaviors. More TAP students (70%) perceived their writing assignments or projects as intensive than non-TAP students did (55%). Some of the other significant differences between the non-TAP and TAP students were that TAP students reported feeling more comfortable approaching faculty outside of class, while non-TAP students were more likely to use the available tutoring services at the community college. Upon transferring to UCLA, the TAP students had a lower mean GPA than the non-TAP students. Again, more of the TAP students reported involvement in the honors program courses at UCLA than did the non-TAP students, which may have accounted for the lower mean GPA for TAP students. Other differences between the two groups were reported but were not
significant. For example, more TAP students attended the Transfer Summer Orientation at UCLA than did the non-TAP students, however non-TAP students were more likely to report social involvement, membership in a student organization and seeking assistance from their faculty than the TAP students. TAP students reported feeling more like a number in the larger crowd at UCLA and overall seemed to experience more transfer shock than the non-TAP students. Still, more TAP students reported feeling like they belonged at UCLA than the non-TAP students.

Relating the results of this study beyond the TAP program in question, Laanan explained that similar programs or services could better assist students in the successful move from the community college to the four-year institution if the transition was understood beyond the impact on the student’s GPA to the student’s social and psychological experience. As a follow-up to his 1996 work, Laanan (1998) performed complementary research to differentiate between the academic and social adjustment processes that students experience. Astin’s (1984) theory of Student Involvement was used, along with Pace’s concept of Quality of Effort (QE), as the conceptual framework of this study. Using a sample of 717 UCLA transfer students, Laanan conducted between-group analyses of traditional versus non-traditional age, status as either TAP or non-TAP participants, and of white or non-white race. Results showed little difference between the TAP and non-TAP students on involvement, quality of effort, adjustment and overall satisfaction. Differences in experiences were found between the white and non-white student groups (Laanan, 1998).

Cejda, Rewey, and Kaylor (1998) assessed the relationship of a student’s upper division status and community college GPA to baccalaureate degree completion at a private liberal arts college. Results of the statistical Analysis of Variance (ANOVA) testing found that community
college transfer students experienced varying degrees of academic transfer shock upon transfer. For most students with a community college GPA of 3.0 or higher, there was a slight decline in their GPA at the liberal arts receiving institution. Students with a community college GPA of 2.5 to 2.99 had a slight increase in their GPA at the liberal arts four-year institution. A relationship between community college GPA and persistence to graduation was also found. Transfer students with a community college GPA of 3.0 or higher persisted and graduated at a rate similar to that of comparable groups of native students. The persistence and graduation rates of transfer students who had received their associate’s degree at the community college were higher (78.5%) than those transfer students who had not (58.9%).

Davies and Casey (1999) noted the limited information collected qualitatively directly from the students. In accordance with Astin’s (1984) Theory of Student Involvement, Davies and Casey stated that a student’s ability, or inability, to become academically and socially engaged impacts his/her successful retention and persistence to graduation at the institution. Inadequate academic preparation, limited faculty involvement, and adverse campus climates or cultures were cited as common barriers to student success, as well as, a disconnect that often exists between the two-year and four-year institutional systems, which can negatively impact a student’s ability to successfully transfer from one institution to another (Davies & Casey, 1999). Conversely, the likelihood of success is improved when students perceive their learning experiences as interesting and view the information that is provided to them as meaningful. A student’s ability to meet new people and make friends can also increase the chance of success. This may account for the difficulties that some students with families have, since increased involvement on campus reduces the time available for their families, which may also lead to increased levels of stress (Davies & Casey, 1999).
Davies and Casey (1999) introduced the idea of an overall “campus culture shock” (p. 60) experienced by students after transferring from a two-year to a four-year institution. Elements of this campus culture shock may include adjusting to parking issues, crowds, long lines, and a decrease in individual service. In their study, Davies and Casey conducted focus groups over two weeks with students who had transferred from a two-year community college to a four-year university. Two primary themes emerged from the focus groups: (a) classroom experiences, such as levels of one-on-one attention, interactions with faculty, coursework demands, and overall learning experience and (b) student-centered, achieving balance with support of friends and student services. Results of the focus groups yielded a collection of student stories of the positive and negative aspects of transferring. Some of the students said that they felt more comfortable on their community college campuses and would have likely stayed there if a four-year degree had been offered. For other students, the ease and feeling of comfort at the community college were disappointing and lacked the element of challenge that they desired. An increase in the services and technology available to students at the university was noted. However, some students found the increase to be more overwhelming and somewhat difficult to navigate. Based on these results, Davies and Casey concluded that students who transfer from a community college to a four-year university need additional support from the four-year institution through all stages of their matriculation, from transfer to graduation.

Rhine, Milligan, and Nelson (2000) continued the ideas explored by Laanan (1996) on academic transfer shock, as well as that of Davies and Casey (1999) who expanded the shock concept to include culture. According to Rhine et al., a student’s academic life, combined with social experiences, is more connected to student outcomes of persistence or attrition than to
academic and social experiences alone. They further explained that the responsibility to assist with a successful transition was that of both the community college and four-year university faculty and staff. Coordination and cooperation between the two-year and four-year institution were described as integral to the success. Community college enrollments account for more than half of all students in post-secondary education, and within this increasing population of students, more than three-fourths plan to pursue a bachelor’s degree. However, many students who begin at a community college are first generation college students and may not have as much knowledge about the college-going experience. They may also be more likely to come from working-class families who are not as financially able to afford tuition at a four-year institution. Students at the community college may also be less prepared academically, giving cause to take lower level developmental courses before taking general education courses required for transfer, or to the need to retake a course that was failed. Academic setbacks combined with limited financial resources often lead to a delay in time to completion of courses necessary to transfer. Therefore, many community college transfer students do not begin as juniors at the four-year institution, further extending their time to degree and increasing the cost (monetary and time) of their overall college education (Knoell & Medsker, 1965; Rhine et al., 2000).

Research completed by Astin (1984) and Pace (1980, 1984) has demonstrated the connection between the quality of student services and student motivation or effort (Laanan, 2001). Astin’s theory of student involvement emphasizes the nature of the campus environment, and an engaging environment will lead to increased student involvement. Higher levels of involvement also relate to student satisfaction and success (Astin, 1984). Once an institution has developed an attractive selection of services for students, according to Pace (1980, 1984), the responsibility is placed back on the student to utilize the services. Pace describes this as a
student’s Quality of Effort (QE); Pace developed both the College Student Experiences Questionnaire (CSEQ) and the Community College Student Experiences Questionnaire (CCSEQ) to assess the QE and levels of student involvement. Portions of the CSEQ and CCSEQ were used to develop the Laanan-Transfer Student Questionnaire (L-TSQ©) (Laanan, 2001).

Laanan (2001) argued that, as more students begin their postsecondary education at the community college, there is an increased need to understand the students’ transition from the two-year to the four-year institution. According to him, many have studied the academic transition for community college transfer students and have found that they often experience a slight dip in their GPA, known now as transfer shock. However, Laanan explained that the psychological, emotional and cultural transitions that transfer students experience are not as well understood and need further study in order to fully offer support for success. While many studies have supported this idea of transfer shock, others have noted an experience known as transfer ecstasy, in which a transfer student has a slight increase in GPA upon entering the four-year institution (Hills 1965; Knoell & Medsker, 1965; Laanan, 1996, 1998). Richardson and Doucette (1980) compared GPA and persistence rates of community college transfer students to native students and found that some of the differences could be attributed to the type of receiving institution. Other studies of transfer student success analyzed the data based on theories, such as Tinto’s theory of student attrition, in an effort to identify student and/or institutional characteristics that impact persistence. While fewer studies have focused on transfer student adjustment, Laanan identified three primary types of studies of adjustment: psychological, environmental, and climate. A consistent thread throughout the psychological studies of adjustment was the inclusion of different stressors that students encounter during their transition. Stressors are typically brought on by the psychological distress of the transition and
adjustment to the new social and cultural aspects of the four-year campus (Bean & Metzner, 1985). This has been found to be even more so for minority students. Laanan (2001) concluded that, to be successful, community college transfer students needed more insight into the expectations of the four-year institution prior to transferring.

While many have studied the initial transition for students moving from the community college to the four-year institution, Eggleston and Laanan (2001) pointed to the need for a greater understanding of the transfer student experience beyond the first semester, and the student services designed specifically for transfer students. Eggleston and Laanan explained that programs and services for native students are considered “essential,” (p. 87) to student success and baccalaureate degree attainment. Eggleston and Laanan suggested that, by understanding the needs of transfer students, four-year institutions could provide transfer programs and services leading to similar positive results. They also noted that with high percentages of transfer students being of a racial or ethnic minority, or international student, there is a greater need for more diversification of programs and services (Eggleston and Laanan, 2001).

Once they arrive at the four-year institution, community college transfer students often deal with more than the typical adjustment that a native freshman may experience. Transfer students experience, what Gardner and Barefoot (1995) described as academic and social issues. Academic issues include interactions with faculty, advising, and academic performance in the classroom, and social issues include self-confidence and learning to adjust to the culture and expectations of the four-year institution. To assist transfer students with this process, Eggleston and Laanan (2001) recommended that admissions officers become knowledgeable of common issues or delays related to transfer of course credit. It was also recommended that
senior institutions establish new student orientation programs specifically for transfer students that are not simply added onto freshman student orientation.

Berger and Malaney (2003) used academic achievement and satisfaction with the university experience as measures of transfer students’ adjustment pre- and post-move from a two-year community college to a four-year university. They noted the access role that community colleges play for students of racial/ethnic minority, lower socio-economic status, and/or of a nontraditional college-going age. While many community college students have aspirations to transfer, only a small percentage (10%) (Conklin, 1993) of those actually ever do. Berger and Malaney (2003) viewed the issue of a successful transfer student transition as the responsibility of both the two-year and the four-year institution. They developed a conceptual framework based on student success literature and Bean’s (1985) model of student persistence. Components of the framework used were: student characteristics, community college involvement, transfer readiness, university involvement, and outcomes (grade point average and satisfaction levels). Results of telephone interviews produced 372 usable student cases. Analyses of the data revealed a drop in hours worked per week and time spent with family for students who transferred from a community college to the four-year university, while hours studied per week and time spent socializing increased.

Overall, a student’s level of satisfaction coincided with his/her GPA, so a student with a higher GPA was often more satisfied than the student with a lower GPA. The area with the lowest reported level of satisfaction was academic support. Berger and Malaney (2003) speculated that students from a community college may have received more support from faculty in their coursework and, therefore, were disappointed with the decrease in support at the four-year university. Results of the study also showed that students who spent more time studying
and doing assignments at the community college were the same students who were most dissatisfied with the academic support at the four-year university. Based on these results, Berger and Malaney recommended making academic support units and faculty more accessible to transfer students.

According to Berger and Malaney (2003), the most meaningful result of their study was evidence that transfer students with greater academic success and satisfaction at the four-year institution were more informed and prepared prior to transferring. Although not surprised by the result, Berger and Malaney believe it supported the need for more effort on the part of the community colleges and four-year institutions in guiding students who plan to transfer. Faculty and advisors need to make sure these students are aware of the requirements to transfer and what will be expected at the four-year university. Efforts should be made to ensure that all faculty and advisors at the two-year community college are well-informed and up-to-date on the requirements for transfer. Likewise, the four-year institutions should provide more opportunities for students intending to transfer to ask questions and gain information about the process. An interesting finding of this study was that the level of community college involvement was not related to academic success and satisfaction at the four-year institution. It seemed to be more predictive of likelihood to transfer than anything else.

Laanan and Starobin (2004) argued that, while academic transfer shock had been well documented, there was a need to understand more about the social-psychological aspects of the transition from the two-year to the four-year institution. Additionally, Laanan and Starobin pointed to the increased call for accountability within all of postsecondary education as support for collecting data on students pre- and post-transfer from a two-year college to a four-year institution. In their study, students who transferred from a multi-campus urban Texas
community college to a in-state public research university were asked to complete the Laanan-Transfer Student Questionnaire (L-TSQ®) Short Form in an attempt to answer the following research questions: (1) what are the background characteristics of urban transfer students at (Texas University) TU? (2) what are the community college and university experiences of urban transfer students at TU? (3) how do urban transfer students describe the factors that facilitated their adjustment or transition? and (4) what lessons and advice do urban transfer students give perspective transfers to TU? Results of the study were reported according to the sections of the L-TSQ® by community college experiences or university experiences. Based on the student responses, Laanan and Starobin reported that the experience at the community college could influence the student’s ability to have a positive or negative transfer experience. The counseling and advising students received at the community college also impacted the quality of their transfer experiences. Laanan and Starobin found that students who were most successful at the four-year institution had been more proactive in seeking out information and had learned how the four-year system worked.

Laanan (2004) noted the lack or limited number of studies of the factors that may lead to transfer shock. He developed the L-TSQ® was developed to measure the students’ experiences at the two-year college prior to transfer and social-psychological factors that may impact their transition. Development of the L-TSQ® was based on Astin’s (1984) theory of student involvement and Pace’s (1980, 1984) Quality of Effort (QE). The L-TSQ® is a 304-item instrument with Likert-type scales designed to measure levels of agreement with statements (e.g., “agree strongly” to “disagree strongly”) and frequency of involvement (e.g., “very often” to “never”) with additional rating scales and categorical scales (Laanan, 2001, p. 337; Laanan & Starobin, 2004). The L-TSQ® measures the transfer students’ experiences at their four-year and
two-year institutions. Other than the L-TSQ©, few instruments have been developed and tested for use specifically with transfer student populations. The three primary sections of the L-TSQ© are as follows: (1) social demographics; (2) community college experiences; and (3) university experiences (Laanan, 2001). A series of open-ended questions at the end of the L-TSQ© provide an opportunity to collect qualitative narratives from transfer students (Laanan & Starobin, 2004).

While community colleges are still viewed as primarily responsible for the preparation of students who plan to transfer to a four-year institution, in recent years, more emphasis has been placed on the role of the four-year institution in the retention and success of transfer students (Townsend & Wilson, 2006). There is now an expectation that the receiving institution will provide orientation and advisement services for transfer students and offer opportunities for campus involvement. However, some four-year institutions have neglected this responsibility. Townsend and Wilson interviewed 19 transfer students (9 women; 10 men) about their experience of transitioning from a two-year to a four-year institution and compared the support and services offered. Tinto’s (1993) theory of student attrition or retention provided the conceptual framework for the study. Townsend and Wilson (2006) explained that Tinto’s theory supported efforts for a smooth transfer and opportunities for academic and social integration into the four-year institution. A qualitative approach was used to explore the phenomenon of transferring from a small community college to a large residential four-year university. Findings were summarized into three categories: (a) transfer process, (b) academic integration, and (c) social integration. Students viewed the transfer process from both the two-year community college and four-year university perspective. Many students expressed frustration with the lack of assistance from the community college in making a decision on which institution to attend or which credits would transfer, and 13 out of 19 participants reported receiving no assistance from
the community college in this process. Participants who did not receive much or any assistance from the community college often used the four-year university’s website to find the answers to their questions and found the course-equivalency tables to be particularly helpful. Overall, the students reported that they had received assistance from the four-year institution of their choice by way of a meeting with an advisor from their college and attending an orientation or welcome session. However, in some cases, students were reluctant to ask for additional help or were unsure of whom to ask or where to find the information (Townsend & Wilson, 2006).

Within the academic integration category, Townsend and Wilson (2006) focused on results related to students’ perceptions of the faculty and classroom environment. For many participants, the move from the community college to the university meant a new feeling of distance between them and the faculty. Students indicated the feeling of being just a number in a large crowd at the university, whereas at the community college they felt like their instructors knew them and were more approachable in and outside of class. Some of the participants noted the difference in the number of assignments per course, with some anxiety expressed about the one or two assignments at the university versus the multiple assignments at the community college, which helped keep them on task and spread out the weight of the grade more.

On the whole, participants found it more difficult to integrate socially and get to know their classmates at the university, somewhat due to the larger class size, but also because most of them did not (or could not) live on campus, limiting their interactions with other students. Whereas, the native student, who typically lives on campus during their first year, is able to socialize with his classmates more during meals and spending time in the residence hall. Participants found it difficult to find their “niche” or to “really fit” (Townsend & Wilson, 2006, p. 448) at the four-year university. Students also said that the community college was an easier
place to socialize because many of their classmates were from their high school or other nearby schools. A few students had a different perspective, reporting many more opportunities to socialize at the university compared to the community college, whose students were often too busy due to work or other responsibilities.

Flaga (2006) argued that while the study of transfer shock is valuable, it does not encapsulate the transfer student transition experience. To further understand the community college transfer student experience, Flaga (2006) conducted a qualitative study, interviewing 35 transfer students at Michigan State University (MSU) during their second semester. Again, at the end of that semester, she interviewed 30 of the original 35 students. The goal of Flaga’s research was to learn more about the first year of transition for transfer students and the nature of the first semester and changes that may have occurred between the first and second semesters.

Results of the qualitative analyses led Flaga (2006) to what she described as the five dimensions of transition: (a) Learning Resources, (b) Connecting, (c) Familiarity, (d) Negotiating, and (e) Integrating. Learning Resources were defined as the ways that students accessed information about the campus and university system; they were broken into three subcategories: Formal, Informal, and Initiative. Connecting included social relationships, academic interactions, and physically spending time on the campus. Familiarity referred to the differences that Flaga observed between students’ first and second interview. She explained that over time the students had internalized the world of four-year university life. Negotiating represented the behavioral changes that students made to adjust or fit within their new environment socially, psychologically and physically. Flaga’s final stage, Integrating, was described as being similar to Tinto’s (1987) theory of freshmen integration with the addition of consideration of the physical environment. According to Flaga (2006), the five dimensions
identified could be used to develop programs or services geared toward facilitating or improving the transition process for community college transfer students.

In his 2007 study, Laanan continued his testing of the Laanan-Transfer Student Questionnaire (L-TSQ©). Oberg’s (1960) concept of the culture shock phenomenon and the more recent work of Ward and Kennedy (1993) were added to the original L-TSQ© theoretical framework of Astin’s and Pace’s theories. The stated purpose of the study was to learn more about the transfer student experience at a four-year research university, as well as build upon previous research that looked beyond academic transfer shock. Laanan mailed 2,369 L-TSQs© and 727 were completed and returned, of which 717 were used in the analysis. The 717 respondents represented 64 California community colleges and were reported as representative of the transfer student population at the four-year receiving institution. Regression analysis of the data revealed that the students’ positive or negative perceptions of the four-year university were predictive of their academic adjustment upon transfer. GPA and intellectual self-esteem were identified as negative predictors of academic adjustment. In regard to social adjustment, analyses showed that students who were involved at the two-year college were more likely to be involved at the four-year university. Campus involvement and collaboration with other students were also related to a more positive social adjustment for transfer students (Laanan, 2007).

Transfer Student Success

Carlan and Byxbe (2000) conducted a comparative study of the academic performance of community college transfer students and native students at a major southern university over a three-year period, from 1989-1991. Data from academic student transcripts provided the demographic information for the stratified student sample. Regression analyses of the transcript data were also conducted to determine which variables, if any, could predict the performance of
transfer versus native students. Performance results for the transfer and native students were found to be comparable in this study. Although, some evidence of possible grade inflation during the first and second years at the community college was found, which according to Carlan and Byxbe, supports arguments often put forth by critics that academic standards are lower at the community college or that students are too enabled by their instructors. Interpretation of these results was dependent upon the assumption that scores on the ACT are predictive of academic grade performance. In that case, native students in this study scored higher on the ACT than transfer students with similar GPAs in their first and second years, or lower division courses. They also found support for transfer shock within the initial semester at the four-year institution, but generally the transfer students’ grades improved by the following semester. An interesting finding was the lack of significance for associate’s degree attainment on the students’ academic performance (Carlan & Byxbe, 2000).

State-level data collected from 1996 to 2002 on students from Washington’s flagship research university and from Washington community colleges were used by Whitfield (2005) to see if any difference existed between the grades of community college transfer students and native students taking organic chemistry or biochemistry courses. Whitfield chose to delimit the study to community colleges located within a 100-mile radius of the flagship university due to the limited or lack of data available from colleges outside of that range. Since the study focused on student performance in upper-division chemistry courses, Whitfield only included students who had completed the prerequisite sequence of courses at the community college or, for comparative purposes, at the four-year flagship. Similar to Carlan and Byxbe (2000), Whitfield (2005) found evidence to support the transfer shock experienced by transfer students during their first semester at the four-year institution. However, Whitfield also found that in the case of
students who continue the series of biochemistry coursework started at the community college are less likely to recover from the shock, describing it more as “transfer coma” (2005, p. 540).

Koker and Hendel (2003) examined the impact of several independent variables on the dependent variable of baccalaureate degree attainment at a large, public four-year university using logistic regression data analysis. The data analyzed were from 1,327 students who had transferred from a two-year college to the four-year site institution or from another four-year institution and who graduated in the 1994-95 academic year. A specific cohort of students from the Post-Secondary Enrollment Options (PSEO) high school dual-enrollment program, who graduated that same year, was also included. Koker and Hendel established need through the presentation of statistics on the relatively high rate (60%) of transfer students who leave during enrollment at their first four-year institution and that 73% of those who left did not enroll in another institution. They used institutional retention data collected at the time of matriculation, during the first post-transfer quarters. The independent variables tested for predictability included: demographics, high school and community college academic characteristics, post-transfer academic characteristics and the impact of membership in the three student cohorts. Results of the analyses suggested that academic background, pre-transfer institutional type, number of credit hours transferred, and level of academic success impact the quality of the transfer student experience. Students who transferred from a two-year college were at a higher risk for attrition than the other student cohorts. Age and gender were not significantly predictive, but race/ethnicity was, with White students being more likely to complete the baccalaureate degree than non-White students.

Ling (2006) conducted a study of transfer student success as measured by academic performance, psychological functioning and career functioning. Using canonical correlation,
Ling analyzed the effect of the following independent variables on transfer student success: academic and career self-efficacy, and a sense of belonging at the four-year institution. Ling identified two patterns of correlations. One pattern demonstrated was the students’ sense of personal vocational identity, which was often accompanied by higher levels of academic self-efficacy and confidence along with positive interactions with faculty. Students within pattern one were also likely to have a clear career path and were generally socially comfortable with their peers. Students grouped in the second pattern were not as sure in their career decisions or vocational identity. Ling explained that the second pattern students demonstrated similar levels of academic self-efficacy and social confidence with peers as those in pattern one; however, students in the second pattern lacked competency in career-related planning or tasks.

Duggan and Pickering (2008) surveyed 369 transfer students during orientation using a modified version of the Transition to College Inventory (TCI) called the Transfer Student Survey (TSS). Items from the TCI were used to identify patterns of noncognitive factors related to student academic success and persistence, while the modified TSS focused on barriers to transfer student success. Results of the data analyses found that noncognitive factors better predicted academic success and persistence for first-year transfer students, yet, levels of prediction varied based on student class standing. Duggan and Pickering stated that these findings were contradictory to existing literature, which indicated demographic variables as most predictive of success or persistence. Different barriers to success were reported based on the student’s classification: freshman, sophomore, or upper division. Some of the barriers identified were represented in more than one classification, such as students’ self-assessments, academic integration, and confidence levels.
Freshman transfer students expressed a need for more balance between their class and work schedules. While the students understood the need to take a full course load, they also needed to find a way to balance that with the reality of their financial situation (Duggan & Pickering, 2008). Self-ratings of their own abilities as they entered the four-year institution were split for freshman transfer students, who either overestimated their preparation or somewhat underestimated their abilities. In addition to balancing work and class, there was a need for balance between academics and socializing for sophomore transfer students, noting the importance of social integration as related to student persistence. However, students who were unable to achieve a balance may have been at risk for doing more socializing than studying. Sophomore transfer students also indicated a probable need to miss multiple class meetings to provide transportation or other support to their families. This concerned Duggan and Pickering because of prior research on the importance of class attendance and the negative impact that family responsibilities can have on student persistence. Similar issues were found among upper division transfer students, but junior and senior students also expressed more issues of confidence in their abilities to succeed academically, due to lower views of self and levels of support available to them.

Whorton’s (2009) dissertation examined the impact of participation in a transfer transition program designed for community college transfer students during their first semester at the receiving four-year institution. A web-based survey was used to collect data from students on their academic self-efficacy and cohesion beliefs. Academic student records were also used to measure the students’ academic performance and persistence for the first semester. Elements of academic and social integration taken from Tinto’s (1975, 1993) theory of student departure provided a conceptual framework for the study (Whorton, 2009). Whorton conducted a census
sampling technique, which involves identifying and sampling all known members of the target population; this yielded an initial sample size of 946. About 50% (N=474) of the initial sample responded to the survey. Whorton then delimited the sample to only community college transfer students who were coded as new students for the fall 2008 within the university’s records and who had attended the community college of interest in this study (N=239). Whorton analyzed data for 139 of the sampled respondents. Analyses of the data compared the results for transfer students who had participated in the transfer transition program to those who had not. In the discussion of the findings, Whorton outlined the benefits associated with participation in the transition program. The most statistically significant finding was the increased (3.29 times higher) likelihood of successful transfer of credits to the four-year institution for the students who attended the transition program.

**Transfer Student Enrollment Patterns**

Community college student enrollment behaviors can impact time-to-degree and ultimately, degree attainment. In 2000, Townsend examined how the enrollment patterns of reverse transfer students were recorded at the community college and the impact of the reverse transfer student on the community college. A reverse transfer student is one who has attended a four-year college or university and transfer to the community college, and in some cases, these students already have one baccalaureate degree. The primary concern in this study was whether or not the enrollment of reverse transfer students was having a negative impact on the space available at the community college to less experienced students, especially in the more selective or competitive programs in health, engineering, and information systems. Townsend conducted an analysis of 22 documents obtained from journals, book chapters, Education Resources Information Center (ERIC) documents, a newspaper article, a commissioned report, and
dissertations published after 1960. Townsend concluded that while the admittance of reverse transfer students may limit access for some students who would be first-time community college students, overall, the colleges could justify the service as a part of their mission to provide education to students’ who need a chance, or even a second chance to succeed. Ultimately, the enrollment of these students provides community colleges with additional income from tuition.

As a follow-up to the 2000 study, Townsend (2001) recommended that a closer look be taken at the transfer mission of the community college and critiques to possibly better define it to reflect the current transfer patterns of students. By updating the definition of transfer to reflect the contemporary community college students, Townsend demonstrated the viability of the transfer function. Six different types of transfer student patterns were identified in this study. First among those patterns was one in which a community college student takes transferrable coursework with an intention to transfer but does not plan to obtain the Associate of Arts (A.A.) or Associate of Science (A.S.) degree prior to transfer. Townsend pointed to past research by Cohen and Brawer (1996) that had shown a decreased likelihood of success at the four-year institution for community college transfer students who did not complete the A.A. or A.S. degree. Unlike the first pattern type, the second included community college students who had obtained the associate’s degree, but had done so in a program not based in the liberal arts, such as an Associate of Applied Science (A.A.S.) degree. Students in this case may encounter issues related to transferability of much of their A.A.S. degree coursework as they attempt to transfer to the four-year institution. The third pattern included transfer students who did not seem to accept the traditional 2+2 linear progression from the two-year to the four-year as their only option. These students exhibit “swirling” patterns, as first described by de los Santos and Wright (1989), involve students transferring from one two-year college to another two-year prior
to transferring to a four-year institution. Another type of swirl occurs when a student at a four-year institution transfers to a two-year institution. This is also referred to as a reverse transfer; a phenomenon first documented by Burton Clark (1960). Another type of swirling student has been identified: the double-reverse transfer (Cooley, 2000). This is a student who attends a two-year institution, transfers to a four-year institution and then returns to a two-year college (Townsend, 2001). The fourth type of transfer student described by Townsend was the high school student who completes college credit from the local community college through a dual enrollment program. However, in most cases these students transfer the credit to a four-year institution upon graduation from high school and do not continue at the community college.

Students in the fifth pattern type may at first glance appear to be reverse transfers but are actually four-year students who only take courses at the community college during the summer without ever transferring into the two-year institution (Townsend, 2001). Students sometimes opt for the community college in the summer to save on tuition, to re-take a course or take additional hours toward their baccalaureate degree without overloading the fall and spring semesters at the four-year institution. Lastly, the sixth transfer pattern known as concurrent enrollment is just that; it is the enrollment at both the two-year and four-year institution during a single semester. Students then transfer the two-year credits toward the fulfillment of the four-year baccalaureate degree.

With transfer changing and becoming something much different than what was originally envisioned when the junior college was established, Townsend (2001) saw a need to understand the impact the evolution has had on baccalaureate degree attainment. Townsend examined three areas: the effect on time-to-degree, college costs, and quality of the courses taken at the two-year college. The effects on time-to-degree and college costs were fairly straightforward from
Townsend’s perspective. Students who participate in dual enrollment or concurrently enroll in a two-year college while attending a four-year institution are likely to complete the baccalaureate degree more quickly. Conversely, patterns of reverse transfer or swirling have the potential of actually slowing a student’s progress.

Alexander McCormick (2003) identified and defined eight different transfer student enrollment patterns. Trial enrollment described as experimenting or exploring course and program offerings. Special program enrollment involves taking unique courses or programs at another college. Supplemental enrollment is the taking of summer courses to speed up time to degree. Rebounding enrollment involves alternating enrollment from one to another institution. Concurrent enrollment, as described as double-dipping, is when a student enrolls at more than one institution in the same academic period. Consolidated enrollment, similar to concurrent in that it involves taking courses at different institutions to fulfill a degree program at one of the colleges, but the multiple enrollments do not necessarily occur in the same academic period. Students involved in concurrent and consolidated enrollment may also be described as a serial transfer student due to enrollment at more than one institution before completing a degree. Lastly, the independent enrollment pattern occurs when course are taken for reasons other than degree attainment (McCormick, 2003). Borden recommended that states and institutions record the patterns of student swirl to better understand and track it. Additionally, academic support systems need to be in place to assist with transition in and out of a degree program (Borden, 2004).

**Transcript Analysis**

Hagedorn (2005) described the community college as an “American invention,” (p. 2). Critics have noted the shortcomings of the community college and its existence over the
years (Brint & Karabel, 1989; Dougherty, 1987, 1994). More current concerns relate to the difficulty of measuring the success and outcomes of the community college and its students due to the lack of reliable tracking systems (Alba & Lavin, 1981). Hagedorn (2005) proposed transcript analysis as a method for understanding the academic behaviors of the community college student, both successful and non-successful.

In an effort to obtain more accurate reports of transfer students who successfully complete a baccalaureate degree, Piland (1995) randomly selected a sample of 300 students from a total of 1,796 community college transfer students who completed their four-year degrees in San Diego County. University and community college transcripts and student records were used to analyze variables such as grade point average (GPA), credits earned, and course taking patterns-dropped/failed. Student record data were inputted to a database, and ranges, means, and medians were calculated for each variable. Results revealed, not unexpectedly, that a relationship existed between student GPA at time of transfer and graduate rates. Students with a higher GPA (3.5 to 4.0) were two times more likely to persist to graduation in a timely manner compared to students with a lower GPA (2.5 or less) (Piland, 1995).

In 1999, Clifford Adelman produced a report for the U.S. Department of Education entitled *Answers in the Tool Box: Academic Intensity, Attendance Patterns, and Bachelor’s Degree Attainment*. The *Tool Box* study utilized a national data set, the 1998 High School & Beyond/Sophomore (HS&B/So), that included a cohort of students who were 10th grade in 1980 who were followed through to 1993. The purpose of the study was to identify factors that contributed to eventual bachelor’s degree attainment based on the students’ transcript records, even if the students attended more than one postsecondary institution or type of institution. According to Adelman, determining rates of degree completion and how to increase them were
of most concern to key stakeholders, such as students, their parents, state legislators, and college administrators. Adelman argued that degree completion was of more importance than retaining a student from the first year to the second and student persistence without ever earning a degree; “degree completion is the true bottom line,” (p. v).

Adelman (1999) outlined four occurrences in higher education that prompted the need for the study. First, the increasing move towards using college graduation rates and calculations of students’ time-to-degree as a measure of institutional accountability to the public, which in turn has led to the conclusion to blame the institution, and not the student, for lack of degree completion. Adelman also noted the increasing number of high school graduates who are entering postsecondary education along with older returning students. A third issue was the ever-changing enrollment patterns of students, who are often attending more than one institution, either by transferring from one to another or enrolling at both at the same time. Not only does this trend increase the difficulty of tracking students and determining what factors contribute to (or inhibit) degree completion, but as Adelman pointed out, much of the research and policy work at that time did not account for this change in student attendance behaviors. Lastly, Adelman noted the debate and controversy surrounding admissions practices at selective colleges and affirmative action policies. A debate in which a student’s grade/class rank compared to test scores are the only variables being considered without any assessment of the high school curriculum from which a college applicant matriculates.

In his study, Adelman (1999) used six ordinary least squares regression equations to determine which variables are most likely to contribute to baccalaureate degree completion. As Adelman entered the blocks of variables into the equation, he found that the fifth model in the series accounted for 43% of the variance in baccalaureate degree completion. SES was the only
demographic variable that maintained significance throughout the analyses; yet, its impact was diminished after the student completed the first year toward the baccalaureate degree. Adelman then conducted a linear regression model using the variables from the fifth model, from which he found two variables of most import: 1. Academic resources and 2. Continuous enrollment. In this case, the academic content and student’s performance at the secondary educational level were used to measure academic resources, and continuous enrollment started at the student’s first post high school entry into higher education.

Based on the growing incidence of students attending more than one institution in their undergraduate years during the 1970s and 1980s and preliminary data from the 1990s, Adelman (1999) projected the growth to continue and increase in the twenty-first century from 40 to 50% of students to 60% of students attending more than one institution. Students beginning at a highly selective institution or at an open-door admissions institution were the two groups of students with the highest rate of attendance at more than one college or university. Adelman found that understanding the multi-institutional attendance patterns of students as it relates to the continuous enrollment factor was also important. Continuous enrollment correlated with degree completion. The fewer institutions that a student attended, the more likely the student was to be continually enrolled, and 70% of student who enrolled at a four-year institution at any time were more likely to be continuously enrolled. Still, about 70% of the students who did alternate between institutions did so at three or more colleges or universities. Interestingly, the 40% of students who moved to an institution in another state completed their baccalaureate degree at a higher rate than those who remained in the same state.

As for differences between students who began at a two-year college versus those who began at a four-year institution, Adelman (1999) found that among students beginning at the
two-year college with aspirations to transfer to a four-year university, the students with a lower SES and lower academic resources were less likely to ever transfer. However, for the 26% of students who began at the two-year college and transferred to the four-year university, over 70% went on to complete the bachelor’s degree. Adelman cited this result as support for the “classic” (p. viii) transfer mode of earning a semester or more of credit at the community college and then transferring to a four-year institution. While the traditional transfer pattern was supported by Adelman, he also acknowledged that the patterns were rapidly changing to more of a “portfolio building” (1999, p. x) style of transfer in which students move between institutions to better their experience within their major of choice with less concern for the continuity of experience at one institution. Adelman encouraged administrators, legislators, and all those concerned with the students’ degree completion rates to follow the actions of the student and not the institution.

In 2006, as a follow-up study to the original Tool Box, Adelman conducted a slightly modified replication of the study, entitled The Tool Box Revisited: Paths to Degree Completion from High School through College. Modifications were based primarily on recommendations following the original 1999 study, but for the most part, it was a true replication. Like the first study, the goal of the 2006 study was to determine what contributes to baccalaureate degree completion, not to examine issues of access, retention, or persistence. Adelman (1999, 2006) explained that rates of degree completion or graduation rates continued to occupy the attention of stakeholders, despite the difficulties associated with accurately measuring such rates.

As anticipated by Adelman in 1999, the incidence of students attending more than one undergraduate institution had increased to about 60%, with 35% transferring into another state. Adelman (2006) noted an increase (up by 10%) in the rate of community college students transferring to a four-year institution. He also noted that about 12% of students enrolled at a
four-year institution are taking courses at the community college to fulfill curricular requirements, while 8% are swirling between two-year and four-year institutions. Keeping with his own recommendation from 1999, Adelman used student transcript records to assess what a student actually did and not what they planned or would like to do in the future, to follow the student and not the institution to determine the level of student success. Data collected from the transcripts were analyzed according to progression from high school to baccalaureate degree completion, defined by Adelman in the following seven steps: 1. Demographic background and high school history, 2. Postsecondary entrance (timing and type of institution), 3. First postsecondary year history (curriculum and performance), 4. Factors of financing postsecondary education in the early years, 5. Postsecondary attendance patterns, 6. Extended postsecondary history (curriculum and performance), and 7. Final model, with complete academic history.

Logistic regression analyses were performed using the data collected in the seven steps. According to Adelman (1999, 2006) logistic regression was appropriate for use in this case since the dependent variable, or outcome, was dichotomous: completed baccalaureate degree or did not. Data were added to the regression analysis in groups or blocks according to the seven steps and the number sequence. Data within a block (or step) that met the statistical criterion for staying in the model were carried forward to the next step and were considered to be “cumulative” (Adelman, 2006, p. 8) in nature. In both the original Tool Box and Tool Box Revisited, Adelman (1999, 2006) made it clear that the results of the data analyses could not (and should not) claim causality between any of the independent and dependent variables, nor could the results be used to predict behaviors. Adelman intended to describe what students were actually doing and not what they might report having done or plan to do on a survey. However, by obtaining a more complete picture of students’ academic and enrollment patterns as they
relate to degree completion, those vested in student success may be better able to provide funding and services for identified areas of need.

In 2006, results of the Transfer and Retention of Urban Community College Students (TRUCCS) project were reported by the Director, Linda Serra Hagedorn, and published by editor Tracy Johnson. In this report, Tinto’s theory of student departure was credited with longevity, which was attributed to its simplicity and common sense approach. Still, Tinto’s theory was not considered the best fit for the community college student experience. This conclusion was drawn based on some common differences among community college students in comparison to their university counterparts, most specifically the lack of leaving their pre-college lives behind them, as described in Tinto’s model. Also, the continuous enrollment pattern that is often found, or even required, among university students, is not as typical for the community college student. Many students at the community college skip a semester or even a year or more between enrollments. Differences like these were Hagedorn’s basis for initiating TRUCCS, which sought to better understand the urban community college student, how to predict their success, and how to apply that knowledge to practice (Johnson, 2006).

A major goal of the TRUCCS project was to identify the primary factors, which can be accessed through transcript data, related to the retention and transfer patterns of community college students (Hagedorn, 2005). According to Hagedorn, there were few studies that used transcript analysis and therefore limited information about the best method or approach to use. Hagedorn and Kress (2008) described most transcript analysis work as rooted in the work of Clifford Adelman—U.S. Dept. of Ed.—1999, 2004, 2005, 2006. Most often analyses of transcript data have included calculation of GPA and number of credits earned as related to progress toward a degree. Hagedorn (2005) noted the lack of a consistent method for collecting
and interpreting transcript data across institutions and states as a possible cause for fewer studies of this kind. Transcript data and student responses from the TRUCCS survey databases were used to compare the academic behaviors and success (or non-success) of white students to students of color (Hagedorn, 2004).

In TRUCCS, data collection was done in three parts: (1) transcript stories, (2) group parsing, and (3) comparison. First, “transcript stories” (Hagedorn, 2005, p. 7) were developed from the transcript data on course taking patterns and other academic behaviors, thus creating a story for each student. Next, the student stories were grouped into more homogenous groups to manage the large amount of data collected, described as “group parsing,” (Hagedorn, 2005, p. 7). In the third phase, comparisons were made between the groups to ascertain any differences or similarities that existed. Hagedorn (2005) selected a sample of transcript stories based on the themes of positive progress, no pattern, no credits, illogical sequencing and some others. Although described as a fairly represented sample, she admitted that stories of less success were intentionally overrepresented for their value in being used to create new policies or improve those that exists to assist the students. Hagedorn (2005) categorized the transcript stories using phrases intended to summarize the student experience: 1. students who withdrew, earning no credits were “a waste of time,” (p. 8), 2. the “mixed bag” (p. 9), students who took many courses with varying levels of academic success, 3. students who took more advanced or transfer level courses but did not complete all courses are “advanced but ineffective,” (p. 9), 4. a “part-time/remedial and going nowhere quickly,” (p. 9) student would enroll part-time, with at least one remedial course, later drop the course and possibly fail the remaining course, and 5. the “determined but with limited success,” (p. 10) student has many credit hours (100+) at the
community college, mostly due to the need to take remedial courses multiple times, followed by multiple efforts at the transfer level courses (Hagedorn, 2005).

Although Hagedorn (2005) acknowledged the lack of one definitive way of doing transcript analysis, the methods used in this study allowed the community college students’ non-linear patterns of course-taking to be better understood. Results of the study support the practice of early identification of less productive patterns among students and proactive intervention. Hagedorn realized that decreases in funding have left community colleges with an overwhelming number of students per academic adviser. Still, she encouraged efforts to address the clear connection identified between a student’s course enrollment patterns and success.

Hagedorn, Moon, Cypers, Maxwell, and Lester (2006) used the metaphor of the game of baseball as a framework for a concept that originated in the TRUCCS Project, “the Transfer Game” (p. 224). The game of transfer was described as the preparation of community college students for successful transfer to a four-year institution by first completing transfer level coursework. Hagedorn et al. described the traditional definition of transfer as a dichotomous outcome, either one transfers or one does not. Not only does this definition omit the students who are on the path but have not completed the transfer process, it also assumes a linear pattern of transfer from the community college to the university. Many community college students follow a less than linear path by either stopping out, enrolling part-time then full-time, and in some cases even reverse transfer, moving from the four-year institution back to the community college. High school dual enrollment programs and university students who enroll only in the summers also skew the data on transfer rates (Hagedorn & Castro, 1999; Hagedorn et al., 2006).

In a 2008 article, Hagedorn and Kress refuted recent criticisms of community colleges, which claimed a lack of data collection and consistency in doing so. The magnitude of this
accusation against community colleges was noted as relative to the present, and growing, trend to be accountable and demonstrate outcome success through the use of data. Hagedorn and Kress explained ways in which transcript analysis can be used by community colleges to track and document success. In 2010, Hagedorn et al. used data collected within the Los Angeles Community College District (LACCD) to develop a web-based tool used to determine a student’s likelihood of transfer from a two-year community college to a four-year institution. As noted earlier in the review of the literature, others have also found student engagement and involvement to be predictive of success, along with academic effort and good college fit (Astin, 1984; Laanan 2001, 2003, 2004; Pace, 1980, 1984; Tinto, 1975). Although LACCD student demographic and academic data were used to calibrate The Community College Transfer Calculator©, it was designed to allow for customization and use by institutions outside of the LACCD. Students were the intended end-users of the CCTC, allowing them to map the academic plan mostly likely to lead to successful transfer from the two-year to the four-year institution.

Two types of student data files were used to develop the CCTC. One, the demographic file obtained from students’ applications and general records, and two, students’ academic transcripts. Descriptive student data such as a gender, race, and age taken from the demographic file were merged with the academic transcript data, such as course-taking patterns, grades earned, and enrollment types (such as full-time vs. part-time). Use of student records and transcripts can be less costly than surveying or conducting focus groups with students, since most institutions already collect and maintain these data. Further, data from the academic record and transcript are not subjective; they are simply records of student descriptors and student academic histories (Adelman, 1996; Hagedorn et al., 2010).
The merged demographic and academic transcript data files were aggregated to produce a working file that focused on the student as the unit of analysis. Data from the National Student Clearinghouse (NSC, 2014), source of American student enrollment data, were used to identify students as either transfer or non-transfer. Hagedorn et al. (2010) defined transfer as enrollment at a four-year institution, regardless of whether or not the student went on to complete the baccalaureate degree. Logistic regression was conducted to determine the likelihood of the dichotomous dependent variable of transfer or non-transfer, based on students’ characteristics and course taking behaviors. Forced entry block method was used to input the independent student variables into the logistic regression model. Chi-square analyses were conducted to further assess the model’s fit to the data, or the relationship to transfer or non-transfer. Once the CCTC template was created in C# programming language, *The Community College Transfer Calculator*© was launched online for use by the LACCD. Transcript data from LACCD students who intended to transfer to a four-year institution were analyzed to develop a logistic regression model that can be used to predict likelihood of transfer or non-transfer to a four-year institution. *The Community College Transfer Calculator*© is available online and can be downloaded and customized to individual institution’s needs and student demographics (Hagedorn et al., 2010).

Using pre- and post-transfer transcript data, the current study will provide a means to begin to understand the demographic and academic factors contributing to the likelihood of community college transfer student success at the destination four-year institution. Success within this study was defined by graduating or not graduating. A greater understanding of what contributes to the likelihood of graduation (or not) for community college transfer students will aid practitioners with advising and development of appropriate academic plans, as well as, add to
the existing information on transfer student success. The next chapter will explain the methodology, data source and plan for data analysis in this study.
CHAPTER III:
RESEARCH METHODOLOGY

Enrollment increases at community colleges, which translate to increases of transfer students at four-year institutions, call for a better understanding of what most impacts persistence to graduation for this population of students (Crisp & Taggart, 2013; Ellis, 2013; Townley, Katz, Wandersman, Skiles, Schillaci, Timmerman, & Mousseau, 2013). Clifford Adelman and Linda Hagedorn utilized students’ academic records as source data for explaining or proposing possible future academic outcomes for students. Hagedorn (2005) loosely defined transcript analysis as coding of data already collected under mandate by the state or federal government, such as enrollment and financial aid records. Transcript data can provide many answers to a variety of questions. Transcript data are information that, in most cases, will not change as it relates to the student outcome of either graduation or not, provided that the researcher is given strong source data. However, as Hagedorn (2005) noted, transcript data are limited to only answering the what and how of the student’s curricular experience at an institution without providing the why. Still, understanding the what and how is necessary and provides an excellent foundation for future research of the why. For instance, Hagedorn and Kress (2008) recommended supplementing transcript data with a survey like the one used in the TRUCCS project or a national survey like the Community College Survey of Student Engagement (CSSE), or even instruments developed specifically for a campus. Hagedorn and Kress pushed for more transcript-based research to better understand the complexity of the many paths that community college students may take before becoming transfer students at a four-year institution.
The purpose of this study is to analyze demographic and transcript data using logistic regression modeling to develop and validate a predictive model for examining the dichotomous variable of graduate or not graduate for community college transfer students who transferred to the site four-year institution. The transcript data used in the current study was obtained from existing university data; no new collection was required. Existing enrollment files, such as students’ applications, financial aid eligibility, and course enrollment history and grades earned are already maintained by university offices of the registrar and institutional data and planning at the four-year site institution.

**Operational Framework**

Over the years, a number of scholars have put forth hypotheses concerning the student and institutional characteristics that contribute to successful transfer and degree completion, and conversely, the lack of success. Unlike student surveys, which collect self-reported data from the students, data pulled from students’ academic transcripts more accurately reflect students’ academic histories (Adelman, 1999). The works of Linda Serra Hagedorn (2006) and Clifford Adelman (1999, 2006) are important studies that utilized transcript data to determine factors that contributed to student success. Hagedorn’s (2006) TRUCCS project was preceded by Adelman’s (1999, 2006) work for the U.S. Department of Education, *Answers in the Toolbox* and the *Toolbox Revisited*, which was explained in more detail within the “Relevant Studies of Attrition, Persistence, and Retention” section of chapter two. The current study took, as a starting point, the findings of these two studies, as well as the more recent *The Community College Transfer Calculator*© (CCTC) work by Hagedorn et al. (2010).
Research Questions

Hagedorn et al. (2010) identified key factors, from previous studies, that were predictive of successful transfer. In particular, Calcagno, Crosta, Bailey, and Jenkins (2007) offered insight through their examination of community college students and their enrollment behaviors pre- and post-transfer, such as student demographics, course completion ratio, need for remedial/development courses, level of math and science courses completed, college grades, and engagement on campus. Some of these factors and others were included in this study.

1. What are the demographic characteristics of the students in this study, and how do these characteristics differ between those who graduated and those who did not?

2. What are the course-taking characteristics of the students in this study, and how do these characteristics differ between those who graduated and those who did not?

3. To what degree do the following demographic and academic factors influence the likelihood of persistence to graduation two years post-transfer, four years post-transfer or at any time post-transfer:
   a. Number of credits transferred from the community college.
   b. Earned an associate’s degree.
   c. Number of community colleges attended prior to enrollment at the four-year university.
   d. Cumulative transfer GPA at time of transfer to the four-year university.
   e. Current or final cumulative GPA at the four-year university.
   f. Number of semesters enrolled at the four-year university.
   g. Number of hours earned at the four-year university.
   h. Number of course withdrawals at the four-year university.
i. Number of Fs received for coursework at the four-year university.

j. Number of no-progresses for coursework at the four-year university.

k. Gender

l. Race

m. Academic major

n. Age at time of enrollment at the community college

o. Age at time of enrollment at the four-year university

4. Using GPA as the measure of academic performance pre- and post-transfer, does having a community college and/or four-year institution GPA in the bottom 25th percentile for the sample impact graduation rates?

**Site Institution and Participant Selection**

The site of this study is a midsize, public and primarily non-residential four-year university founded in the late 1960s. For the purposes of this study, Big City University (BCU) was used as a pseudonym for the site institution. BCU is classified as a Research University with very high research activity (RU/VH) in the Basic Classifications of Institutions of Higher Education of the Carnegie Foundation for the Advancement of Teaching (CFAT, 2013). Average enrollment for RU/VH institutions is 26,015 (CFAT, 2013). According to the BCU Common Data Set Response report, 17,999 students enrolled at BCU in fall 2012, with undergraduate students accounting for 62.7% (11,291) of the total enrollment (Hall, 2013). Of the 11,291 undergraduates, 8,295 (73.4%) were enrolled full-time. More women (6,500) than men (4,791) were enrolled as undergraduate students and were the majority group for both full-time (57.1%) and part-time (58.7%) enrolled students. Among the 11,014 degree-seeking undergraduate students, 6,539 (59.3%) were classified as White, non-Hispanic/Latino, 2,923
(26.5%) as Black or African American, non-Hispanic/Latino, and 522 (4.7%) as Asian, non-Hispanic/Latino. All other racial/ethnicity categories accounted for 3% or less of the population. Total number of transfer students enrolled fall 2012 was 1,270 or 11.5% of all degree-seeking undergraduate students. Forty-one percent of enrolled transfer students were male and 59% were female (Hall, 2013). Out of the 1,247 students who transferred to BCU in fall 2011, as reported by State Commission on Higher Education (SCHE, 2012), 1,150 (92.2%) transferred from an in-state institution and 760 (66%) of them transferred to BCU from an in-state two-year community college.

Of the 1,578 first-time and full-time undergraduate students who enrolled in fall 2011, 888 (56.2%) were transfer students (U.S Department of Education, Institute of Education Sciences [IES], 2013). Retention and graduation reporting for the 2007-2008 full-time undergraduate students did not include transfer students. According to the report, 79.9% of the initial 1,503 first-time full-time freshmen students were retained through fall 2011 (Office of Planning and Analysis, 2012). IES (2013) reported the four-year (23%), five-year (38%), and six-year (45%) graduate rates for full-time, first-time, degree/certificate-seeking undergraduates. This study focused on in-state community college transfer students who first enrolled in the 2007-2008 academic year at BCU. BCU is one of three four-year public institutions in the University System, and from 2007-2013, an average of 1,121 new transfer students entered BCU each year (Office of Planning and Analysis, 2008, 2013). In 2007-2008, 1,060 transfer students enrolled at BCU (Office of Planning and Analysis, 2008). The sample in this study was drawn from the 2007-2008 population. Sample size was calculated using a confidence interval of 5 with a 95% confidence level, resulting in a sample of 322 (Field, 2009).
Data Source and Collection

The data, including student transcripts and other academic and demographic records, were extracted electronically from BCU’s computerized student information system in collaboration with the Office of Institutional Effectiveness and Analysis, after seeking approval from the Institutional Review Boards from BCU, the site institution, and The University of Alabama, the institution at which the researcher is pursuing doctoral studies. The data were exported from the student information system and formatted in Excel and imported into Statistical Package for the Social Sciences (SPSS) version 21.0. The data were reviewed for any potential errors. For purposes of student confidentiality, the university’s student identifier were removed from each record and replaced with a randomized numerical value to identify students for the study prior to the data being imported into SPSS.

These data provided the information necessary to explore the research questions posed in this study. As noted in chapter one, there is a lack of analysis of students in the state who transfer from a community college to a four-year institution, with or without earning an associate’s degree, and the successful completion of the baccalaureate degree. The lack of examination of these students and the gaps in existing literature give cause for investigation of community college transfer students’ baccalaureate degree completion in general and at the site institution. The demographic and community college academic data used in this study were initially collected as a part of BCU’s admissions process and are kept as a part of the students’ official academic records. Students who apply as transfer students are required to submit official college transcripts, for all colleges attended. Students who have earned less than 24 college-level credit hours are required to apply as freshmen and submit high school and standardized test scores along with their college transfers.
The researcher obtained community college and university transcript data for students categorized as a transfer student by BCU in the fall of 2007. The data were accessed during the fall of 2013 and spring of 2014, so students entering in 2007 would have had sufficient time in which to complete their baccalaureate degree coursework. However, both students who graduated and those who did not graduate were included in the analyses to allow for comparison of the two groups. The student demographic characteristics included in the student profiles are gender, age, and race/ethnicity. To complete the profiles, the following academic characteristics were also included: number of transfer credits, number of credit hours at BCU, community college GPA, and award (or not) of the associate’s degree, undergraduate major at admission and current major, GPA at the four-year institution, number of semesters enrolled (fall, spring, summer) at BCU, number of community colleges attended, number of course withdrawals, grades of “F” or no progress for courses taken at BCU. For research question two, information related to enrollment behaviors were recorded: enrollment in developmental coursework (math, English, or reading), dual enrollment coursework, and whether or not college-level math was completed at the community college.

**Data Coding and Analysis**

Descriptive statistics were run for the independent variables, including demographics and the pre- and post-transfer academic activities, such as hours earned at BCU, major at time of admission, most current major, number of transfer hours, transfer GPA, BCU GPA, associate’s degree received, number of community colleges attended prior to transfer, number of semesters enrolled at BCU, college-level math completed at the community college, developmental coursework taken at the community college, dual enrollment credit, the number of course withdrawals, failed courses or grade of no progress, change of major, and degree type pursued.
Next, students were categorized as having transfer GPAs or BCU GPAs that are discrepant or non-discrepant from the mean for the sample. Finally, logistic regression analyses were conducted to determine which independent variables were predictive of graduation from BCU. Unlike linear regression, logistic regression is able to manage analysis of categorical and continuous independent variables (Burns & Burns, 2008; Wuensch, 2014). Still, the researcher recoded certain independent variables to a “yes” or “no” (1 or 0) format before analysis to allow for greater use within the logistic regression model, which treats all predictors in the analysis as numerical within SPSS (Tabachnick & Fidell, 2007).

**Variables**

As shown in Table 1, the independent variables used in this study were selected based upon the extensive work regarding pre- and post-transfer student success by scholars such as Clifford Adelman, Linda Serra Hagedorn, Frankie Santos Laanan, and many others noted in the review of the literature. This study focused on two-year transfer students with variant academic histories and demographic backgrounds. Transfer and BCU GPAs were compared to the mean GPAs for the sample, and students were then categorized into discrepant GPA groups based on the results of the comparison. The sample was divided into 4 groups of bottom 25th percentile based on transfer GPAs at or below the 25th percentile of the sample, which may relate to the students’ likelihood to persist (Cejda et al., 1998). The rank of the students’ transfer GPA and BCU GPA from the mean GPAs were used to sort the groups. Students with transfer GPAs and BCU GPAs that are neither at nor below the 25th percentile were included in the Neither GPA Low group. The Low Transfer GPA group included students with a transfer GPA at or below the 25th percentile. The Low BCU GPA group included students with a transfer GPA above the 25th
percentile and a BCU GPA at or below the 25th percentile. The Both GPAs Low group included students with both a transfer GPA and BCU GPA at or below the 25th percentile.

Table 1

*Independent and Dependent Variables Used in the Study*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Variable type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Community Colleges Attended</td>
<td>Categorical</td>
<td>1 college</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 colleges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 or more colleges</td>
</tr>
<tr>
<td>Total Number of Transfer Credit Hours</td>
<td>Continuous</td>
<td>Range: 0-60</td>
</tr>
<tr>
<td>Total Number of BCU Credit Hours</td>
<td>Continuous</td>
<td>Range: 0-120</td>
</tr>
<tr>
<td>Total Number of BCU Semesters</td>
<td>Continuous</td>
<td>Range: 0-23</td>
</tr>
<tr>
<td>Transfer Cumulative GPA</td>
<td>Continuous</td>
<td>Range: 0-4.0</td>
</tr>
<tr>
<td>BCU Cumulative GPA</td>
<td>Continuous</td>
<td>Range: 0-4.0</td>
</tr>
<tr>
<td>Total Number of BCU Course Withdrawals</td>
<td>Continuous</td>
<td>Range: 0-12</td>
</tr>
<tr>
<td>Total Number of BCU Fs Received</td>
<td>Continuous</td>
<td>Range: 0-12</td>
</tr>
<tr>
<td>Total Number of BCU Grades of No Progress Received</td>
<td>Continuous</td>
<td>Range: 0-14</td>
</tr>
<tr>
<td>College-Level Math Completed at Community College</td>
<td>Discrete</td>
<td>Yes or No</td>
</tr>
<tr>
<td>Associate’s Degree Awarded</td>
<td>Discrete</td>
<td>Yes or No</td>
</tr>
</tbody>
</table>
(Table 1 Continued)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Variable Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual Enrollment Hours</td>
<td>Discrete</td>
<td>Yes or No</td>
</tr>
<tr>
<td>Developmental Coursework</td>
<td>Discrete</td>
<td>Yes or No</td>
</tr>
<tr>
<td>Developmental English</td>
<td>Discrete</td>
<td>Yes or No</td>
</tr>
<tr>
<td>Developmental Math</td>
<td>Discrete</td>
<td>Yes or No</td>
</tr>
<tr>
<td>Developmental Reading</td>
<td>Discrete</td>
<td>Yes or No</td>
</tr>
<tr>
<td>Changed Major after Admitted</td>
<td>Discrete</td>
<td>Yes or No</td>
</tr>
<tr>
<td>Gender</td>
<td>Discrete</td>
<td>Male or Female</td>
</tr>
<tr>
<td>Age</td>
<td>Categorical</td>
<td>≤24 Traditional</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥25 Non-Traditional</td>
</tr>
<tr>
<td>Race</td>
<td>Categorical</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-White</td>
</tr>
<tr>
<td>Academic Field of Study</td>
<td>Categorical</td>
<td>Fine Arts, Humanities and Social</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sciences (FASS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Science, Technology, Engineering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and Math (STEM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business (BUSI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Education (EDUC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Undeclared (UNDECLARED)</td>
</tr>
<tr>
<td>Bottom 25th Percentile GPA Group</td>
<td>Categorical</td>
<td>Group 1: Low Transfer GPA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group 2: Low BCU GPA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group 3: Neither GPA Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group 4: Both GPAs Low</td>
</tr>
</tbody>
</table>

**Dependent**

| Graduate in two years                 | Dichotomous   | Yes or No                        |
| Graduate in four years                | Dichotomous   | Yes or No                        |
| Graduate at any time                  | Dichotomous   | Yes or No                        |

This study, being retrospective in nature, was *ex post facto* research (Gall et al., 2007).

The researcher used data from students who transferred to BCU in the past in a logistic regression model to identify which independent variables were predictive of graduation for
community college transfer students at BCU. Results based on research questions one and two provided descriptive results of the study sample. Question three guided the analysis of the influence, if any, that the independent variables (IV) had on the students’ likelihood of persistence and graduation. Research question four compared the graduation rates of discrepant GPA groups. The dichotomous nature of the dependent variable (DV), graduate or not graduate, guided the researcher’s decision to conduct logistic regression to discover correlations between the DV and set of IVs. Logistic regression analysis also establishes the strength of the relationship among variables in regards to the outcome variable. In comparison to discriminant analysis, logistic regression is less restricted and does not require the assumption of normally distributed data and/or presence of a linear relationship. In logistic regression analysis, the null hypothesis is true when all the coefficients in the regression equation are zero. The alternate hypothesis is true when the model using the predictor variable is significantly different from the null of zero, so the predication level is not random (Burns & Burns, 2008; Tabachnick & Fidell, 2007). Logistic regression employs the maximum likelihood method to determine the best fitting model. Maximum likelihood is based on the binominal probability theory of predicting group membership in one of two groups, in this case graduate or not graduate, using the regression coefficients of the independent variables. The odds ratio is calculated by dividing the likelihood of success by the likelihood of failure in accurately predicting group membership (Burns & Burns, 2008).

Results of regression analyses also provide a statistical model for a predictive relationship of the independent variables on the dependent outcome (Field, 2009; Gall et al., 2007; Tabachnick & Fidell, 2007). Once correlations are found and developed into predictive models, it is important to also consider the effect size of the results. The effect size provides an
approximate measure of the statistical power of the relationships found within a sample (Creswell, 2009; Gall et al., 2007). Determining effect size standardizes the way in which researchers compare results from studies with different types of measures. Calculating effect size provides an objective measure of the effect of the results obtained from a study sample and how likely the same impact would be found in the population. Pearson’s correlation coefficient $r$ is often used to calculate the effect size. However, in logistic regression, the Nagelkerke $R^2$ and Cox and Snell $R^2$ are statistical measures of how well the independent variables predict the outcome variable. The Nagelkerke $R^2$ is the more preferred measure, over the Cox & Snell $R^2$, since it provides a fuller range of measurement (0-1) and was used to determine effect size for the results of this study (Field, 2009).

**Confidentiality and Data Security**

Data files requested from the institution were blind, or without data that could identify the individual student. Students were assigned a random identifying number to track during data analysis, however the numbers were removed and results were reported in the aggregate, also the data file was secured on a flash drive in a lock drawer in the researcher’s BCU office.

**Research Positionality**

BCU is the employer for the researcher and was selected for convenient access to the data with full disclosure and support from the institution’s senior administration. The researcher’s current position, as well as past work experience, involves community college transfer student admissions, articulation of transfer credit, and administration of transfer-related university policies. Two studies of the transfer student experience at a prior four-year institution were conducted by the researcher using a modified version of the LTSQ©. Results of the studies were presented at national conferences, and overall, indicated the need for more support services for
transfer students at the four-year institution, which may bias the researcher in regards to the current state of services provided at BCU. While the researcher was not a transfer student, as a first-generational college student, there is a somewhat personal connection to the challenges of navigating an unfamiliar system.

Summary

This chapter outlined the methodology, data collection, and analysis procedures used in this study. An applied research design was used to understand the factors most predictive of retention to graduation at a four-year public institution for community college transfer students using data from their academic transcripts. The primary purpose of the study was to discover which factors contributed to successful completion of the four-year baccalaureate degree, with hope of also gaining insight into possible strategies for services and support programs that could be implemented pre- and post-transfer (Hedrick, Bickman, & Rog, 1993). The current study was developed based on the more recent work by Hagedorn et al. (2010), who developed an instrument for predicting likelihood of student transfer from a community to a four-year institution. The purpose of the study and the operational framework for the study were explained, along with a description of how the data were obtained, stored, and analyzed. Additionally, descriptions of the site institution and the sample were provided. Finally, this chapter presented the researcher’s perspective and possible biases.
CHAPTER IV:
DATA ANALYSIS AND FINDINGS

This chapter discusses the results from the data analysis and provides a framework for discussing how the pre- and post-transfer characteristics and academic behaviors were hypothesized to effect graduation from the four-year site institution, BCU. The independent variables included gender, race, transfer GPA, BCU GPA, age, major, hours transferred, hours earned at BCU, degree type, and a few specific to the types of courses taken and grades earned. There were four research questions guiding this study. Research questions one and two explored the relational impact of demographic variables and course taking profiles on predicting graduation for the students in this study. Research question three examined the independent variables and the respective capacity to predict graduation or not for in-state community college transfer students. Question four examined the graduation rates among discrepant GPA groups. This chapter presents a summary of the demographic profile of the study sample, and the data analysis.

Results and Logistic Regression Models

Logistic regression was the main method of data analysis used in this study. It is recommended that each independent variable have a minimum of 10 cases since the maximum likelihood coefficients are estimated on large samples. Frequencies were run for each independent variable to assess the appropriateness of use within the analyses. Only five cases indicated that the student had earned an associate’s degree, which, being less than 10, is decidedly inappropriate for use. Also, the BCU administrator who pulled the data reported that
associate degree attainment may have been neglected by the data processing staff, so the data for this variable were suspect. The current major undeclared variable was also found to have fewer than 10 cases, reporting only seven cases. Unlike linear regression, which produces a continuous numerical value outcome, rather than a categorical outcome, logistic regression is the calculation of the probability of a specific outcome based on the presence of the independent variable(s).

Below is the equation for logistic regression with more than one IV, where \( P \) is the odds, \( a \) is the constant, \( b \) is the Exp(B) or odds ratio, and \( X \) is the value of the IV.

Each independent variable was tested to determine the degree of influence on the probability of predicting the outcome of group membership for the students, as either graduate or non-graduate. Independent variables (IVs) found to be significant were designated as the primary IVs, or predictor variables, and included the following: BCU GPA, number of BCU hours, transfer GPA, number of transfer hours, number of BCU semesters, number of BCU course withdrawals, number Fs earned at BCU, current business major, changed major after admitted, nontraditional age when first enrolled at BCU, attended more than one community college, completed college-level math at the community college. The primary IVs were applied to the logistic regression model using the enter method, or standard method, which is the default method within SPSS. Results of the logistic regression analyses allowed the researcher to create a statistical model for describing the relationship between the primary IVs and the dependent variable of graduate or not graduate. Tests of multicollinearity were conducted to avoid any issue of high intercorrelation among the predictor variables. Outcomes for each analysis were tested against a significance level of \( \alpha < .05 \) to prevent a Type I error (Burns & Burns, 2008; Tabachnick & Fidell, 2007).
**Multicollinearity Check**

In order for a regression model to assume the predictive nature of an independent variable, the researcher had to determine whether a perfect linear relationship, or a strong correlation, existed for the predictors (Field, 2009; Tabachnick & Fidell, 2007). Table 6 shows the collinearity statistics for the primary independent variables. The tolerance statistic demonstrates the level of collinearity that a regression analysis can tolerate. Tolerance is calculated by subtracting the $R^2$ from 1. The variance inflation factor (VIF) indicates the degree of standard error inflation caused by collinearity and is calculated by dividing 1 by the tolerance for that variable, $1/(1-R^2)$. Variables that are not related will produce a tolerance and VIF of 1. Tolerance level moves toward 0 as the variables become more closely related and the VIF increases greatly (IDRE, 2014). As seen in Table 2, the tolerance statistics for the primary independent variables were all above 0.1 and VIF values were below 10, showing no evidence of multicollinearity. Therefore, all of the primary independent variables remained in the models (Field, 2009; Tabachnick & Fidell, 2007).

Table 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU GPA</td>
<td>.405</td>
<td>2.469</td>
</tr>
<tr>
<td>BCU Hours</td>
<td>.164</td>
<td>6.088</td>
</tr>
<tr>
<td>Transfer GPA</td>
<td>.813</td>
<td>1.230</td>
</tr>
<tr>
<td>Transfer Hours</td>
<td>.847</td>
<td>1.181</td>
</tr>
<tr>
<td>BCU Semesters</td>
<td>.164</td>
<td>6.114</td>
</tr>
<tr>
<td>BCU Withdrawals</td>
<td>.711</td>
<td>1.407</td>
</tr>
<tr>
<td>BCU Fs</td>
<td>.711</td>
<td>1.407</td>
</tr>
<tr>
<td>Current BUSI Major</td>
<td>.923</td>
<td>1.083</td>
</tr>
<tr>
<td>Changed Major after Admitted</td>
<td>.859</td>
<td>1.164</td>
</tr>
<tr>
<td>Nontraditional Age 1st Enrolled at BCU</td>
<td>.916</td>
<td>1.091</td>
</tr>
<tr>
<td>Attended more than 1 CC</td>
<td>.963</td>
<td>1.083</td>
</tr>
<tr>
<td>College-Level Math at CC</td>
<td>.802</td>
<td>1.164</td>
</tr>
</tbody>
</table>
Demographic Analysis

This section outlines the steps taken to sample the dataset and to answer research questions one and two regarding the demographic and academic profiles of the students in the study. Prior to sampling, the dataset contained more than 28,000 students who first enrolled at BCU during the 2007-2008 academic year. Initial review of the data led to the removal of students with incomplete data. Students who attended an out-of-state community college or any four-year institution were also removed, reducing the number of students to 1,983. Sample size was calculated using a confidence interval of 5 with a 95% confidence level, resulting in a sample of 322. After further cleaning of the data, the final number of students in the sample was 257. Descriptive statistics for the sample were organized according to group membership of graduate or non-graduate. Comparison of the two groups is displayed in Table 3. Percentages and frequencies for each independent variable are displayed in Table 4 along with the graduation rates by each independent variable. Table 3 also provides answers to research question two: the course taking profile of students in the study, specifically developmental courses and completion of college-level mathematics at the community college. The overall graduation rate for the sample was 62%. Rates for graduating from BCU in two years (27.6%) and four years (56.8%) were also calculated. Review of both Table 3 and Table 4 provides a fuller picture of the sample. For example, male students in the sample have a higher rate of graduation (66.0%), but more female students (90) graduated than male students (70).
Table 3

*Comparison of Graduates to Non-Graduates by Independent Variables*

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Sample %</th>
<th>Graduate</th>
<th>Non-Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>151</td>
<td>58.8%</td>
<td>90</td>
<td>61</td>
</tr>
<tr>
<td>Male</td>
<td>106</td>
<td>41.2%</td>
<td>70</td>
<td>36</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>187</td>
<td>72.8%</td>
<td>120</td>
<td>67</td>
</tr>
<tr>
<td>Non-White</td>
<td>70</td>
<td>27.2%</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td><strong>Age when Enrolled at CC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional (younger than 24)</td>
<td>241</td>
<td>93.8%</td>
<td>151</td>
<td>90</td>
</tr>
<tr>
<td>Non-Traditional (24 or older)</td>
<td>16</td>
<td>6.2%</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td><strong>Age when Enrolled at BCU</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional (younger than 24)</td>
<td>213</td>
<td>82.9%</td>
<td>140</td>
<td>73</td>
</tr>
<tr>
<td>Non-Traditional (24 or older)</td>
<td>44</td>
<td>17.1%</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td><strong>Associate's Degree</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earned Associate’s</td>
<td>5</td>
<td>1.9%</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Did Not Earn</td>
<td>252</td>
<td>98.1%</td>
<td>157</td>
<td>95</td>
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<td><strong>Number of CCs Attended</strong></td>
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<tr>
<td>One</td>
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<td>87.9%</td>
<td>139</td>
<td>87</td>
</tr>
<tr>
<td>More than One</td>
<td>31</td>
<td>12.1%</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td><strong>Completed College-Level Math at CC</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>220</td>
<td>85.6%</td>
<td>142</td>
<td>78</td>
</tr>
<tr>
<td>Did Not Complete</td>
<td>37</td>
<td>14.4%</td>
<td>18</td>
<td>19</td>
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<tr>
<td><strong>Developmental Coursework at CC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Took Developmental Math</td>
<td>118</td>
<td>45.9%</td>
<td>67</td>
<td>51</td>
</tr>
<tr>
<td>Did Not Take Developmental Math</td>
<td>139</td>
<td>54.1%</td>
<td>93</td>
<td>46</td>
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<tr>
<td>Took Developmental English</td>
<td>67</td>
<td>26.1%</td>
<td>42</td>
<td>25</td>
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<tr>
<td>Did Not Take Developmental English</td>
<td>190</td>
<td>73.9%</td>
<td>118</td>
<td>72</td>
</tr>
<tr>
<td>Took Developmental Reading</td>
<td>30</td>
<td>11.7%</td>
<td>17</td>
<td>13</td>
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<td>Did Not Take Developmental Reading</td>
<td>227</td>
<td>88.3%</td>
<td>143</td>
<td>84</td>
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(Table 3 Continued)

<table>
<thead>
<tr>
<th>Variables</th>
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<th>Sample %</th>
<th>Graduate</th>
<th>Non-Graduate</th>
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<tbody>
<tr>
<td>Dual Enrollment Hours</td>
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</tr>
<tr>
<td>Had Dual Enrollment Hours</td>
<td>24</td>
<td>9.3%</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Did Not Have Dual Enrollment Hours</td>
<td>233</td>
<td>90.7%</td>
<td>148</td>
<td>85</td>
</tr>
<tr>
<td>Change Major after Admitted</td>
<td></td>
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<td></td>
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<tr>
<td>Did Change Major</td>
<td>71</td>
<td>27.6%</td>
<td>51</td>
<td>20</td>
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<tr>
<td>Did Not Change Major</td>
<td>186</td>
<td>72.4%</td>
<td>109</td>
<td>77</td>
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<tr>
<td>Major at Admission to BCU</td>
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<td></td>
</tr>
<tr>
<td>Fine Arts, Humanities and Social Sciences (FASS)</td>
<td>56</td>
<td>21.8%</td>
<td>35</td>
<td>21</td>
</tr>
<tr>
<td>Science, Technology, Engineering and Math (STEM)</td>
<td>91</td>
<td>35.4%</td>
<td>55</td>
<td>36</td>
</tr>
<tr>
<td>Business (BUSI)</td>
<td>55</td>
<td>21.4%</td>
<td>34</td>
<td>21</td>
</tr>
<tr>
<td>Education (EDUC)</td>
<td>33</td>
<td>12.8%</td>
<td>22</td>
<td>11</td>
</tr>
<tr>
<td>Undeclared (UNDECLARED)</td>
<td>22</td>
<td>8.6%</td>
<td>14</td>
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<tr>
<td>Current Major at BCU</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fine Arts, Humanities and Social Sciences (FASS)</td>
<td>73</td>
<td>28.4%</td>
<td>47</td>
<td>26</td>
</tr>
<tr>
<td>Science, Technology, Engineering and Math (STEM)</td>
<td>80</td>
<td>31.1%</td>
<td>51</td>
<td>29</td>
</tr>
<tr>
<td>Business (BUSI)</td>
<td>58</td>
<td>22.6%</td>
<td>35</td>
<td>23</td>
</tr>
<tr>
<td>Education (EDUC)</td>
<td>39</td>
<td>15.2%</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>Undeclared (UNDECLARED)</td>
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</table>
## Table 4

*Frequencies and Graduation Rates by Independent Variables*

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<thead>
<tr>
<th>Variables</th>
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<th>2 Year Graduation Rate %</th>
<th>4 Year Graduation Rate %</th>
<th>Graduation Rate %</th>
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<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>151</td>
<td>27.8%</td>
<td>55.6%</td>
<td>59.6%</td>
</tr>
<tr>
<td>Male</td>
<td>106</td>
<td>27.3%</td>
<td>58.5%</td>
<td>66.0%</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>187</td>
<td>29.9%</td>
<td>59.3%</td>
<td>64.1%</td>
</tr>
<tr>
<td>Non-White</td>
<td>70</td>
<td>21.4%</td>
<td>50.0%</td>
<td>57.1%</td>
</tr>
<tr>
<td><strong>Age when Enrolled at CC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional (younger than 24)</td>
<td>241</td>
<td>28.6%</td>
<td>56.8%</td>
<td>62.6%</td>
</tr>
<tr>
<td>Non-Traditional (24 or older)</td>
<td>16</td>
<td>12.5%</td>
<td>56.3%</td>
<td>56.3%</td>
</tr>
<tr>
<td><strong>Age when Enrolled at BCU</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional (younger than 24)</td>
<td>213</td>
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<td>59.6%</td>
<td>65.7%</td>
</tr>
<tr>
<td>Non-Traditional (24 or older)</td>
<td>44</td>
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<td>43.2%</td>
<td>45.4%</td>
</tr>
<tr>
<td><strong>Associate's Degree</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earned Associate’s</td>
<td>5</td>
<td>40.0%</td>
<td>60.0%</td>
<td>60.0%</td>
</tr>
<tr>
<td>Did Not Earn</td>
<td>252</td>
<td>27.4%</td>
<td>56.7%</td>
<td>62.3%</td>
</tr>
<tr>
<td><strong>Number of CCs Attended</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>226</td>
<td>25.2%</td>
<td>55.8%</td>
<td>61.5%</td>
</tr>
<tr>
<td>More than One</td>
<td>31</td>
<td>45.2%</td>
<td>64.5%</td>
<td>67.7%</td>
</tr>
<tr>
<td><strong>Completed College-Level Math at CC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>220</td>
<td>30.5%</td>
<td>59.5%</td>
<td>64.5%</td>
</tr>
<tr>
<td>Did Not Complete</td>
<td>37</td>
<td>10.8%</td>
<td>40.5%</td>
<td>48.6%</td>
</tr>
<tr>
<td><strong>Developmental Coursework at CC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Took Developmental Math</td>
<td>118</td>
<td>25.4%</td>
<td>52.5%</td>
<td>56.7%</td>
</tr>
<tr>
<td>Did Not Take Developmental Math</td>
<td>139</td>
<td>29.5%</td>
<td>60.4%</td>
<td>66.9%</td>
</tr>
<tr>
<td>Took Developmental English</td>
<td>67</td>
<td>22.4%</td>
<td>56.7%</td>
<td>62.6%</td>
</tr>
<tr>
<td>Did Not Take Developmental English</td>
<td>190</td>
<td>29.5%</td>
<td>56.8%</td>
<td>62.1%</td>
</tr>
<tr>
<td><strong>Took Developmental Reading</strong></td>
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<td></td>
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</tr>
<tr>
<td>Took Developmental Reading</td>
<td>30</td>
<td>16.7%</td>
<td>53.3%</td>
<td>56.6%</td>
</tr>
<tr>
<td>Did Not Take Developmental Reading</td>
<td>227</td>
<td>29.1%</td>
<td>57.3%</td>
<td>62.9%</td>
</tr>
<tr>
<td><strong>Dual Enrollment Hours</strong></td>
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<td></td>
</tr>
<tr>
<td>Had Dual Enrollment Hours</td>
<td>24</td>
<td>29.2%</td>
<td>45.8%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Did Not Have Dual Enrollment Hours</td>
<td>233</td>
<td>27.5%</td>
<td>57.9%</td>
<td>63.5%</td>
</tr>
<tr>
<td><strong>Change Major after Admitted</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did Change Major</td>
<td>71</td>
<td>18.3%</td>
<td>64.8%</td>
<td>71.8%</td>
</tr>
<tr>
<td>Did Not Change Major</td>
<td>186</td>
<td>31.2%</td>
<td>53.8%</td>
<td>58.6%</td>
</tr>
<tr>
<td><strong>Pursued a Bachelor of Science Degree</strong></td>
<td></td>
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</tr>
<tr>
<td>196</td>
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<td>28.6%</td>
<td>57.1%</td>
<td>63.7%</td>
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</tbody>
</table>
(Table 4 Continued)

<table>
<thead>
<tr>
<th>Variables</th>
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<th>2 Year Graduation Rate %</th>
<th>4 Year Graduation Rate %</th>
<th>Graduation Rate %</th>
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</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine Arts, Humanities and Social Sciences (FASS)</td>
<td>56</td>
<td>28.6%</td>
<td>55.4%</td>
<td>67.8%</td>
</tr>
<tr>
<td>Science, Technology, Engineering and Math (STEM)</td>
<td>91</td>
<td>27.5%</td>
<td>54.9%</td>
<td>60.4%</td>
</tr>
<tr>
<td>Business (BUSI)</td>
<td>55</td>
<td>21.8%</td>
<td>52.7%</td>
<td>70.9%</td>
</tr>
<tr>
<td>Education (EDUC)</td>
<td>33</td>
<td>33.3%</td>
<td>66.7%</td>
<td>69.6%</td>
</tr>
<tr>
<td>Undeclared (UNDECLARED)</td>
<td>22</td>
<td>31.8%</td>
<td>63.6%</td>
<td>54.5%</td>
</tr>
<tr>
<td>Current Major at BCU</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine Arts, Humanities and Social Sciences (FASS)</td>
<td>73</td>
<td>27.4%</td>
<td>57.5%</td>
<td>64.4%</td>
</tr>
<tr>
<td>Science, Technology, Engineering and Math (STEM)</td>
<td>80</td>
<td>30.0%</td>
<td>58.8%</td>
<td>63.8%</td>
</tr>
<tr>
<td>Business (BUSI)</td>
<td>58</td>
<td>17.2%</td>
<td>51.7%</td>
<td>60.3%</td>
</tr>
<tr>
<td>Education (EDUC)</td>
<td>39</td>
<td>38.5%</td>
<td>64.1%</td>
<td>64.1%</td>
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<tr>
<td>Undeclared (UNDECLARED)</td>
<td>7</td>
<td>28.6%</td>
<td>28.6%</td>
<td>28.6%</td>
</tr>
</tbody>
</table>

Research Question One

What are the demographic characteristics of the students in this study, and how do these characteristics differ between those who graduated and those who did not?

As seen in Table 3, the sample was almost half male (41.2%) and more than half female (58.8%) and primarily White (72.8%). In order to make the race variable dichotomous, it was reduced to either White (72.8%) or Non-White (27.2%), of which 16.7% were African-American. The large majority of students (93.8%) were of traditional college-age (18-24 years old) at the time of enrollment at the community college and at the time of enrollment at BCU (82.9%). Students’ academic majors at the time of admission to BCU were grouped into like categories of (21.8%) Fine Arts, Humanities and Social Sciences (FASS), (35.4%) Science,
Technology, Mathematics, and Engineering (STEM), (21.4%) Business (BUS), (12.8%) Education (EDUC), and (8.6%) Undeclared (UNDECLARED). Seventy-one (28%) of the students changed their major after admittance to BCU. The largest change of major groups were students who began as UNDECLARED (77.2%), followed by the STEM students at 32.9%. Seventy-six percent of the students were pursuing a Bachelor of Science degree.

Research Question Two

What are the course-taking characteristics of the students in this study, and how do these characteristics differ between those who graduated and those who did not?

Eighty-six percent of the sample completed a college-level math course at the community college. Just over half (51.8%) of the sample took at least one developmental course at the community college. Math was the most commonly taken developmental course (54.1%), then English (26.1%) and reading (11.7%). Very few of the students (24, 9.3%) in the sample had taken dual enrollment courses at the community college while in high school. Most of the students in this sample did not earn an associate’s degree (98.1%). Only 12.1% of the students attended more than one community college prior to transfer to BCU, with only 1.2% attending 3 community colleges.

Research Question Three

To what degree do the demographic and academic factors influence the likelihood of persistence to graduation two years post-transfer, four years post-transfer or at any time post-transfer?

Exploration of the independent variables and their predictive relationship with the dependent variables began with the univariate analysis of the IVs with each DV of graduate at any time, graduate after two years, and graduate after four years. Multivariate analysis of the
IVs was conducted after identifying which IVs were significant for each of the DVs. Independent variables with a $p$-value of $< .05$ were considered significant and allowed the researcher to reject the null hypothesis that no relationship existed between the IV and the DV. Logistic statistics included for each IV were the $\beta$ -level, or $b$-coefficient, indicating the probability of making a Type II error, the degrees of freedom ($df$), or number of observations minus one, and the standard error (S.E.) of the mean, or variability across samples. Similar to the $t$-statistic used in linear regression, the Wald statistic was used to test the significance of individual $b$ coefficients in the logistic regression model and is calculated by dividing the $b$ coefficient by its standard error. Additionally, two pseudo $R^2$ measures, the Cox and Snell $R^2$ and the Nagelkerke $R^2$ are presented for each primary IV. The Cox and Snell $R^2$ is based on the log likelihood, or logarithm of the likelihood ratio, for the logistic regression model compared to the log likelihood for the baseline or constant model and is limited to a maximum value of less than one. Due to this limitation, the Nagelkerke $R^2$, an adjusted version of the Cox and Snell $R^2$, is used more often and provides a fuller range, from zero to one (Field, 2009).

The $-2$ Log Likelihood is a measure similar to the total sums of squares in linear regression. If a relationship exists between the primary IV and the dependent variable, there will be a decrease in the $-2$ Log Likelihood, improving the ability to accurately predict the outcome variable. The odds ratio, or Exp(B) in the SPSS output, presents the change in odds as the predictor variable changes. Once the odds for each outcome was calculated based on the unit change of the predictor variables, the odds ratio was calculated by dividing the odds after the unit change by the odds before the change. If the result is greater than one, then the odds of the outcome occurring increase as the predictor variable increases. The odds ratio was calculated within a 95% confidence interval, so the researcher is 95% certain that the Exp(B) for the sample
is representative of the population (Field, 2009). Results of tests for goodness of fit for the primary IVs are also included. The Omnibus tests of model coefficients, which is a ratio of the chi-square test of the model compared to the null model. Results that are significant at a p < .05 level indicate that the model more accurately predicts the outcome than the null model (Tabachnick & Fidell, 2007; Field, 2009).

Table 5 displays the logistic regression statistics for the univariate analysis of each individual primary IVs and the DV graduated at any time, followed by Table 6 with the pseudo $R^2$ and goodness of fit statistics for the univariate analysis of each individual primary IVs and the DV graduated at any time. Table 7 displays the logistic statistics for the first of three models, the Graduated Model.

Table 5

*Logistic Statistics: Univariate Analysis of Individual Primary IVs and Graduated at Any Time*

<table>
<thead>
<tr>
<th>Primary IV</th>
<th>$\beta$</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>$p$</th>
<th>Exp(B)</th>
<th>95% C.I. for Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU GPA</td>
<td>2.49</td>
<td>.322</td>
<td>59.745</td>
<td>1</td>
<td>.000</td>
<td>12.056</td>
<td>6.413</td>
</tr>
<tr>
<td>BCU Hours</td>
<td>.113</td>
<td>.015</td>
<td>54.143</td>
<td>1</td>
<td>.000</td>
<td>1.120</td>
<td>1.087</td>
</tr>
<tr>
<td>Transfer GPA</td>
<td>.939</td>
<td>.238</td>
<td>15.612</td>
<td>1</td>
<td>.000</td>
<td>2.557</td>
<td>1.605</td>
</tr>
<tr>
<td>Transfer Hours</td>
<td>.036</td>
<td>.009</td>
<td>15.056</td>
<td>1</td>
<td>.000</td>
<td>1.037</td>
<td>1.018</td>
</tr>
<tr>
<td>BCU Semesters</td>
<td>.539</td>
<td>.069</td>
<td>60.664</td>
<td>1</td>
<td>.000</td>
<td>1.715</td>
<td>1.497</td>
</tr>
<tr>
<td>BCU Withdrawals</td>
<td>-.127</td>
<td>.057</td>
<td>4.873</td>
<td>1</td>
<td>.027</td>
<td>.881</td>
<td>.787</td>
</tr>
<tr>
<td>BCU Fs</td>
<td>-.496</td>
<td>.091</td>
<td>29.809</td>
<td>1</td>
<td>.000</td>
<td>.609</td>
<td>.510</td>
</tr>
<tr>
<td>Nontraditional Age 1st Enrolled at BCU</td>
<td>-.834</td>
<td>.335</td>
<td>6.175</td>
<td>1</td>
<td>.013</td>
<td>.435</td>
<td>.225</td>
</tr>
</tbody>
</table>
Table 6

*Pseudo $R^2$ and Goodness of Fit: Univariate Analysis of Individual Primary IVs and Graduated at Any Time*

<table>
<thead>
<tr>
<th>Primary IV</th>
<th>Nagelkerke $R^2$</th>
<th>Cox &amp; Snell $R^2$</th>
<th>-2 Log Likelihood</th>
<th>Omnibus Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU GPA</td>
<td>.551</td>
<td>.404</td>
<td>207.551</td>
<td>133.124, $p = .000$</td>
</tr>
<tr>
<td>BCU Hours</td>
<td>.803</td>
<td>.589</td>
<td>111.952</td>
<td>228.723, $p = .000$</td>
</tr>
<tr>
<td>Transfer GPA</td>
<td>.086</td>
<td>.063</td>
<td>323.990</td>
<td>16.686, $p = .000$</td>
</tr>
<tr>
<td>Transfer Hours</td>
<td>.085</td>
<td>.062</td>
<td>324.144</td>
<td>16.531, $p = .000$</td>
</tr>
<tr>
<td>BCU Semesters</td>
<td>.460</td>
<td>.338</td>
<td>234.647</td>
<td>106.028, $p = .000$</td>
</tr>
<tr>
<td>BCU Withdrawals</td>
<td>.026</td>
<td>.019</td>
<td>335.686</td>
<td>4.990, $p = .025$</td>
</tr>
<tr>
<td>BCU Fs</td>
<td>.213</td>
<td>.156</td>
<td>297.007</td>
<td>43.669, $p = .000$</td>
</tr>
<tr>
<td>Nontraditional Age 1st Enrolled at BCU</td>
<td>.032</td>
<td>.024</td>
<td>334.476</td>
<td>6.199, $p = .013$</td>
</tr>
</tbody>
</table>

Table 7

*Graduated Model*

<table>
<thead>
<tr>
<th>Primary IV</th>
<th>$\beta$</th>
<th>S.E.</th>
<th>Wald</th>
<th>$df$</th>
<th>$p$</th>
<th>Exp(B)</th>
<th>95% C.I. for Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU GPA</td>
<td>2.35</td>
<td>1.140</td>
<td>4.251</td>
<td>1</td>
<td>.039*</td>
<td>10.491</td>
<td>1.123 – 97.991</td>
</tr>
<tr>
<td>BCU Hours</td>
<td>.185</td>
<td>.045</td>
<td>16.812</td>
<td>1</td>
<td>.000*</td>
<td>1.203</td>
<td>1.101 – 1.315</td>
</tr>
<tr>
<td>Transfer GPA</td>
<td>-1.137</td>
<td>.802</td>
<td>2.008</td>
<td>1</td>
<td>.156</td>
<td>.321</td>
<td>.067 – 1.546</td>
</tr>
<tr>
<td>Transfer Hours</td>
<td>.139</td>
<td>.045</td>
<td>9.053</td>
<td>1</td>
<td>.003*</td>
<td>1.149</td>
<td>1.050 – 1.258</td>
</tr>
<tr>
<td>BCU Semesters</td>
<td>-.454</td>
<td>.283</td>
<td>2.575</td>
<td>1</td>
<td>.109</td>
<td>.635</td>
<td>.364 – 1.106</td>
</tr>
<tr>
<td>BCU Withdrawals</td>
<td>-.035</td>
<td>.162</td>
<td>.045</td>
<td>1</td>
<td>.832</td>
<td>.966</td>
<td>.703 – 1.328</td>
</tr>
<tr>
<td>Nontraditional Age 1st Enrolled at BCU</td>
<td>-1.181</td>
<td>1.081</td>
<td>1.194</td>
<td>1</td>
<td>.275</td>
<td>.307</td>
<td>.037 – 2.554</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>-16.979</td>
<td>5.920</td>
<td>8.227</td>
<td>1</td>
<td>.004*</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

* = The Exp ($\beta$) is significant at the .05 level

<table>
<thead>
<tr>
<th>Nagelkerke $R^2$</th>
<th>Cox &amp; Snell $R^2$</th>
<th>-2 Log Likelihood</th>
<th>Omnibus Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>.920</td>
<td>.676</td>
<td>51.200</td>
<td>289.476, $p = .000$</td>
</tr>
</tbody>
</table>
The Graduated Model increased accuracy in predicting the outcome of *graduate at any time* for the sample to 97.3%, which is an increase from the 62.3% reported by the null or constant model. The Omnibus Tests of Model Coefficients for the model was statistically significant against the null model $\chi^2, (8, N=257) = 289.476, p < .001$. The -2 Log likelihood is 51.200. Cox and Snell $R^2$ is .676. The Nagelkerke $R^2$ is .920, which is used as a measure of effect size and indicates that the Graduated Model is useful in predicting *graduation at any time*. Due to page space limitations, IVs were abbreviated in the logistic regression equation for the Graduated Model but follow the list order of Table 7.

$$\text{logit}(P) = -16.979 + 10.491*BCUGPA + 1.203*BCUHRS + .321*TransGPA + 1.149*TransHRS + .635*BCUSems + .966*BCUWs + .712*BCUFs + .307*NonTrad@BCU$$

Additional regression analysis was conducted using the three significant IVs from the Graduated Model: BCU GPA, BCU hours, and transfer hours. Accuracy in predicting the outcome of *graduate at any time* for the sample decreased from 97.3%, to 96.1%. The Omnibus Tests of Model Coefficients for the model was statistically significant against the null model $\chi^2, (3, N=257) = 275.682, p < .001$. The -2 Log likelihood is 64.994. Cox and Snell $R^2$ is .658. The Nagelkerke $R^2$ is .896, which is used as a measure of effect size and indicates that while less than the Graduated Model (.920), the three significant IVs are useful in predicting *graduation at any time*.

Table 8 displays the logistic regression statistics for the univariate analysis of each individual primary IVs and the DV *graduated in two years*, followed by Table 9 with the pseudo $R^2$ and goodness of fit statistics for the univariate analysis of each individual primary IVs and the DV *graduated in two years*. Table 10 displays the logistic statistics for the Graduated in 2 Model.
Table 8

*Logistic Statistics: Univariate Analysis for Individual Primary IVs and Graduated in 2 Years*

<table>
<thead>
<tr>
<th>Primary IV</th>
<th>$\beta$</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>$p$</th>
<th>Exp(B)</th>
<th>95% C.I. for Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU GPA</td>
<td>1.413</td>
<td>.254</td>
<td>31.050</td>
<td>1</td>
<td>.000</td>
<td>4.110</td>
<td>2.500 - 6.756</td>
</tr>
<tr>
<td>BCU Hours</td>
<td>.014</td>
<td>.004</td>
<td>10.148</td>
<td>1</td>
<td>.001</td>
<td>1.014</td>
<td>1.005 - 1.023</td>
</tr>
<tr>
<td>Transfer GPA</td>
<td>.754</td>
<td>.254</td>
<td>8.836</td>
<td>1</td>
<td>.003</td>
<td>2.126</td>
<td>1.293 - 3.495</td>
</tr>
<tr>
<td>Transfer Hours</td>
<td>.052</td>
<td>.012</td>
<td>19.215</td>
<td>1</td>
<td>.000</td>
<td>1.053</td>
<td>1.029 - 1.078</td>
</tr>
<tr>
<td>Attended more than 1 CC</td>
<td>.893</td>
<td>.392</td>
<td>5.184</td>
<td>1</td>
<td>.023</td>
<td>2.442</td>
<td>1.132 - 5.265</td>
</tr>
<tr>
<td>BCU Withdrawals</td>
<td>.528</td>
<td>.128</td>
<td>16.964</td>
<td>1</td>
<td>.000</td>
<td>.590</td>
<td>.459 - .758</td>
</tr>
<tr>
<td>BCU Fs</td>
<td>-.967</td>
<td>.217</td>
<td>19.785</td>
<td>1</td>
<td>.000</td>
<td>.380</td>
<td>.248 - .582</td>
</tr>
<tr>
<td>Business Major-Current</td>
<td>-.752</td>
<td>.380</td>
<td>3.917</td>
<td>1</td>
<td>.048</td>
<td>.471</td>
<td>.224 - .993</td>
</tr>
<tr>
<td>Changed Major after</td>
<td>-.704</td>
<td>.345</td>
<td>4.156</td>
<td>1</td>
<td>.041</td>
<td>.495</td>
<td>.251 - .973</td>
</tr>
</tbody>
</table>

Table 9

*Pseudo $R^2$ and Goodness of Fit: Univariate Analysis for Individual Primary IVs and Graduated in 2 Years*

<table>
<thead>
<tr>
<th>Primary IV</th>
<th>Nagelkerke $R^2$</th>
<th>Cox &amp; Snell $R^2$</th>
<th>-2 Log Likelihood</th>
<th>Omnibus Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU GPA</td>
<td>.241</td>
<td>.167</td>
<td>256.092</td>
<td>46.855, $p = .000$</td>
</tr>
<tr>
<td>BCU Hours</td>
<td>.060</td>
<td>.042</td>
<td>292.010</td>
<td>10.937, $p = .001$</td>
</tr>
<tr>
<td>Transfer GPA</td>
<td>.051</td>
<td>.035</td>
<td>293.676</td>
<td>9.271, $p = .002$</td>
</tr>
<tr>
<td>Transfer Hours</td>
<td>.131</td>
<td>.090</td>
<td>278.584</td>
<td>24.363, $p = .000$</td>
</tr>
<tr>
<td>Attended more than 1 CC</td>
<td>.028</td>
<td>.019</td>
<td>297.953</td>
<td>4.994, $p = .025$</td>
</tr>
<tr>
<td>BCU Withdrawals</td>
<td>.154</td>
<td>.107</td>
<td>273.955</td>
<td>28.992, $p = .000$</td>
</tr>
<tr>
<td>BCU Fs</td>
<td>.232</td>
<td>.160</td>
<td>258.046</td>
<td>44.900, $p = .000$</td>
</tr>
<tr>
<td>Business Major-Current</td>
<td>.024</td>
<td>.017</td>
<td>298.611</td>
<td>4.336, $p = .037$</td>
</tr>
<tr>
<td>Changed Major after</td>
<td>.025</td>
<td>.017</td>
<td>298.447</td>
<td>4.500, $p = .034$</td>
</tr>
<tr>
<td>Admit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Graduated in 2 Model increased accuracy in predicting the outcome of graduate in two years post-transfer for the sample to 80.9%, which is an increase from the 72.4% reported by the null or constant model. The Omnibus Tests of Model Coefficients for the model was statistically significant against the null model $\chi^2, (9, N=257) = 93.749, p < .001$. The -2 Log likelihood is 209.179. Cox and Snell $R^2$ is .306. The Nagelkerke $R^2$ is .441, which is used as a measure of effect size and indicates that the Graduated in 2 Model is not very useful in predicting graduation two years post-transfer. Due to page space limitations, IVs were abbreviated in the logistic regression equation for the Graduated in 2 Model but follow the list order of Table 10.

$$\text{logit}(P) = -5.108 + 2.225^{*}\text{BCU GPA} + 1.013^{*}\text{BCU HRS} + .668^{*}\text{Trans GPA} + 1.055^{*}\text{Trans HRS} + .577^{*}\text{BCU Fs} + 2.624^{*}\text{More 1 CC} + .752^{*}\text{BCU Ws} + .474^{*}\text{BUSIMjr} + .753^{*}\text{Changed Mjr}$$

Additional regression analysis was conducted using the four significant IVs from the Graduated in 2 Model: BCU GPA, transfer hours, BCU course withdrawals, and Fs earned at
BCU. Accuracy in predicting the outcome of *graduate in two years* for the sample decreased from 80.9%, to 79.4%. The Omnibus Tests of Model Coefficients for the model was statistically significant against the null model $\chi^2, (4, N=257) = 82.859, p < .001$. The -2 Log likelihood is 220.087. Cox and Snell $R^2$ is .276. The Nagelkerke $R^2$ is .398, which is used as a measure of effect size and indicates that the four significant IVs are not very useful in predicting *graduation in two years post-transfer*.

Table 11 displays the logistic regression statistics for the univariate analysis of each individual primary IVs and the DV *graduated in four years*, followed by Table 12 with the pseudo $R^2$ and goodness of fit statistics for the univariate analysis of each individual primary IVs and the DV *graduated in four years*. Table 13 displays the logistic statistics for the Graduated in 4 Model.

Table 11

*Logistic Statistics: Univariate Analysis of Individual Primary IVs and Graduated in 4 Years*

<table>
<thead>
<tr>
<th>Primary IV</th>
<th>$\beta$</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>$p$</th>
<th>Exp(B)</th>
<th>95% C.I. for Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU GPA</td>
<td>2.347</td>
<td>.304</td>
<td>59.461</td>
<td>1</td>
<td>.000</td>
<td>10.449</td>
<td>5.755 - 18.971</td>
</tr>
<tr>
<td>BCU Hours</td>
<td>.053</td>
<td>.006</td>
<td>69.119</td>
<td>1</td>
<td>.000</td>
<td>1.055</td>
<td>1.042 - 1.068</td>
</tr>
<tr>
<td>Transfer GPA</td>
<td>.896</td>
<td>.231</td>
<td>15.002</td>
<td>1</td>
<td>.000</td>
<td>2.450</td>
<td>1.557 - 3.857</td>
</tr>
<tr>
<td>Transfer Hours</td>
<td>.035</td>
<td>.009</td>
<td>14.604</td>
<td>1</td>
<td>.000</td>
<td>1.036</td>
<td>1.017 - 1.055</td>
</tr>
<tr>
<td>BCU Semesters</td>
<td>.249</td>
<td>.045</td>
<td>30.668</td>
<td>1</td>
<td>.000</td>
<td>1.282</td>
<td>1.174 - 1.400</td>
</tr>
<tr>
<td>College-Level Math at CC</td>
<td>.770</td>
<td>.362</td>
<td>4.521</td>
<td>1</td>
<td>.033</td>
<td>2.159</td>
<td>1.062 - 4.388</td>
</tr>
<tr>
<td>BCU Withdrawals</td>
<td>-.222</td>
<td>.063</td>
<td>12.355</td>
<td>1</td>
<td>.000</td>
<td>.801</td>
<td>.707 - .906</td>
</tr>
<tr>
<td>BCU Fs</td>
<td>-.586</td>
<td>.103</td>
<td>32.321</td>
<td>1</td>
<td>.000</td>
<td>.557</td>
<td>.455 - .681</td>
</tr>
<tr>
<td>Nontraditional Age 1st Enrolled at BCU</td>
<td>-.664</td>
<td>.335</td>
<td>3.935</td>
<td>1</td>
<td>.047</td>
<td>.515</td>
<td>.267 - .992</td>
</tr>
</tbody>
</table>
### Table 12

*Pseudo $R^2$ and Goodness of Fit: Univariate Analysis of Individual Primary IVs and Graduated in 4 Years*

<table>
<thead>
<tr>
<th>Primary IV</th>
<th>Nagelkerke $R^2$</th>
<th>Cox &amp; Snell $R^2$</th>
<th>-2 Log Likelihood</th>
<th>Omnibus Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU GPA</td>
<td>.516</td>
<td>.384</td>
<td>226.855</td>
<td>124.641, $p = .000$</td>
</tr>
<tr>
<td>BCU Hours</td>
<td>.507</td>
<td>.378</td>
<td>229.532</td>
<td>121.965, $p = .000$</td>
</tr>
<tr>
<td>Transfer GPA</td>
<td>.081</td>
<td>.060</td>
<td>335.553</td>
<td>15.943, $p = .000$</td>
</tr>
<tr>
<td>Transfer Hours</td>
<td>.082</td>
<td>.061</td>
<td>335.318</td>
<td>16.178, $p = .000$</td>
</tr>
<tr>
<td>BCU Semesters</td>
<td>.180</td>
<td>.134</td>
<td>314.539</td>
<td>36.957, $p = .000$</td>
</tr>
<tr>
<td>College-Level Math at CC</td>
<td>.024</td>
<td>.018</td>
<td>346.878</td>
<td>4.619, $p = .032$</td>
</tr>
<tr>
<td>BCU Withdrawals</td>
<td>.072</td>
<td>.053</td>
<td>337.384</td>
<td>14.113, $p = .000$</td>
</tr>
<tr>
<td>BCU Fs</td>
<td>.243</td>
<td>.181</td>
<td>300.098</td>
<td>51.398, $p = .000$</td>
</tr>
<tr>
<td>Nontraditional Age 1st Enrolled at BCU</td>
<td>.002</td>
<td>.001</td>
<td>351.162</td>
<td>.334, $p = .563$</td>
</tr>
</tbody>
</table>

### Table 13

*Graduated in 4 Model*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$</th>
<th>S.E.</th>
<th>Wald</th>
<th>$df$</th>
<th>$p$</th>
<th>Exp(B)</th>
<th>95% C.I. for Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCU GPA</td>
<td>2.347</td>
<td>.304</td>
<td>59.461</td>
<td>1</td>
<td>.000*</td>
<td>10.449</td>
<td>5.755 - 18.971</td>
</tr>
<tr>
<td>BCU Hours</td>
<td>.053</td>
<td>.006</td>
<td>69.119</td>
<td>1</td>
<td>.000*</td>
<td>1.055</td>
<td>1.042 - 1.068</td>
</tr>
<tr>
<td>Transfer GPA</td>
<td>.896</td>
<td>.231</td>
<td>15.002</td>
<td>1</td>
<td>.000*</td>
<td>2.450</td>
<td>1.557 - 3.857</td>
</tr>
<tr>
<td>Transfer Hours</td>
<td>.035</td>
<td>.009</td>
<td>14.604</td>
<td>1</td>
<td>.000*</td>
<td>1.036</td>
<td>1.017 - 1.055</td>
</tr>
<tr>
<td>BCU Semesters</td>
<td>.249</td>
<td>.045</td>
<td>30.668</td>
<td>1</td>
<td>.000*</td>
<td>1.282</td>
<td>1.174 - 1.400</td>
</tr>
<tr>
<td>College-Level Math at CC</td>
<td>.770</td>
<td>.362</td>
<td>4.521</td>
<td>1</td>
<td>.033*</td>
<td>2.159</td>
<td>1.062 - 4.388</td>
</tr>
<tr>
<td>BCU Withdrawals</td>
<td>-.222</td>
<td>.063</td>
<td>12.355</td>
<td>1</td>
<td>.000*</td>
<td>.801</td>
<td>.707 - .906</td>
</tr>
<tr>
<td>BCU Fs</td>
<td>-.586</td>
<td>.103</td>
<td>32.321</td>
<td>1</td>
<td>.000*</td>
<td>.557</td>
<td>.455 - .681</td>
</tr>
<tr>
<td>Nontraditional Age 1st Enrolled at BCU</td>
<td>-.664</td>
<td>.335</td>
<td>3.935</td>
<td>1</td>
<td>.047*</td>
<td>.515</td>
<td>.267 - .992</td>
</tr>
</tbody>
</table>

* = The Exp ($\beta$) is significant at the .05 level

<table>
<thead>
<tr>
<th>Nagelkerke $R^2$</th>
<th>Cox &amp; Snell $R^2$</th>
<th>-2 Log Likelihood</th>
<th>Omnibus Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>.758</td>
<td>.565</td>
<td>137.408</td>
<td>214.088, $p = .000$</td>
</tr>
</tbody>
</table>
The Graduated in 4 Model increased accuracy in predicting the outcome of graduate in four years post-transfer for the sample to 91.1%, which is a large increase from the 56.8% reported by the null or constant model. The Omnibus Tests of Model Coefficients for the model was statistically significant against the null model $\chi^2, (9, N=257) = 214.088, p < .001$. The -2 Log likelihood is 137.408. Cox and Snell $R^2$ is .565. The Nagelkerke $R^2$ is .758, which is used as a measure of effect size and indicates that the Graduated in 4 Model is somewhat useful in predicting graduation four years post-transfer. Due to page space limitations, IVs were abbreviated in the logistic regression equation for the Graduated in 4 Model but follow the list order of Table 13. Additional regression analysis was not conducted for the significant IVs in Model, since all IVs were significant.

$logit(P) = -6.063 + 6.011*BCUGPA + 1.110*BCUHRS + .364*TransGPA + 1.071*TransHRS + .797*BCUFs + .990*BCUWs + .545*BCUSems + .287*ClgMth@CC + .815*NonTrad@BCU$

Research Question Four

Does having a community college and/or four-year institution GPA in the bottom 25th percentile for the sample impact graduation rates?

Previous research by Cejda et al. (1998) found that students’ academic performance at the community college was associated with their performance at their post-transfer four-year institution. Analysis of the data according to discrepant GPA groups focuses on the importance of pre- and post-transfer academic performance on persistence to graduation. GPA percentile groups were used to categorize students as discrepant or non-discrepant based on transfer GPA and BCU GPA. Students were categorized into bottom 25th percentile groups based upon whether or not their transfer GPA or BCU GPA was discrepant from the average transfer GPA or BCU GPA for the sample. The four groups were as follows, with low meaning in the bottom
25th percentile: Low Transfer GPA, Low BCU GPA, Neither GPA Low, or Both GPAs Low.

The Neither GPA Low students were the non-discrepant group, since neither their transfer nor BCU GPAs were in the bottom 25th percentile. Students in the Low Transfer GPA group had a community college GPA (2.54 or lower) that was at or below the 25th percentile for the sample but had a BCU GPA that was above the 25th percentile. Low BCU GPA students had a BCU GPA (2.10 or lower) that was at or below the 25th percentile but had a community college GPA that was above the 25th percentile. Table 12 displays the categorization of the sample by bottom 25th percentile group and the associated means.

Table 14

*Means for Percentile Groups*

<table>
<thead>
<tr>
<th>Bottom 25th Percentile Group</th>
<th>Mean Transfer GPA</th>
<th>Mean BCU GPA</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Transfer GPA</td>
<td>2.28</td>
<td>2.74</td>
<td>0.46</td>
</tr>
<tr>
<td>Low BCU GPA</td>
<td>3.04</td>
<td>1.31</td>
<td>1.73</td>
</tr>
<tr>
<td>Neither GPA Low</td>
<td>3.31</td>
<td>3.09</td>
<td>0.22</td>
</tr>
<tr>
<td>Both GPAs Low</td>
<td>2.20</td>
<td>1.21</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Table 15

*Comparison of Graduates and Non-Graduates by Percentile Groups*

<table>
<thead>
<tr>
<th>Bottom 25th Percentile Group</th>
<th>n</th>
<th>Sample %</th>
<th>Graduate</th>
<th>Non-Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Transfer GPA</td>
<td>38</td>
<td>29.6%</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>Low BCU GPA</td>
<td>38</td>
<td>29.6%</td>
<td>1</td>
<td>37</td>
</tr>
<tr>
<td>Neither GPA Low</td>
<td>155</td>
<td>60.3%</td>
<td>128</td>
<td>27</td>
</tr>
<tr>
<td>Both GPAs Low</td>
<td>26</td>
<td>10.1%</td>
<td>1</td>
<td>25</td>
</tr>
</tbody>
</table>

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Rates of *graduation at any time, graduation in two years* and *graduation in four years* were calculated and compared among the four discrepant GPA groups as shown in Table 16. The graduation rates for the Both GPAs Low group and the Low BCU GPA groups were similar and lower than respective rates for the Low Transfer GPA group. The Neither Low GPA group did not have a transfer or BCU GPA in the bottom 25\textsuperscript{th} percentile and had the highest graduation rates. Students in the Both GPAs Low group had a community college GPA and BCU GPA that was at or below the 25\textsuperscript{th} percentile. Both the Low BCU GPA and Low Transfer GPA groups had 38 (29.6\%) students. The largest group was the Neither GPA Low group with 155 (60.3\%), and the smallest group was the Both GPAs Low group with 26 (10.1\%). As shown in Table 14, the group with highest graduation rate (82.6\%) was the Neither GPA Low group. The groups with the lowest graduation rate were the Low BCU GPA group (2.6\%) and the Both GPAs Low group (3.8\%).

Table 16

*Graduation Rates by Percentile Group*

<table>
<thead>
<tr>
<th>Bottom 25\textsuperscript{th} Percentile Group</th>
<th>n</th>
<th>2 Year Graduation Rate%</th>
<th>n</th>
<th>4 Year Graduation Rate%</th>
<th>n</th>
<th>Graduation Rate%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Transfer GPA</td>
<td>12</td>
<td>31.6%</td>
<td>15</td>
<td>39.5%</td>
<td>30</td>
<td>78.9%</td>
</tr>
<tr>
<td>Low BCU GPA</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>1</td>
<td>2.6%</td>
</tr>
<tr>
<td>Neither GPA Low</td>
<td>59</td>
<td>38.1%</td>
<td>59</td>
<td>38.1%</td>
<td>128</td>
<td>82.6%</td>
</tr>
<tr>
<td>Both GPAs Low</td>
<td>0</td>
<td>0.0%</td>
<td>1</td>
<td>3.8%</td>
<td>1</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

**Summary**

In this chapter, descriptive statistics for the sample and results of the analyses of transcript data were presented. The student sample for this study included only in-state community college students who transferred to BCU in the 2007-2008 academic year. A
demographic profile and summary of academic behaviors were created to describe the sample. The process for sorting students into discrepant GPA groups and results of the comparison among the groups were explained. Results of the logistic analysis of the data demonstrated the ability of each model to correctly predict the likelihood of a student graduating (or not graduating) from BCU post-transfer.
CHAPTER V:
DISCUSSION

The purpose of this study was to identify factors that were predictive of whether or not an in-state community college transfer student would graduate from the site institution. The sample for this study included 257 students who transferred to BCU in 2007-2008 academic year. Data received included enrollment records through fall 2013, allowing for 5-6 years post-transfer to graduate. Quantitative research methods were used to examine the predictive impact the independent variables had on the dependent variable of graduate or not graduate. Elements of the research questions one through three were selected based on the work of Hagedorn et al. (2010), and research question four was developed based on prior examination of academic performance using GPA percentile groups by Cejda et al. (1998).

To gauge the representativeness of the sample for this study, graduation rates were compared to the rates for the reference population—BCU. The overall graduation rate for the sample was 62%. Rates were also calculated for graduation in two years (27.6%) post-transfer and four years post-transfer (56.8%). BCU did not publish graduation rates for transfer students, but the rates for full-time baccalaureate degree seeking freshmen students were 31.5% in four years and 53.5% in six years (Office of Institutional Effectiveness and Analysis, 2014). Assuming that the four-year graduation rate for the freshman is considered on-time graduation, the 27.6% two years post-transfer (or on-time) graduation rate for the sample is a comparable rate. Likewise, the four years post-transfer graduation rate is similar to the six year freshman
graduation rate. Therefore, the graduation rates for the sample appear to be representative of the BCU population.

The following sections include a summary of the findings for the primary independent variables (IVs) and are categorized as either an academic factor or demographic characteristic.

**Findings for Academic Factors**

**Coursework Completed at the Community College**

Hagedorn et al. (2010) found that the level of English and math successfully completed by the student at the community college were predictive of likelihood of transfer to the four-year institution. Only the Graduated in 4 Model included the college-level math completed at the community college independent variable (IV). For the most part, in this study, developmental coursework in math, English, and reading did not have an impact on the outcome variable of graduate or not graduate. However, for the *graduate in two years post-transfer* time period, the IV of not completing college-level math at the community college had the lowest rate of graduation with 10.8%. Students who did not complete college-level math at the community college had a 48.6% overall graduation rate and a 40.5% rate for *graduation in four years*, which is consistent with Hagedorn et al.’s (2010) findings on the importance of mathematics course completion and successful transfer to a four-year institution.

Despite the lack of significance with the logistic regression models, students who took developmental coursework at the community college had graduation rates below the average rates for the sample within each graduation scenario (*graduate at any time, in two years, and in four years*). Students who took any developmental coursework prior to transfer had an overall graduation rate of 58.6%, compared to the sample’s 62% graduation rate. The rate decreased to 56.7% for students who specifically took developmental math. For the two-year graduation rate,
students who took any developmental course had a rate lower than 27.6% at 27.1%, followed by those who took developmental math at 25.4%, then developmental English at 22.4%, and lastly the drop in rate for students who took developmental reading at 16.7%. Four-year graduation rates for students who took developmental coursework were slightly below the overall 56.8% for the sample. Taking any developmental coursework at the community college dropped the four-year graduation rate to 54.9%. The lowest four-year graduation rate for developmental coursework was for the students who had taken developmental math at 52.5%, followed by developmental reading at 53.3%. Students who took developmental English were only a tenth of a point (56.7%) below the overall sample four-year graduation rate. Again, these findings are supportive of previous research by Hagedorn et al. (2010) that identified a relationship between lower rates of successful transfer for students who took developmental coursework.

**Grade Point Average**

Initial identification of BCU GPA and transfer GPA as primary IVs was expected, as a significant relationship between GPA and persistence to graduation has been found in numerous other studies (Cejda, 1997, Cejda et al., 1998; Laanan, 1996, 2007; Moumouris, 1997; Piland, 1995; Underwood, 1998). Rates of graduation were also calculated for the discrepant GPA groups. Not surprisingly, the Neither GPA Low group had the highest rate of graduation with 82.6%, which is much higher than the overall rate of 62% for the sample. It was also not a surprise to find that students in the Neither GPA Low group with a transfer GPA and BCU GPA in the top 75th percentile for the sample were more likely to graduate. Students in the Low Transfer GPA group had a graduation rate higher than the overall sample at 78.9% but below the Neither GPA Low group. The lowest rates of graduation were the Both GPAs Low group with 3.8%, and the Low BCU GPA group with only 2.6%.
Credit Hours and Semesters Enrolled

While some of the variance in the number of credit hours earned and semesters enrolled at BCU occurred due to transfer students entering BCU at different points in matriculation, BCU hours and number BCU semesters were found to be predictive of likelihood to graduate. This finding is logical, assuming that students with a higher GPA at the post-transfer four-year institution are likely to persist and therefore, more likely to complete more semesters and hours of coursework. Also, students who transferred with a higher GPA would be better positioned to recover for a transfer GPA shock in their first semester (Hills, 1965). Whereas a student who entered BCU with the admission minimum GPA of 2.0 may find it difficult to restore their academic good standing if they experience a slight dip in their GPA during the first semester.

Failing Courses and Course Withdrawals

Negative $b$-coefficients ($\beta$) were found for the number of F grades received at BCU and number of course withdrawals at BCU primary IVs. The number of BCU Fs variable consistently had a negative $b$ coefficient, first when tested alone against the outcome of graduate at any time ($\beta = -.496$), then graduate in two years ($\beta = -.967$), and graduate in four years ($\beta = -.586$). Number of BCU Fs also had a negative $b$-coefficient for all three logistic regression models ($\beta = -.340; -.276; -.550; -.586$), indicating that the presence of more Fs earned at BCU had a negative impact on the likelihood of graduation. This was also true for the number of course withdrawals at BCU, except for when it was tested individually tested against the graduate in two years outcome. Finding that failing grades and numerous course withdrawals had a negative impact on likelihood of graduation also relates back to the importance of GPA and academic progress. Students who fail a course may be placed on academic warning or suspension due to the low semester GPA or decreased cumulative GPA, which could delay
enrollment for the next semester or year. Likewise, students who frequently withdraw from courses delay their progress toward degree completion.

**Earned Associate’s Degree**

One independent variable that was notably missing from examination was associate degree attainment. Previous studies have found that students who earn the associate’s degree are 50% more likely to complete the bachelor’s degree, and therefore, is typically examined similar studies (Brint, 2003; Carlan & Byxbe, 2000; Cejda et al., 1998; Cejda & Kaylor, 2001; Davies & Dickman, 1998; Fredrickson, 1998; Laanan, 2000; Moumouris, 1997). Inconsistencies in application processing and posting of the associate’s degree to the students’ records were found within the dataset, so it was excluded from use within the logistic regression modeling. The five students who had an earned associate’s degree posted to their record did have a higher two-year graduation rate (40.0%) than the students who did not have earned associate’s degree posted to their record (27.4%). The four-year graduation rate (60.0%) was slightly higher for these five students as well, compared to the 56.7% graduation rate for students who did not have earned associate’s degree posted to their record.

**Academic Major and Degree**

Students who were admitted to BCU within the Fine Arts, Humanities and Social Sciences (FASS) academic major group had a two-year graduation rate of 28.6%, a four-year graduation rate of 55.4% and a graduate a anytime rate of 67.8%. Science, Technology, Engineering, and Math (STEM) students had graduation rates similar to the FASS students, with a two-year rate of 27.5% and four-year rate of 54.9%. However, the graduate at any time rate was lower for STEM students (52.7%) and was also below the 62% overall graduation rate for the sample. Interestingly, the academic major group with the lowest two-year graduation rate
(21.8%), as well as the highest graduate at any time rate (70.9%) was Business (BUSI). The low two-year rate may be attributed to the pre-requisites required for admission into the BUSI academic major, which may have delayed progress for community college transfer students who had not completed the pre-requisites prior to transfer. Education (EDUC) students had the highest two-year graduation rate at 33.3% and highest four-year graduation rate at 66.7%.

Twenty-seven percent of the students in the sample changed their academic major after being admitted to BCU. Students who changed academic major had a low two-year graduation rate, 18.3%. This is not surprising, since changing major often requires the student to extend their time to graduation due to differences in program course requirements and pre-requisites. Similar to students who were admitted to BCU as EDUC students, the EDUC current major group had the highest two-year graduation rate at 38.5%. Students currently in the FASS major group had the highest rate of graduation at any time with 64.4%. Students who were currently in the UNDECLARED academic major group had the lowest graduation rate, 28.6%. Since completion of a degree program requires selection of a specific major, the researcher expected the graduation rate for this group to be 0%, so the quality of that data is suspect. Students who pursued a Bachelor of Science (BS) degree had higher rate of graduation (63.7%) than those who pursued a Bachelor of Arts (BA) degree (57.3%). As a very high research activity institution, BCU is more known for the quality of majors that would lead to a BS degree, so students within the BS degree programs may have a more positive academic experience than those in the lower quality (or perceived as lower quality) BA degree programs.
Findings for Demographic Characteristics

Age

Moumouris (1997) found that as the age of the student increased the likelihood of degree completion decreased, which held true for this study. Age was the only demographic IV to have any predictive value. Specifically, non-traditional college age at the time of enrollment at BCU was found to be negatively predictive when tested alone against the graduate at any time outcome ($\beta = -0.834$) and when tested against the graduate in four years outcome ($\beta = -0.664$). Non-traditional age at time of enrollment at BCU was also negatively influential within the Graduated Model ($\beta = -1.181$) and 2 ($\beta = -0.664$). Students of non-traditional age ($\geq 24$) at the time of enrollment at BCU graduated at a rate 45.4%, much lower than the overall rate of 62%. Non-traditional age at time of enrollment at BCU also accounted for the lowest rate (43.2%) for graduation in four years post-transfer. Similarly, students who were of non-traditional age at the time of enrollment at the community college had a very low two-year graduation (12.5%) and low four-year graduation rate (56.2%). Still, non-traditional age students did not account for much of the sample, only 6.2% for non-traditional age at time of enrollment at the community college and 17.1% of the sample for non-traditional age at time of enrollment at BCU. The lower numbers of non-traditional age students was unexpected at a public university in metropolitan area, which would be a convenient option for a greater number of people.

Race

No significant differences were found in the predictive value of race, which is fairly consistent with the findings of the reviewed literature (Hagedorn et al., 2010; Moumouris, 1997) with the exception of the work of Koker and Hendel (2003), who found race to be predictive of baccalaureate degree completion. According to Koker and Hendel, White students were more
likely to complete their degree. Laanan (1998) found differences between the experiences of White and non-White students. Graduation rates for White students and Non-White students were not very different, but the White students had higher rates. Whites students had a two-year graduation rate of 29.9%, and Non-White students had a two-year graduation rate of 21.4%. Non-White students’ rate of graduation in four years was 50.0%, and the four-year graduation rate for White students was 59.3%. Non-White students’ graduation at any time rate (57.1%) was below the overall graduation rate for the sample (62%), and the White students’ graduation at any time rate (64.1%) was above the overall rate for the sample.

Gender

Gender is regularly examined in research, but in this study, as in many others, gender was not a significantly predictive IV (Fredrickson, 1998; Hagedorn et al., 2010; Koker & Hendel, 2003; Moumouris, 1997; Underwood, 1998). Graduation rates for the men and women of the sample were comparable, but the men did have a higher four-year graduation rate (58.5%) than the women (55.6%). Men also had a higher graduation at any time rate of 66.0%, compared to the women’s 59.6%, which was below the overall graduation rate for the sample.

Findings for Logistic Regression Models

Graduated Model

After identifying the primary independent variables for the graduation at any time, graduate in two years, and graduate in four years outcomes, logistic regression analysis was used to test the predictive strength of each model. Logistic regression for the Graduated Model included primary IVs BCU GPA, BCU hours, transfer GPA, transfer hours, number of BCU semesters, BCU course withdrawals, BCU Fs received, and non-traditional age at time of enrollment at BCU. Graduation at any time was the outcome variable for the Graduated Model.
Based on the Omnibus Tests of Model Coefficients ($\chi^2$, (8, N=257) = 289.476), the Graduated Model was statistically significant ($p < .001$) against the null model at predicting likelihood of graduation or not. Prior to this study, a model for predicting graduation at any time post-transfer for in-state community college students at a public four-year university had not been published. Therefore, results of this research filled a gap in the previous literature by determining an equation for determining the probability of success, or graduation post-transfer.

**Graduated in 2 Model**

Logistic regression for the Graduated in 2 Model included primary IVs BCU GPA, BCU hours, transfer GPA, transfer hours, BCU Fs received, attended more than one community college prior to transfer, BCU course withdrawals, currently a business major, and changed major after being admitted to BCU. *Graduation within two years post-transfer* was the outcome variable for the Graduated in 2 Model. Based on the Omnibus Tests of Model Coefficients $\chi^2$, (9, N=257) = 93.749, the Graduated in 2 Model was statistically significant ($p < .001$) against the null model at predicting likelihood of graduation or not in two years post-transfer. However, the Graduated in 2 Model had a low effect size and may not be as useful. Prior to this study, a model for predicting graduation two years post-transfer for in-state community college students at a public four-year university had not been published.

**Graduated in 4 Model**

Logistic regression for the Graduated in 4 Model included primary IVs BCU GPA, BCU hours, transfer GPA, transfer hours, BCU Fs received, BCU course withdrawals, currently a business major, number of semester enrolled at BCU, completion of college-level math at the community college, and non-traditional age at time of enrollment at BCU. *Graduation within four years post-transfer* was the outcome variable for the Graduated in 4 Model. Based on the
Omnibus Tests of Model Coefficients $\chi^2, (9, N=257) = 214.088$, the Graduated in 4 Model was statistically significant ($p < .001$) against the null model at predicting likelihood of graduation or not in four years post-transfer. Prior to this study, a model for predicting graduation four years post-transfer for in-state community college students at a public four-year university had not been published.

**Implications for Practice**

Performance-based funding and increased public accountability regarding student outcomes have brought persistence and rates of graduation to the forefront of American higher education (D’Amico, Friedel, Katsinas, & Thornton, 2014). A corresponding response to this trend has been the emergence of enrollment management as a functional area within colleges and universities. The role of enrollment management varies but often includes admissions, financial aid, and initiatives for retention and graduation. With the rising costs of tuition, financial aid is a key component of enrollment management (Coomes, 2000). Students who have difficulty financing their education are less likely to enroll, persist, or graduate (Goldrick-Rab, 2010). The issue of college-related cost is often impetus for community college attendance, particularly among traditional college-age students (Cejda, 1997; Cejda & Kaylor, 2001; Cohen & Brawer, 2008; Laanan, 2004, 2007; Townsend 2000, 2001, 2002). As such, enrollments at the community college are likely to continue to increase. At many institutions, including at BCU, enrollment management administrators recognize this trend and are seeking to capitalize on the growing number of prospective transfer students. Transfer student enrollments are often used to round out the freshman enrollment projections. Yet, projecting transfer student success at the four-year institution can be more difficult due to the diversity of students’ pre-transfer academic histories (Calcagno et al., 2007; Higgins & Katsinas, 1999; Vaughan, 2006; Wyner, 2006). At
BCU the recruitment, admission, and retention of undergraduate students are functionally connected under the organizational structure of enrollment management. The researcher composed the implications for practice through the lens of an enrollment management administrator.

Unlike the freshman admissions process, which requires reports of standardized test scores and typically involves attendance at only one high school, the transfer student admissions process requires a minimum number of transfer credit hours to be considered a transfer student, good standing at previous institutions, and a GPA minimum. With freshman admissions, enrollment management officers develop formulaic evaluation processes for the applications using standardized test scores and high school GPA. Other criteria are often considered in the freshman application evaluation, but the use of standardized test scores does allow the administrators to predict a student’s likelihood for success at the institution. The use of GPA in transfer admissions evaluations is usually the only objective measure of academic potential for success. Adding the equations for the Graduated Model, the Graduated in 2 Model, and the Graduated in 4 Model to the admission evaluation process for community college transfer students would provide enrollment management administrators with a standard measure of potential academic success at the four-year institution.

The model equations could also be used to project likelihood of graduation for community college transfer students who are currently enrolled at the four-year institution. Information gleaned from use of the equations on current student data could be shared with academic advisors and faculty to activate a process of an early intervention for students at risk for attrition. Automatic systemic alerts could also be associated with individual IVs from the model, such as the number course withdrawals or intent to change academic major. Alerts often
exist for students with a lower institutional GPA, but additional monitoring of students who began with a lower transfer GPA should be added. Due to lower graduation rates, students who did not complete college-level math at the community college prior to transfer and/or took developmental coursework at the community college, in particular math or reading, should be flagged for monitoring by their academic advisor or faculty, as well as be connected to academic support services on campus. Other student services, such as support initiatives for students of non-traditional age at the time of enrollment at BCU, could be developed based on the findings of this study.

A number of these types of alerts or student services are in place at BCU, and results of this study justify these efforts and bring new areas of concern to light. Still, the researcher cautions against the use of the model equations as the only admissions evaluation tool. A calculation using the model equations produces a probability of an outcome but does not account for all aspects of a student’s potential. Likewise, students who did not complete college-level math at the community college or who took developmental coursework should not be denied admission based on the lower rates of graduation reported in this study. Instead, this information is intended to guide the services and individualized response by the academic advisor and faculty to the student. Furthermore, without reliable information regarding students’ associate’s degree completion, the models are limited in their use, since associate’s degree attainment has been previous linked to likelihood for baccalaureate degree completion (NSC: Research Center, 2012).

Implications for Future Research

Findings from this study were based on a select group of independent variables available through BCU’s student information system. Future research involving variables outside of these
data points is needed to gain a more holistic view of the student and the independent factors that are related to probability for success, or graduation from BCU. Financial aid eligibility would be an interesting area to explore using this group of students since, as noted earlier, many students begin at the community college due to financial limitations or to save money on the overall cost of higher education. Likewise, financial aid awards have been linked to retention (Goldrick-Rab, 2010). If requested and approved, BCU could provide financial aid information specific to the students in this sample, allowing new models to be developed and tested. Differences in graduation rates may also be found when comparing students based on their financial aid eligibility and actual award amounts.

If BCU chooses to utilize the equations for the Graduated Model, the Graduated in 2 Model, and the Graduated in 4 Model for predicting graduation at any time, graduation two years post-transfer and graduation four years post-transfer, then further research is needed to validate the models. Validation could be completed by comparing the predicted outcome with the actual outcome using a new cohort of students or by continuing to track students from the original sample that are still enrolled at BCU. Research using modified definitions of some of the demographic variables is recommended. For example, examination of the race variable beyond the dichotomous White or non-White would add depth to the results and correspond better with the BCU institutional reporting that includes eight race categories: Hispanic/Latino, American Indian/Alaskan Native, Asian, Black/African American, Native Hawaiian/Pacific Islander, White, two or more races, or unknown (Office of Institutional Effectiveness and Analysis, 2014).

While this study did include a count of the number of community colleges attended prior to transfer to BCU, there was no direct study of the institutions of origin. Comparison of the
students according to the type of community college from which they transferred could identify institutional types that are better preparing students for transition to a public four-year highly intensive research university in an urban setting. In particular, a comparison of students who began at a community college in the BCU metro area to those who came from a rural or suburban community college would assist BCU in planning recruitment efforts as well as development of partnerships and services with certain community colleges (Hardy, 2005; Katsinas, 2003).

Having used the *Community College Transfer Calculator*© (CCTC) work of Hagedorn et al. (2010) as a starting point and guide for the methodology used in this study, the results of the logistic regression modeling should be used to customize the CCTC templates. The CCTC would provide administrators with a more user-friendly tool for calculating the model equations. Adaptation of the CCTC for use in predicting likelihood for graduation would increase the chance of the models being used, since the CCTC offers a simpler interface for users and eliminates the need to use statistical software such as SPSS.

To add more depth to the knowledge of the students in the sample, it is recommend that a qualitative study be conducted. This could be done through interviews with the students in the sample or web-based survey and would possibly lead to a greater understanding of the *why* and not just the *what* regarding the students’ academic histories and outcome of graduation or not.

**Limitations**

The site for this research study was selected due to the convenience for the researcher who is an employee at BCU. Being a single-institution study, the generalizability of the results is somewhat limited and was considered when interpreting the results. The quality of some the data were suspect, such as the low number of associate’s degrees earned. The data entry for
admissions and transcript data is a manual process, so human error must be taken into consideration.

**Conclusion**

Findings from this study contributed to the literature related to community college transfer student persistence and graduation based on pre- and post-transfer academic behaviors. This research reinforced previous studies that found the GPA to be predictive of transfer student success (Cejda, 1997, Cejda et al., 1998; Laanan, 1996, 2007; Mourmouris, 1997; Piland, 1995; Underwood, 1998). Similar to the findings of Hagedorn (2010), students who did not complete college-level at the community college or who took developmental coursework at the community college had lower rates of success as measured by *graduation at any time, in two years, and in four years*. Furthermore, the results of this study recommended the use of three models of predictor IVs for predicting the probability of graduation for prospective and current community college transfer students at BCU. Enrollment management administrators can also use the models to guide their conversations with prospective students regarding the student services that would be available to them once they transfer. Academic advisors and faculty can use the models to advise and respond to transfer students’ academic needs and potential. By utilizing these models, BCU could intervene early with students who are at risk for attrition and increase rates of graduation for all community college transfer students.
REFERENCES


http://nces.ed.gov/ipeds/datacenter/Snapshot.aspx?unitId=acababb1b1ae&action=download


APPENDIX A

LETTER OF UA IRB APPROVAL

August 30, 2013

Jessica Bumpus
Department of ELPTS
College of Education
The University of Alabama
Box 77092

Re: IRB # EX-13-CM-093: “Influences on Community College Transfer Student Persistence at an Urban Public University: Developing and Valuating a Predictive Model Using Demographic Data and Transcript Data”

Dear Ms. Bumpus,

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given exempt approval according to 45 CFR part 46.101(b)(4) as outlined below:

4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

This approval expires on August 29, 2014. If the study continues beyond this date, you must complete the eProtocol Renewal Form. If you modify the application, please complete the eProtocol Revision Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the eProtocol Final Report Form.

Should you need to submit any further correspondence regarding this application, please include the assigned IRB application number.

Good luck with your research.

Sincerely,

Carrylette T. Myles, MSM, CIM
Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama

cc: Dr. David Hardy
APPENDIX B

LETTER OF BCU IRB APPROVAL

Institutional Review Board for Human Use

Form 4: IRB Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

The Institutional Review Boards for Human Use (IRBs) have an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The Assurance number is FWA00005960 and it expires on January 24, 2017. The IRBs are also in compliance with 21 CFR Parts 50 and 56.

Principal Investigator: BUMPUS, JESSICA G
Co-Investigator(s):
Protocol Number: E130806002
Protocol Title: Influences on Community College Transfer Student Persistence at an Urban Public University: Developing and Validating a Predictive Model Using Demographic Data and Transcript Data

The above project was reviewed on 8/29/13. The review was conducted in accordance with the Assurance of Compliance approved by the Department of Health and Human Services. This project qualifies as an exemption as defined in 45CF46.101, paragraph 4.

This project received EXEMPT review.
IRB Approval Date: 8/29/13
Date IRB Approval Issued: 8/29/13

Cari Oliver
Assistant Director, Office of the Institutional Review Board for Human Use (IRB)

Investigators please note:

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one year anniversary of the IRB approval date.

Any modifications in the study methodology, protocol and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at or other participating institutions must be reported promptly to the IRB.

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