

ABSTRACT

BUCKLE, EARLE MELFORD. A Comparison of the Academic Performance of Jamaican Community College Transfer Students and Native University Students Enrolled in a Collaborate Baccalaureate Degree Program. (Under the direction of Duane Akroyd and Leila González Sullivan.)

There is a perception in the Jamaican postsecondary education system that students who begin baccalaureate studies at community colleges do not perform as well academically as those who begin at the public universities. Therefore, the purpose of this study was to compare the academic performance of transfer students who began their baccalaureate studies under a franchising arrangement between a community college and a university with the academic performance of native university students. Grade point average, time to degree, and baccalaureate degree attainment were used as proxies for academic performance.

The study's conceptual framework was developed from existing models of student attrition. Based on these models, it was hypothesized that institutional type and student characteristics were significant factors in determining a student's academic success in baccalaureate degree studies. T-tests, one-way ANOVA, and logistic regression were used to analyze data from a stratified sample of transfer and "native" juniors selected from a Jamaican public university. The study compared the academic performance of the two groups as each progressed toward attaining the baccalaureate degree.

The study found no significant difference between the academic performances of the two groups while they were enrolled in the university's upper division. Findings also suggested that community college attendance had no significant effect on the likelihood of a student attaining the baccalaureate degree within six years of initial matriculation into a

baccalaureate degree program. Rather, a student's lower division (or community college) grade point average was found to have a significant effect on the likelihood of that student attaining the baccalaureate degree within that time. Based on these findings, the study presented a number of recommendations for policy, practice, and future research.

A Comparison of the Academic Performance of Jamaican Community College
Transfer Students and Native University Students Enrolled
in a Collaborative Baccalaureate Degree Program

by
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DEDICATION

This dissertation is dedicated to the memory of my father and mother, Ewart and May Buckle. Although not having the privilege to go beyond elementary school, they believed in the importance of education as a means of upward mobility and sacrificed selflessly so that I could receive the best education that Jamaica offered. Thanks, mom and dad. May your souls rest in peace.

BIOGRAPHY

Earle Buckle was born in rural Jamaica on August 17, 1956. He received his early education at Lowe River Elementary and Knox College. At Knox, he excelled in the natural sciences and decided to pursue a career in this area. In 1975, he enrolled at the University of the West Indies (UWI) for a Bachelor's Degree in the Natural Sciences.

Completing his Bachelor's Degree in 1979, he took a job as a teacher of mathematics at Excelsior High School, Kingston, Jamaica. He spent two years at this institution and then moved next door to the Excelsior Community College (EXED), where he has spent the last 30 years. At EXED, Earle has held several positions including those of teacher of mathematics, head of the Pre-University department, and head of the Business department. In 2001, he was promoted to the post of Vice President (Student Affairs).

While employed at EXED, Earle continued to pursue academic and professional studies. During the period 1982 to 1994, he completed postgraduate Diplomas in Education and in Management Studies as well as an Executive Masters in Business Administration (EMBA), all at the UWI. In 1994, he was awarded the Kenton Wilks Memorial scholarship for outstanding performance in the EMBA program. In 2006, he was awarded a Fulbright scholarship to pursue doctoral studies at North Carolina State University, Raleigh, NC.

Earle is also a community organizer. In 2004-2005, as a member of the Lions Club of Downtown Kingston, he was selected as the most outstanding president for District 60-B, which encompasses over 70 clubs across the Caribbean. In 1982, he married Valerie Hall. They are the proud parents of one daughter, Tiffoni.

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The completion of a dissertation is really the end of a very long journey of academic studies. During this journey, many persons, some remembered, others long forgotten, made invaluable contributions to my reaching this destination. To all these unnamed persons, I owe you a debt of gratitude.

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CHAPTER ONE

Introduction

The developed world has long recognized the importance of postsecondary education in national development. Postsecondary education has been generally associated with reduction in crime, reduced dependence on public health services, greater individual productivity, and with national and regional economic development (Becker, 1993; Leslie & Brinkman, 1988; Pascarella & Terenzini, 2005; Paulson & Smart, 2001). In the case of developing countries, postsecondary education is seen as a catalyst for economic and social development as well as a means to raise the standard of living and alleviate poverty (World Bank, 2000). According to the World Bank report, postsecondary education in developing countries creates opportunities for these countries to reduce the migration of their brightest and best. In addition, it allows them to meet the challenges created by globalization and the expansion of the knowledge economy.

Recognizing the importance of postsecondary education to a country's development, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) declared that developing countries should increase postsecondary access to a wider public by using diversified models and a variety of delivery modes (UNESCO, 1998). However, in attempting to expand postsecondary education, these developing countries faced obstacles such as inadequate funding, underdeveloped educational structures, limited faculty, inadequate research capacity, and students unprepared to meet the challenges of postsecondary work (World Bank, 2000). According to the World Bank, not only have developing countries attempted to increase enrollment in postsecondary education, they have

also attempted differentiation, “a process whereby new types of institutions are born and new providers enter the market” (p. 26).

Simultaneously, the private returns on postsecondary education provide a major incentive for an individual to pursue studies at the postsecondary level (Becker, 1993; Leslie & Brinkman, 1988; National Center for Education Statistics (NCES), 2006; Pascarella & Terenzini, 2005; Paulson & Smart, 2001). At the individual level, postsecondary education provides a means of upward social mobility, a method to increase lifetime earnings, and a means of improving the individual’s quality of life (NCES, 2006; Pascarella & Terenzini, 2005; Paulson & Smart, 2001; Wang, 2009). In the case of individuals in many developing countries, postsecondary education not only provides the means for upward social mobility and increased earnings but also offers opportunities for migration to developed countries, particularly in North America and Europe (Carrington & Detragiache, 1999; World Bank, 2003).

Since achieving political independence in 1962, Jamaica, a small developing country in the Caribbean, has had a challenging task of providing postsecondary education to satisfy national, local, and individual needs. Ideally, the Jamaican government wanted a system of postsecondary institutions that would enrich and diversify its postsecondary sector and provide communities with an educational resource responsive to their needs (Walsh, 2005). However, inadequate funding and having an education system that catered mainly to the academic and social elite were major obstacles to increasing access (Evans & Burke, 2007; Hall, 2005).

In exploring possible means of expanding postsecondary education for its population, the Jamaican government researched the postsecondary education systems in other countries. The American community college system attracted their attention. These American institutions, with their open and inexpensive access and wide variety of educational and training programs and services (Cohen & Brawer, 2003; Vaughan, 2000) seemed the perfect recipe for the expansion of the Jamaican postsecondary education system. The Jamaican government saw the introduction of community colleges as a means of simultaneously providing the necessary expansion and differentiation of the Jamaican postsecondary education sector (Walsh, 2005).

Using the American community college as its model, Jamaica opened the first of eight community colleges in 1974. With the introduction of community colleges, the Jamaican postsecondary education system now had a group of institutions that offered postsecondary access to a wider cross-section of the Jamaican population at a lower cost. However, these colleges evolved within a postsecondary system that had no standard policy framework or set of guidelines that would monitor and regulate the sector (Evans & Burke, 2007; Jones & Wattenbarger, 1990; Hall, 2005). In 1995, more than twenty years after the first community college emerged on the Jamaican postsecondary education landscape, the Jamaican government mandated a stakeholders' taskforce to revisit these colleges' mission. The taskforce recommended that the community colleges should focus on postsecondary level programs in response to national needs (Ministry of Education, 1996).

Statement of the Problem

Funding constraints, issues relating to student and institutional quality, and the absence of a standard framework for articulation across the system continue to create significant challenges for the Jamaican postsecondary education sector (Inter-American Development Bank, 2003a; Hall, 2005; Ministry of Education, 2006). Notwithstanding these challenges, Jamaica's competitiveness in the global economy depends on its ability to increase both access and success at the postsecondary level. According to the Ministry of Education (2006), Jamaica's postsecondary education system needs a paradigm shift in order to produce the critical mass of postsecondary graduates needed to trigger sustained economic development.

A popular recommendation is for the Jamaican postsecondary sector to use community colleges as its engine of growth (Hamilton & Severin, 2005; Miller, 2005; Ministry of Education, 1996). For example, the Ministry of Education stakeholders' taskforce recommended that the universities allow community colleges and other such institutions to offer the first two years of baccalaureate degree studies (Ministry of Education, 1996). According to the taskforce, the universities would serve the Jamaican society well by concentrating on the final two years of baccalaureate degree programs as well as on graduate studies and research. In addition, Jamaican community colleges, having excess capacity, offering greater accessibility, and operating at lower costs, provide the best opportunity for increasing access and success at the postsecondary level (Hamilton & Severin, 2005; Miller 2005).

Whereas in 1990, the four existing community colleges were enrolling less than 10% of postsecondary students, by 2005 the number of colleges had expanded to eight and were enrolling almost 25% of the postsecondary student population. Despite this significant increase in enrollment, Jamaican community college students continue to encounter significant barriers in moving beyond the associate degree. Currently, students who begin studies at Jamaican community colleges and then transfer to one of the island's two public universities comprise less than 10% of the total enrollment at these universities. According to the Ministry of Education (2006), this small percentage of Jamaican community college transfer students enrolling at the public universities is a cause for concern.

The limited opportunities available for Jamaican students to pursue baccalaureate degrees in its public postsecondary institutions have resulted in students seeking alternative opportunities to obtain these degrees. Many are migrating to North America to enroll in either public or private baccalaureate degree-granting institutions. In addition, numerous overseas baccalaureate degree-granting institutions have set up successful operations in Jamaica. The effect is that Jamaica is losing a large proportion of its most qualified high school students through migration. The island is also losing significant financial resources through the payment of tuition and fees to overseas postsecondary education providers (Miller, 2005; Ministry of Education, 2006). Based on these trends, funding agencies, policymakers, and education administrators are consistently recommending that the Jamaica government and postsecondary institutions work toward creating a seamless public postsecondary education system. Such a system must be able to encourage and facilitate

movement between levels for students wishing to pursue baccalaureate degree programs (Hall, 2005; Sherlock, 1991).

While a more efficient articulation system and increased capacity will provide more opportunities for Jamaican students to access baccalaureate degrees, a major issue to address is the perception that Jamaican community colleges offer a lower quality education than its public universities (IDB, 2003b; Jamaica Gleaner, 2005a; Jamaica Gleaner, 2005b; Stennett, 2005). The perception is that students who begin studies at Jamaican community colleges usually have lower persistence rates, graduation rates, and academic capacity than those who begin studies at the public universities. Scholars, educational administrators, and policymakers contend that the perception of Jamaican community colleges offering a lower quality education figures prominently in Jamaican students' college-going decisions (Miller, 2005). According to Miller, numerous qualified students, unable to enroll in baccalaureate degree studies at the public universities, have chosen to enroll at local private four-year colleges or at overseas institutions, rather than to enroll at the community colleges. Notwithstanding the implications of these decisions, researchers are conducting little or no local research to inform and guide the Jamaican postsecondary education planning process (Ministry of Education, 2006).

In the absence of local research, findings from studies done in the United States on the academic performance of community college transfer students could guide policymakers and administrators in the Jamaican postsecondary education system. A consequence of the Jamaican policymakers using the American community college system as a model to create the Jamaican community college system is that both systems have many structural

similarities. For example, like their American counterparts, Jamaican community colleges offer open access and lower tuition than the four-year institutions. In addition, the Jamaican community colleges offer programs and services such as university transfers, developmental education, and community and economic development, just as the American ones do.

Based on these similarities, scholars, policymakers, and administrators in both countries seems to concur regarding the challenges and benefits of a community college education. For example, in relation to the transfer function, some scholars in the American system suggest that the community college transfer function is a deterrent to the academic success of students (Brint & Karabel, 1989; Dougherty, 1994; McGrath & Spear, 1991; Pascarella & Terenzini, 2005). Others suggest that the transfer function is beneficial (Cohen, 1996; Cohen & Brawer, 2003; Eaton, 1994; Townsend, 2007; Zinger & Hansen, 2006). Jamaican scholars, administrators, and policymakers hold similar views, some in support of and others against the Jamaican community college transfer function (Grant-Woodham, 2007; Hall, 2005; Miller, 2005; Walsh, 2005).

Concerned about the academic performance of community college transfer students, as compared to students who begin their baccalaureate degree studies at a four-year institution (native university students), American researchers have conducted numerous studies on this issue. Findings from these studies generally suggest that native university students outperform community college transfer students academically (Best & Gehring, 1993; Keeley & House, 1993; Pascarella & Terenzini, 2005). However, some researchers found no difference in academic performance between the two groups, and some even found that the community college transfer students outperform the native university students

(Johnson, 2005; Quanty, Dixon, & Ridley, 1999). While the extent to which findings from these studies are applicable to the Jamaican situation is unknown, they provide a useful point of reference to gauge possible research on Jamaican community college transfer students' academic performance in the upper division of the four-year institution.

Community College – University Collaboration

Despite the recommendation for greater collaboration between Jamaican community colleges and public universities, the universities are making little effort to change the existing arrangement (Stennett, 2005). A possible explanation for this attitude is the belief that associate degrees do not cover adequately the first two years of baccalaureate studies (Grant-Woodham, 2007). In Jamaica, an associate degree program serves two major purposes: terminal qualifications for students wishing to join the labor force directly and university access for students wishing to continue to a baccalaureate degree (University Council of Jamaica, 2003). Based on these purposes, associate degree programs emphasize both general education and specialized courses, with specialized courses accounting for approximately two-thirds of the curriculum.

While being reluctant to offer upper division enrollment to associate degree graduates, the Jamaican public universities do offer an alternative transfer program for students wishing to do the first two years of their baccalaureate studies in community colleges. Institutions refer to these programs as “franchising agreements” (Grant-Woodham, 2007, p. 137). According to Grant-Woodham, under a franchising arrangement, a university (called the host institution) develops a program and authorizes the community college (called

the receiving institution) to offer this program. The community college is responsible for providing instruction and student services but must adhere to the university's prescribed curriculum and quality assurance framework. Based on this arrangement, a student successfully completing the first two years of the franchised program at the community college automatically transfers into the upper division of a similar baccalaureate program offered at the university.

The universities design these programs based on curriculums they offer on their home campuses. Consequently, Jamaican community college transfer students enrolled under a franchising arrangement have dual enrollment at both the community college and the particular public university offering the franchise. From the point of initial enrollment, the community college students are required to follow a specific course of study and to continue with that same course of study when they transfer to the four-year institution. Both the students enrolled in the franchised program at the community college and the native students enrolled in a parallel program at the university pursue a similar curriculum, do similar coursework, and sit for similar course examinations.

The franchising arrangement between Jamaican community colleges and four-year public institutions has similarities to several community college-university transfer partnerships in the United States. These include dual admission partnerships and state-mandated articulation arrangements. In the case of dual admission partnerships between American community colleges and universities, the literature suggests that these partnership arrangements often increase retention and graduation rates, decrease transfer shock, create a

seamless arrangement for the transfer of credits, and enhance collaborations (Bastedo, 2005; DiMaria, 1998).

Several state-mandated transfer and articulation arrangements in the American system involve institution-to-institution arrangements (Anderson, Sun, & Alfonso, 2006). The Jamaican Community college- university franchising arrangement is similar to several of these institution-to-institution arrangements. Based on these similarities, findings relating to the performance of American community college transfer students could have possible implications for research on the academic performance of Jamaican community college students enrolled under franchising arrangements.

On the other hand, there are also significant differences between the two community college systems. For example, in relation to its transfer function, the Jamaican community college system faces tough challenges from those high schools that prepare students for direct entry into the sophomore year at the Jamaican public universities. This high school-university arrangement is a vestige of the British system of postsecondary education. Under this system, outstanding high school students are able to spend two additional years in high school where, if successful in the examinations offered at that level, these students gain placement in the sophomore year of the public universities. The Jamaican public considers these two additional years (called sixth form or grade 13), as the gold standard for students wishing to gain placement at the local public universities (Roberts & Brissett, 2003).

In addition, the transfer function in Jamaican community colleges, like that in Latin America, differs from that in American community colleges in relation to the curriculums offered (De Moura Castro & Garcia, 2003). According to De Moura Castro and Garcia,

instead of concentrating on general education courses, most associate degree programs offered in Latin America and the Caribbean concentrate predominantly on specialized career-oriented courses, with only a small portion devoted to general education courses. To this extent, transfer arrangements between Jamaican community colleges and its public universities are problematic. Consequently, studies conducted to compare the performance of Jamaican community college transfer students enrolled under franchising arrangements with the public universities and native university students could conceivably address some of the negative perceptions some Jamaican policymakers and educational administrators have on the quality of academic studies at Jamaican community colleges. In turn, this could have some positive effect in addressing some of the existing articulation barriers between the Jamaican community colleges and the public universities.

Transition Effect

According to Pascarella and Terenzini (2005), there is evidence to suggest that students who begin their studies at community colleges do not perform as well academically as those who begin studies at the four-year institution. Several studies on the academic performance of community college transfer students support this observation. In particular, some studies report that community college transfer students exhibit lower retention rates, poorer academic performance in university upper division courses, and lower graduation rates than students who begin their programs at the four-year institutions (Carlan & Byxbe, 2000; Christie & Hutcheson, 2003; Whitaker & Pascarella, 1994).

In addition, studies have shown that community college transfer students who graduate from four-year institutions take a longer time to complete the baccalaureate degree than those who start at the four-year institution (Cuccaro-Alamin, 1997; Dougherty, 1994; Glass & Bunn, 1998; Pascarella & Terenzini, 2005). These findings have led critics of the American community college transfer function to argue that attending a community college substantially reduces the chances of a student attaining the baccalaureate degree (Brint & Karabel, 1989; Dougherty, 1994; Pascarella & Terenzini, 2005; Whitaker & Pascarella, 1994). Currently, there is no evidence to suggest that these findings are applicable to the Jamaican postsecondary education system.

Another set of studies compares the academic performance of transfer students before and after transfer. A majority of these studies report that students who begin their studies in community colleges experience a dip in first and possibly second semester grade point average (GPA) upon transfer to the four-year institution (Carlan & Byxbe, 2000; Cejda, Kaylor & Rewey, 1998; Glass & Harrington, 2002; Hills, 1965; Jones, 1994; Kelley & House, 1993; Laanan, 2001; Whitfield, 2005). These studies generally report mean semester GPA declines of between .3 and .5. Researchers call this phenomenon *transfer shock* (Hills, 1965) and conclude that it is at this point that many transfer students leave the four-year institution due to presumed failure.

While transfer shock is a popular finding for many studies on community college transfer students, a few studies report that some transfer students experience a significant increase in GPA on entering the four-year institution (Boswell, 1992; Cejda, 1997). Researchers use the term *transfer ecstasy* to describe this phenomenon (Fredrickson, 1998;

Nickens, 1972). Both transfer shock and ecstasy are transition effects that researchers have used frequently to account for the academic performance of community college transfer students in the four-year institution.

Academic Performance

Academic performance, as measured by cumulative GPA, time to degree, and baccalaureate degree attainment, has long been one of the important evaluation standards for assessing the achievement of community college transfer students in four-year institutions (Carlan & Byxbe; 2000; Christie & Hutcheson, 2003; Egemba, 1997; Johnson, 2005; Koker & Hendel, 2003; Mourmouris, 1997; Quany, Dixon, & Ridley, 1999; Schmidtke & Eimers, 2004). In the case of cumulative GPA, its predictive validity in relation to persistence, baccalaureate degree attainment, and career development enhances its use as a proxy for academic performance (Cohen-Schotanus et al., 2006; Pascarella & Terenzini, 2005). Similarly, baccalaureate degree attainment and time to degree are popular measures of academic success (Astin, 1993; Cohen & Brawer, 2003).

The academic performance of transfer students, as compared to native university students, is particularly important since it may provide information on the efficient use of resources for baccalaureate studies. For example, a major concern is that if a transfer student takes a much longer time to graduate than a native student does, the total cost to the taxpayer of a student attaining a baccalaureate degree could be greater for the student who begins academic studies in the community college (Cuccaro-Alamin, 1997; Poch & Wolverton, 2006). Since Jamaica has limited resources for postsecondary education, policymakers and

educational administrators are likely to be interested in finding the most efficient and effective pathways for students to attain the baccalaureate degree. Currently, there is no empirical research available on Jamaican community college transfer students to inform policy or practice.

Conceptual Framework

This study was designed within the context of the academic performance of Jamaican community college transfer students and native university enrolled in the upper division of one of Jamaica's two public universities. The study used GPA, time to degree, and baccalaureate degree attainment as proxies for academic performance. A review of the literature on persistence did not provide any single theoretical or conceptual framework specifically designed for studies involving the academic performance of community college transfer students. However, combinations of these theories provided guidelines that facilitated the development of the conceptual framework for this study.

Existing persistence theories, to varying degrees, emphasize the importance of student background characteristics, academic preparation, institutional characteristics, and environmental factors as significant in a student's decision to persist to baccalaureate degree attainment (Bean & Metzner, 1985; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2007; Pascarella & Terenzini, 2005; Tinto, 1987, 1993). Based on a review of the literature, this researcher identified two popular persistence theories as appropriate for developing the study's conceptual framework. These are Tinto's (1993) theory of student departure (Tinto's theory), which emphasizes a student's social and academic integration into an institution, and

Bean and Metzner's (1985) conceptual model of nontraditional undergraduate student attrition.

Tinto's (1993) theory posits that a student's levels of academic and social integration within an institution have a direct impact on that student's academic performance. According to Tinto, academic integration represents a student's satisfactory compliance with the academic norms and values of the institution. Simultaneously, social integration represents the extent to which the student finds the institution's social environment amicable to his or her preferences. Elaborating on his theory, Tinto suggests that academic and social integration are complementary. According to Tinto, both define the extent of the student's congruence with the institution and influence the student's desire to persist or depart.

The concepts of social and academic integration, which characterize the student-institution fit, provide a general framework for understanding the transition effect on community college transfer students entering the four-year institution and on their subsequent academic performance in the senior institution. Central to this conceptualization is the notion that transfer students bring with them a set of characteristics and experiences that interact with the institution (Cameron, 2005). This student-institution interaction produces a transition effect that could lead to either congruence and successful integration or incongruence and eventual departure (Braxton, 2000; Tinto, 1993).

Bean and Metzner's (1985) conceptual model, developed for nontraditional students, asserts that social integration does not play as important a role as academic integration in the attrition of nontraditional students. According to Bean and Metzner, a nontraditional student's decision to depart the institution is based primarily on academic performance,

intent to leave, the student's background, and environmental factors. The model further asserts that the interaction of these variables plays an important role in determining the student's departure decision.

This study parallels previous studies that used student background characteristics and institutional type as independent variables to determine their effect on students' academic performance (Carlan & Byxbe, 2000; Cejda, 1997; Glass & Harrington, 2002; Graham & Hughes, 1994; Johnson, 2005; Koker & Hendel, 2003; Whitfield, 2005). According to Glass and Bunn (1998), a transfer student's academic success at the four-year institution involves the interaction of individual and institutional variables mediated by environmental factors. Similarly, Ishitani (2006) suggests that persistence models often emphasize the interaction between student and institutional characteristics. Ishitani argues that such an interaction has a significant effect on a student's academic performance.

Figure 1 depicts the study's conceptual framework. It conceptualizes a student's academic performance as being dependent primarily on two defining variables, institutional type and student background characteristics. Further, it conceptualizes that when a student enters the upper division of the four-year institution, that student experiences a transition effect whose magnitude is dependent primarily on the student-institution interaction.

Based on previous research (Braxton, 2000; Cameron, 2005; Pascarella & Terenzini, 2005; Tinto, 1993; Townsend & Wilson, 2006, 2009), academic and social integration appear to be important components of this transition effect. According to Tinto, a student's ability to separate from past activities and influences determines the extent to which he or she integrates academically and socially into a new environment. Tinto further suggests that this

is a process involving the student continuously moving between three stages, separation, transition, and integration.

The framework theorizes that a good student-institution fit is likely to lead to successful integration, resulting in the student persisting to baccalaureate degree attainment (Braxton, 2000; Cameron, 2005; Tinto, 1993). Alternatively, if the student-institution fit is poor, integration is likely to be unsuccessful, resulting in the student departing from the institution without completing the baccalaureate degree (Tinto, 1993).

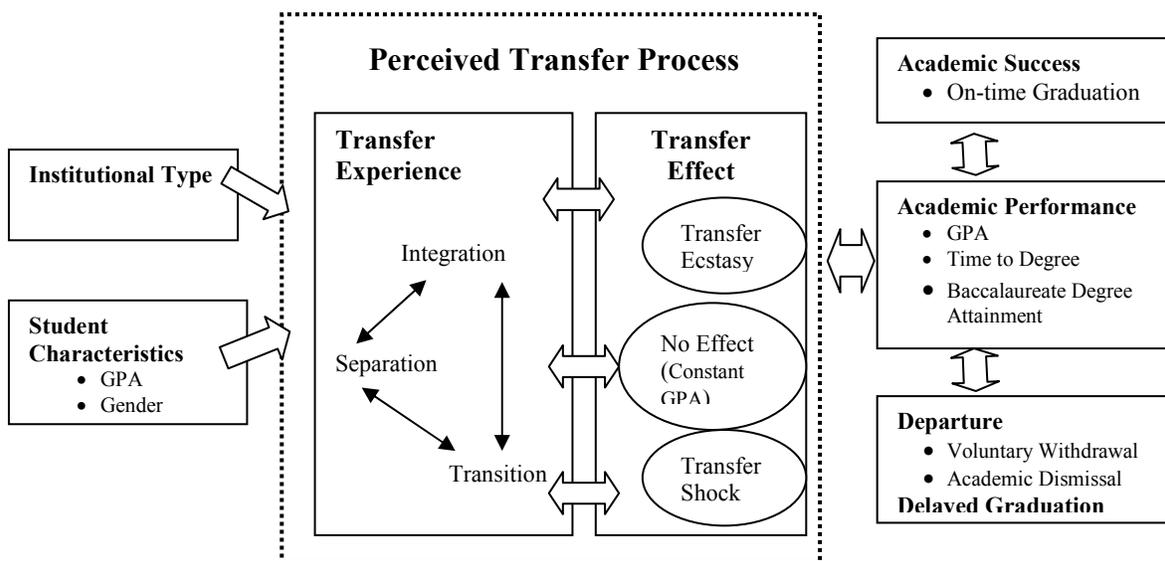


Figure 1. Conceptual model depicting the relationship between student characteristics, institutional type, and students' academic performance, mediated by the students' perceived transfer process.

The conceptual framework is both longitudinal and dynamic, with many of the perceived processes providing opportunities for continuous feedback. For example, transfer

students are likely to take a longer time to integrate successfully into the four-year institution's upper division than native students would. A likely result is that these transfer students would experience an initial transfer effect not experienced by native students. This transfer effect is likely to be reflected in a significant dip in the transfer student's GPA in the first and/or second semesters after transfer. At this stage, the student may become discouraged and depart the institution.

However, if the transfer student who experiences an initial transfer shock persists beyond the first year, such a student is likely to become integrated into the institution. In this situation, the result is likely to be an improvement in GPA as the student progresses toward baccalaureate degree attainment. Further, because of this initial negative transfer effect and other factors, it is possible that this transfer student's time to degree would be longer than that of the native student.

On the other hand, if the transfer student does not experience transfer shock, it is possible that such a student is likely to have an easier transition into the four-year institution. It is also possible that when other transfer student characteristics are held constant, the student who does not experience transfer shock is likely to perform academically just as well or better than native students do. In addition, this transfer student is likely to have a shorter time to degree than transfer students who experienced transfer shock.

Variable Selection

Based on the limited data available for this study, student characteristics included only gender, semester GPA, and cumulative GPA while institutional type was used as a

proxy for institutional characteristics. The variable, transition type, was used to define students who experienced transfer shock or who did not experience transfer shock. The study also used GPA, baccalaureate degree attainment, and time to degree as proxies for the dependent variable, academic performance.

Student characteristics. Applying Tinto's (1993) theory and Bean and Metzner's (1985) conceptual model, this study sought to determine the effect of student background characteristics and institutional type on the academic performance of Jamaican community college transfer students, as compared to native university students. Student background characteristics have been widely recognized as significant variables in persistence theories (Bean & Metzner, 1985; Pascarella & Terenzini, 2005; Tinto, 1987, 1993). Student background characteristics include such variables as age, gender, ethnicity, socio-economic background, lower division GPA, and high school GPA.

Institutional characteristics. Institutional characteristics include variables such as institutional size, selectivity, sources of revenue, patterns of expenditure, characteristics of faculty, types of certification awarded, and residential status (Calcagno, Bailey, Jenkins, Kienzl, & Leinbach, 2008; Titus, 2006). Based on findings from previous studies, researchers have identified institutional characteristics as being significant contributors to a student's academic performance (Kuh et al.; 2007; Pascarella & Terenzini, 2005).

While it is generally accepted that institutions having the same Carnegie classification may have different characteristics, as a group, institutions having a particular classification are more similar in characteristics than institutions with other classifications (Christie & Hutcheson, 2003). Consequently, Christie and Hutcheson argue that researchers studying

community colleges and public four-year institutions can use institutional type as a proxy for institutional characteristics. Using institutional type as an independent variable, researchers have reported significant differences in upper division academic performance between students who begin baccalaureate studies at community colleges and those who begin at the four-year institution (Best & Gehring, 1993; Boswell, 1992; Christie & Hutcheson, 2003; Cuccaro-Alamin, 1997; Glass & Bunn, 1998; Ishitani, 2006; Kuh et al., 2007; Pascarella & Terenzini, 2005; Townsend & Wilson, 2006).

Transition type. A concern among researchers is the difference in academic performance between community college transfer students and native university students at the point of entry into the upper division of the four-year institution. Many studies have reported that transfer students experience a decline in mean semester GPA at this point. Based on Tinto's (1993) theory, transfer students are likely to have difficulty adjusting socially and academically at the four-year institution. This may result in the transfer student experiencing an initial decline in academic performance, that is, the student experiencing transfer shock. Simultaneously, other studies have reported findings indicating the transfer students experiencing an increase in mean semester GPA on entering the four-year institution, that is, the student experiencing transfer ecstasy. Consequently, this study's conceptual framework visualizes students as experiencing a transition effect on entering the upper division of the four-year institution. This transition effect is an intervening variable conceptualized as having a significant effect on a transfer student's subsequent academic success in the four-year institution.

Academic performance. A transfer student's ability to integrate into the upper division of the four-year institution will have a direct and significant effect on that student's subsequent academic performance (Pascarella & Terenzini, 2005). According to Townsend and Wilson (2006), academic performance, as measured by GPA, time to degree, and baccalaureate degree attainment, has been a popular proxy for measuring academic and social integration. In the case of community college students, researchers often analyze the extent of their integration into the four-year institution by comparing their GPA in upper division coursework, their retention rates, and their graduation rates with those of native university students.

Researchers have also shown an interest in the academic performance of transfer students during the semesters immediately before and immediately after transfer to the four-year institution. A significant change in GPA provides evidence of a transition effect. For example, a significant dip in GPA provides evidence for transfer shock while a significant increase provides evidence for transfer ecstasy.

Purpose of the Study

The purpose of this study was to compare the academic performance of transfer students who began their baccalaureate studies at Jamaican community colleges under franchising agreements between the community colleges and the public universities with the academic performance of students who began their baccalaureate studies at the public universities.

Research Questions

1. Is there a significant difference between Jamaican community college transfer students' mean semester GPA at the end of the semesters immediately before and immediately after transfer to the upper division of a Jamaican public university?
2. Is there a significant difference between Jamaican community college transfer students and native university students with respect to their mean semester GPA at the end of the first semester of the junior year?
3. Are there significant differences between Jamaican community college transfer students who experienced transfer shock, Jamaican community college transfer students who did not experience transfer shock, and Jamaican native university students with respect to their mean upper division cumulative GPA at the end of the senior year?
4. For Jamaican students who complete the baccalaureate degree within six years of beginning baccalaureate degree studies, are there significant differences between community college transfer students who experienced transfer shock, community college transfer students who did not experience transfer shock, and native university students with respect to their mean time to degree?
5. What is the effect of student characteristics and institutional type on the likelihood that a Jamaican student will complete the baccalaureate degree within six years of beginning baccalaureate degree studies?

Significance of the Study

Policy and Practice

This study has significance for both policy and practice. At the national and institutional levels, Jamaican policymakers are concerned about access, quality, relevance, and cost of postsecondary education. For example, the Ministry of Education Strategic Plan for Postsecondary Education Framework identifies the major weaknesses in Jamaican postsecondary education as access, inadequate funding, duplication of programs, and quality of instruction (Ministry of Education, 2006). The plan notes that researchers are conducting little or no research to inform and guide the planning process. Findings from this study could therefore facilitate the decision-making process at both the governmental and institutional levels.

In addition, some scholars, policymakers, and educational administrators have opposing views on the performance of Jamaican students who begin their baccalaureate studies at community colleges as compared to those who begin at the public universities. Consequently, findings from this study could provide empirical evidence to inform these views. According to Helm and Cohen (2001), in moving forward, institutions can learn much from the outcome of research studies on students' performance at the postsecondary level.

If findings from the study suggest that there is no significant difference between the academic performance of Jamaican community college transfer students and native university students, this would partially address the issue of attendance at a community college being a deterrent to students' baccalaureate degree attainment. This could conceivably increase the pressure on the public universities to revise their criteria for the

articulation of community college transfer programs into their baccalaureate degree programs. Such a revision could provide a more favorable climate for community college transfer students to enter the universities' upper divisions.

On the other hand, the findings would still be useful if they suggest that Jamaican native university students outperform transfer students academically. In this situation, postsecondary education stakeholders would need to collaborate even more intensively to improve the performance of transfer students. At stake is the need for Jamaica to use its limited resources to increase access and success for its student population at all levels of the postsecondary system.

This study also has significance at the international level. Community colleges are increasingly gaining popularity in many countries outside the United States. A major drawback is that community colleges in these countries often have to depend on American studies to make major decisions relating to issues such as programs and services, faculty recruitment, and student learning outcomes. The extent to which issues relating to American institutions are relevant to institutions in other countries is unknown. Consequently, a study on the academic performance of Jamaican community college transfer students and native university students in a setting comparable to the postsecondary system in many of these countries could provide useful information to these institutions for both policymaking and practice.

Research

A significant feature of this study is the fact that there is no published study comparing the academic performance of Jamaican community college transfer students and native university students. While American studies might suggest expectations for the performance of Jamaican community college transfer students and native university students, there is no evidence as to their applicability to Jamaican postsecondary institutions. Consequently, findings from this study could be relevant to researchers, both in Jamaica and internationally.

In addition, instead of concentrating on general education courses in the first two years of the program, students enrolled in this type of arrangement are required to enroll in several courses related to their majors. In this respect, this program has similarities to postsecondary systems that offer Applied Associate of Arts (A.A.A.) and Applied Associate of Science (A.A.S.) degrees. For example, most transfer and articulation arrangements between community colleges and four-year institutions in the United States emphasize transfer of students having the Associate of Arts (A.A.) or Associate of Science (A.S.) degrees (Townsend & Ignash, 2000). In general, most states regard applied associate degrees as terminal degrees. Very few published studies on transfer and articulation have been conducted using the applied associate degrees. To the extent that programs under the franchising arrangements replicate many of the features of an applied associate degree, findings from this study could be useful for postsecondary systems offering these degrees.

There are also features of the study's data analysis that are not widely reported in the literature. Most studies on transfer shock tend to categorize transfer students as a single entity

and report findings in relation to the group. Few studies report findings relating to transfer students who experienced transfer shock and those who did not experience the phenomenon. To the extent that this study tracks these groups separately and compares their academic performance in upper division work, findings could add to the literature.

Limitations and Delimitations

This study has several limitations and delimitations. First, it is a single institution study where the analytic sample is selected from university juniors in a single faculty (college). While this may be useful in relation to homogeneity of the sample, it limits the applicability of the findings in relation to its generalizability across other faculties or institutions. In addition, the sample consists of students taken from a single cohort of community college transfer and native university students. The extent to which the academic performance of students from other cohorts may be different is unknown.

Second, the study also uses stratified random sampling to ensure equal representation of community college transfer students and native university students. However, transfer students and native university students do not appear in equal proportion in the target population. To the extent that the two groups of students might exhibit different characteristics, the sample might not be a true representation of the target population. This could lead to some bias in the findings.

Third, the study is non-experimental. Consequently, variables used in the model were restricted only to those available from the dataset. Limitations on the variables used have

consequences in relation to the significance of the model selected and in the interpretation of the results.

Definition of Terms

Collaborative arrangement: a partnership or other type of agreement between two or more individuals or organizations.

Community college transfer student (transfer student): a student who first enrolls at a community college for baccalaureate degree credits and then transfers to a four-year institution to complete his or her baccalaureate degree studies.

Developed countries: areas of the world that are advanced technologically, highly urbanized, wealthy, and have generally evolved through both economic and demographic transitions.

Developing countries: countries that generally have low levels of industrialization, personal income, educational attainment, and health standards.

Faculty: similar to a college in US universities, a faculty in the British postsecondary system refers to a group of departments (or schools) within the university.

Grade point average (GPA): is computed on a 4.0 scale as follows: Multiply the numerical grade obtained for each course completed by the number of credits assigned to that course. These numbers are then added and their total divided by the total number of credits for all courses completed.

Lower Division: typically refers to the first two years of baccalaureate degree studies. In a university, it refers to the freshman and sophomore years, while in a community college it refers to credit courses equivalent to university freshman and sophomore courses.

Ministry of Education, Jamaica: that arm of the Jamaican government that has overall responsibility for primary, secondary, and postsecondary (tertiary) education.

Native university student (native student): a student who begins baccalaureate studies at a four-year institution without previously earning baccalaureate credits at a community college or similar institution.

Pre-requisites: specified attributes that students are required to have in order to gain enrollment in specific courses/programs. These attributes may include specific student characteristics, specified academic performance in certain courses, or a specified number of credit hours.

Transfer ecstasy: the increase in GPA experienced by transfer students during their first and/or second semester at the four-year institution.

Transfer shock: the decline in GPA experienced by transfer students during their first and/or second semester at the four-year institution.

University examination: a university-authorized criterion-referenced test that students sit for at the end of a specified period of study, usually at the end of a semester.

University franchised program/course: a specific program/course that a university develops and authorizes other institutions to offer to students on its behalf. Most franchised programs involve arrangements for community colleges and similar institutions to offer the

first two years of baccalaureate degree studies. However, franchising entire baccalaureate degree programs is becoming increasingly popular.

Upper division: the traditional last two years (junior and senior) of a baccalaureate degree program.

Chapter Summary

Globalization and the movement toward a knowledge-based economy have increased the need for greater access to postsecondary education in Jamaica. However, lack of financial resources remains a major impediment to increasing access. Community colleges, with their lower costs and open access, provide the best opportunity for this expansion. Nevertheless, the perception that community colleges offer a lower quality education than the island's public universities is a major deterrent to students beginning their baccalaureate programs at these institutions. However, there is no published study to guide deliberations on this issue.

The purpose of this study, therefore, was to compare the academic performance of transfer students who began their baccalaureate studies at Jamaican community colleges under franchising agreements between the community colleges and the public universities with the academic performance of students who began their baccalaureate studies at the public universities. Findings are likely to have significance for policymaking, practice, and future research.

The next chapter provides a review of related literature. First, it provides a synopsis of the Jamaican education system, focusing primarily on community colleges. Second, it provides a comparison of the community college transfer function in the United States, Latin

America, and Jamaica. Third, it provides a short summary of the perceived relationship between academic performance and academic and social integration. Fourth, it provides a review of previous studies done on the academic performance of community college transfer students and native university at different stages as both groups progress toward baccalaureate degree attainment. The chapter concludes with a synopsis of the literature comparing the academic performance of transfer and native students in countries other than the United States.

CHAPTER TWO

Review of Related Literature

The Jamaican Economy

Jamaica is the third largest island in the Caribbean, and the most populous of the English speaking islands. It has a population of about 2.7 million with 91% Black and another 6% of mixed origin. The island has a per capita income of around US\$4700 and an unemployment rate of 11 % (Central Intelligence Agency, n.d.; World Bank, 2009). The economy is heavily reliant on tourism and bauxite mining. In addition, Jamaican migrants, particularly to North America and Europe, contribute significantly to the Jamaican economy through regular monetary remittances. The high migration of skilled labor, coupled with the low productivity in local industries, has increased the importance of these monetary remittances to the island's economy.

Jamaica's education system has three components, primary, secondary, and postsecondary. Primary schools cater to children less than 12 years old and enroll approximately 90% of this cohort. Secondary schools cater to students aged 12-17 years and enroll approximately 77 % of this cohort (UNESCO, 2005). Postsecondary institutions enroll about 20 % of the 18-24 year old cohort (Miller, 2005). Postsecondary institutions include community colleges, teachers' colleges, vocational training centers, nursing colleges, universities, and other four-year colleges.

Despite these aggregate figures, the island faces severe challenges in relation to postsecondary education and workforce training. Twenty percent of the high school students leave school by grade nine and only about 7% of professionals have university degrees. In

addition, 75 % of the workforce has no formal training, 65 % of persons younger than 34 years have no academic qualification, and 35 % of adults over 18 years possess, at most, basic literacy skills (HEART Trust/National Training Agency, 2005). Overall, Jamaica's adult literacy rate is 86 % (United Nations Development Program, 2009).

The Jamaican Secondary Education System

Jamaica's secondary school system caters to students aged 12 to 17 years and enrolls approximately 77% of that age cohort. There are five grade levels ranging from grade seven (first form) to grade eleven (fifth form). At the end of grade eleven, students are required to sit for a number of subject-specific criterion-referenced standardized tests (called examinations), which are administered by a Caribbean regional body called the Caribbean Examination Council (CXC). The CXC offers examinations in 33 different subjects (courses) including mathematics, English language, chemistry, biology, accounting, physics, geography, and Caribbean history. The full name of the examination is Caribbean Secondary Examination Certificate (CSEC). This examination certifies Caribbean students for entry into postsecondary education or the labor market.

In addition to the criterion-referenced tests, CSEC assesses students in each subject through School Based Assessments (SBA). This internal assessment enables the teacher to provide opportunities for students to acquire skills and attitudes through activities done during the course of study. The final CSEC grade is a combination of the criterion-referenced test and the SBA score (Caribbean Examination Council, n.d.). Students can obtain grades ranging from Grade one (excellent) to Grade six (unable to assess). In order to qualify for

entry into most postsecondary academic programs (i.e. associate degrees, teacher training, and registered nursing), students are required to obtain Grades one, two, or three in each of five subjects, including English language and mathematics. Some specialized postsecondary programs may request specific prerequisites. For example, students pursuing an associate of science may be required to have achieved CSEC grade one or grade two in English language, mathematics, and at least two of the science subjects (i.e. physics, chemistry, and biology).

Students wishing to pursue baccalaureate studies may choose to do an additional two years in high school to improve their chances of gaining entry to the public universities, particularly the universities' professional schools. These two additional years are similar to grades 12 and 13 and are known in the Jamaican system as sixth form. These additional two years of high school have been the traditional pathway, adopted from the British postsecondary system, to gain entry to the public universities. It continues to be the most popular and prestigious pathway to access Jamaica's public universities.

At the end of the two years in sixth form, students sit for the Caribbean Advanced Proficiency Examinations (CAPE), administered by the CXC. The examination method is similar to the one students sit for at the end of grade 11. The public universities consider the sixth form curriculum to be equivalent to that of the community college associate degree (Roberts & Brissett, 2003). Consequently, students who enroll in Jamaican community college associate degree programs or who enroll in the island's sixth form program normally gain the equivalent of 30 academic credits on entry to the public universities. This normally results in the students being exempt from the universities' first year. Moreover, according to Roberts and Brissett, once successful in the CAPE examinations, students using the sixth

form route normally get preferential entry in the public universities. Roberts and Brissett suggest that the CAPE examination is the gold standard for students wishing to gain entry in Jamaica's public universities.

In order to expand postsecondary opportunities to students pursuing the sixth form route, in 2005 the Caribbean Examination Council began to award CAPE associate degrees. To qualify for these awards, students sitting for CAPE examinations must be successful in a prescribed combination of subjects (Jamaica Information Service, 2005). According to the Jamaica Information Service (JIS), the Caribbean Examination Council developed these associate degrees for individuals who require certification for entry into local and overseas universities and other tertiary institutions. In addition, the CAPE associate degree is intended for persons seeking upward mobility in their careers, wishing to pursue studies aimed at developing specific skills, or who desire flexible and cost effective means of furthering their education. The JIS noted that the introduction of the CAPE associate degree will provide more options for students to meet entry requirements for academic studies and professional certification within the region as well as overseas. The JIS further noted that the CAPE associate degree programs are exciting innovations and fit readily in the framework of relevance, responsiveness and quality.

The Jamaican Postsecondary Education System

Postsecondary education is the third stage of education that builds on secondary education and caters to the intellectual, social, and occupational needs of learners (Roberts, 2002). The postsecondary system primarily focuses on the age cohort 18-24 years (Ministry

of Education, 2006). Roberts suggests that the postsecondary education system in Jamaica is a loosely coupled network of diverse institutions that vary in size, type, and mission. They include the main campus of a large regional public university that is funded by all the countries in the English-speaking Caribbean, one local public university, three local private universities, eight community colleges, ten teacher-training colleges, five theological colleges, five nursing colleges, and just under 50 foreign providers (Hamilton & Severin, 2005). According to Hamilton and Severin, many of the overseas providers are off-shore branches of well-established, prestigious universities in North America and Europe but a few are of “dubious pedigrees” (p. 38).

In relation to structure, a number of different functional units in the Jamaican postsecondary education system have coordinating, planning, and information roles. These include the postsecondary unit of the Ministry of Education, the University Council of Jamaica (UCJ), the Council of Community Colleges of Jamaica (CCCCJ), Joint Board of Teacher Education (JBTE), and the Nursing Council. In addition, individual institutions have clearly defined missions and often operate independently.

History

After emancipation in 1865, the need arose to train schoolteachers and local clergy (Evans & Burke, 2007). Consequently, teacher training colleges and seminaries were the first postsecondary institutions to be set up in Jamaica. The British Government facilitated the establishment of the teacher training colleges through a Negro education grant to assist missionary societies in the education of newly freed slaves (Chevannes, 2003).

The second expansion phase began in 1948 with the establishment of a Caribbean regional university college headquartered in Jamaica. This institution, the University College of the West Indies (UCWI), started as a college of the University of London. Its curriculum, adopted from the British, targeted a narrow neo-colonial elite class (Chevannes, 2003; Roberts, 2002). Prior to the establishment of the UCWI, university education was externally focused, with expatriates sending their children to study in their homelands. A few privileged locals were able to access studies overseas or through correspondence courses (Roberts, 2002).

The third phase started in the 1960s when Jamaica and several other Caribbean countries gained independence from Britain. During this phase, the need became urgent for Jamaica to develop postsecondary institutions to address national needs (Roberts, 2002). This need resulted in the UCWI gaining its charter in 1962 to become the University of the West Indies (UWI). However, the UWI continued to have a regional, rather than a national focus.

In addressing the needs of its local population during this third phase, the Jamaican government chartered several professional schools, community colleges, and multi-purpose postsecondary institutes. One such institution, the Jamaica Institute of Technology received its charter in 1958. After a year, it was renamed the College of Arts, Science, and Technology (C.A.S.T). This institution grew to become Jamaica's premier wholly owned public postsecondary institution. In 1995, it became the University of Technology (UTECH). With a current population of approximately 10,000 students, it is the second largest university in Jamaica.

However, the rapid introduction of UTECH and the other postsecondary institutions created serious structural challenges for the postsecondary education sector (Evans and Burke, 2007). There was no coherence between the different units of the system (Hall, 2005) and the system lacked internal efficiency (Ministry of Education, 2006). According to Hall, despite improvements during the decade of the 1990s, the postsecondary education system continues to lack a clear mandate. Further, the Ministry suggests that the system can only achieve its full potential when it is able to allow for the seamless transfer of students between its different levels.

Enrollment

Currently there are about 40,000 students enrolled in postsecondary education in Jamaica, with 53% at the public universities, 25% at community colleges, 17% at teachers' colleges, and the rest dispersed among the other institutions making up the system. This overall enrollment represents approximately 20% of the age cohort 18-24 years, a 100% increase over the enrollment of a decade ago. With 245,000 students enrolled at the secondary level, Miller (2005) describes postsecondary education in Jamaica as standing on a "pinhead on top of a broad base" (p.81). The universities, in particular, have been able to restrict enrollment by setting extremely high academic and non-academic matriculation requirements. Miller attributes the under-development of this sector to a deliberate colonial policy of restricting the emergence and growth of postsecondary education. This policy, Miller suggests, served to maximize the availability of laborers in the plantation economy and to justify importing colonial leadership from Britain.

Policy Issues

The Ministry of Education Strategic Plan (Ministry of Education, 2006) indicates that the postsecondary sector needs to have a paradigm shift to accommodate the increased number of individuals wishing to access postsecondary education. The plan notes that the current number of individuals leaving the postsecondary system with baccalaureate degrees continues to be below the critical number needed to trigger and sustain economic development. It suggests that postsecondary institutions collaborate closely to facilitate a seamless transition of students from one level to the next.

However, the absence of a coherent framework poses significant challenges for the different units to collaborate (Hall, 2005). Hall suggests that in such a system, institutional needs are likely to take precedence over national policy. According to the University of the West Indies (UWI) Research and Policy Group (2005), “without a clearly defined policy, it becomes difficult to provide guidance and planning in addressing questions of educational attainment, access, and quality” (p. 378). In addition, the group notes that the absence of a clearly defined policy has implications in relation to the postsecondary sector meeting enrollment targets and affordability, as well as institutional and program adequacy.

Human Resource Issues

The limited opportunities for students to pursue baccalaureate degrees are driving many students to enroll in expensive offshore programs (Ministry of Education, 2006). The Ministry of Education suggests that this movement of students to overseas institutions drains the island of much needed human and financial resources. The drain in human resources

from developing countries, often referred to as “brain drain,” (Carrington & Detragiache, 1999, p.1) has been a contentious issue in dialogue between developed and developing countries. This brain drain involves highly educated workers, as well as outstanding scholars, migrating from developing countries to developed countries in North America and Western Europe. According to Carrington and Detragiache, an important implication of brain drain is that a developing country may not achieve faster economic growth through increased investment in education.

The Carrington and Detragiache (1999) study of migrants to the United States reports that 42% of Jamaican migrants have postsecondary education. In addition, World Bank figures show that Jamaica has the highest migration rate to the United States of persons having a postsecondary education (World Bank, 2003). According to the World Bank, 80% of Jamaica’s population having postsecondary training migrates to the United States. That is, out of every five persons trained at the postsecondary level in Jamaica, four migrate to the United States.

On the other hand, supporters of the brain drain phenomenon offer alternative explanations. According to the World Bank (2003), developing countries have low growth potential and offer few incentives for developing human capital. The report suggests that a globalized economy involving the movement of labor across borders increases the incentive for an individual in a developing country to pursue postsecondary education. The report argues that since some persons will not migrate, the incentive to migrate might actually increase the average level of postsecondary education in the country. In addition, the World

Bank notes that many persons who migrate remit substantial funds to their home countries or later return as highly skilled specialists.

Role of the Public Universities

Jamaica has five local universities, three private and two public, with one of the public institutions being the main campus of the only regional university in the Caribbean. As a developing country, Jamaica depends on its universities to produce graduates with the skills and knowledge to ensure the country's competitiveness in the international arena. According to Hall (2005), the public universities must now consider a balance between being autonomous and being responsive to the needs and expectations of Jamaican society.

Miller (2005) suggests several ways public universities can assist in Jamaica's postsecondary education reform agenda. First, they can strengthen and broaden alliances with other postsecondary institutions with the objective of expanding educational opportunities at the baccalaureate level. While doing this, these universities can assist in building sustainable capacity in these institutions.

Second, the expansion of access to baccalaureate degrees will lead to greater demand for postgraduate and research studies. Researchers have estimated the individual rate of return for a baccalaureate degree in Jamaica at 19.4% and graduate education at 28% (James & Williams, 2005). These figures compare favorably with the estimated 12% rate of return for primary and secondary education.

Third, the universities should expand alliances with the private and public sectors to conduct research and service. In addition, they should provide leadership in the application of

information and communication technology, particularly in the delivery of online education. Finally, the universities should lead the postsecondary education sector in Jamaica in marketing postsecondary education to international students and scholars.

Jamaican Community Colleges

History, Purpose, and Role

Jamaica established its first community college in 1974. By 1980, there were four such colleges located in different sections of the island. Their purpose and functions included: providing options for high school drop-outs to achieve their diplomas; preparing young adults to enter certain professions and occupations; preparing students for transfer to four-year institutions; training middle managers; contributing to the social, economic, and cultural development of local communities; and, incorporating academic and vocational training in one institution (Jones & Wattenbarger, 1990; Walsh, 2005).

According to the Ministry of Education (1977), Jamaica established its community colleges as part of a long-term goal for quality education on the island. Based on this original strategic plan for community colleges, the Ministry declared that the government's intention was to establish these institutions to provide alternative educational opportunities for a wide cross-section of the Jamaican public. The Ministry further declared that these new colleges should take into account individual needs and aspirations as well as provide adequate opportunities for lifelong learning. Yet, much of this did not materialize in the first 15 years after the establishment of these institutions. According to Jones and Wattenbarger (1990), during the 1980's there was no real assimilation of these new colleges into the Jamaican

postsecondary system. Jones and Wattenbarger argued that, “the colleges are appendages that have not been permitted to achieve the country’s educational goals” (p.32). Further, the Jamaican community colleges encountered severe difficulties and became neglected (Walsh, 2005).

More recently, Jamaican policymakers, educational administrators, international donors, and significant sections of the Jamaican population are of the view that Jamaican community colleges should be playing a greater role in the Jamaican postsecondary education sector. Many of these stakeholders have expressed the view that the Jamaican community colleges and other such institutions should be offering the first two years of a four-year baccalaureate degree (Hall, 2005). Hall cites quality, access, and finance as critical variables in making this a reality. Roberts (2002) asserts that the Jamaican public universities are not able to provide the full complement of qualified and interested applicants with access to postsecondary education. In addition, Roberts argues that for the community colleges to satisfy the needs of these applicants, the pool of qualified lecturers and administrators would have to increase significantly.

Degree Programs

Since the early 1990s, there has been more attention directed at the Jamaican community college movement. This change seemed to have started in 1991 when these colleges first introduced the associate degree in their curriculums. The associate degree, modeled after its American counterpart, has become very popular with Jamaican students.

According to Middlehurst and Woodfield (2004), the popularity of associate degrees increased significantly in relation to basic vocational and technical training courses.

Notwithstanding its increasing popularity, the introduction of the associate degree in Jamaica has created a number of issues and concerns. The major concern is the inability and, possibly, reluctance, of the Jamaican public universities to provide increased access to this growing group of qualified prospective students who may wish to attain baccalaureate degrees. This has caused an influx of new providers in the Jamaican postsecondary sector (Miller, 2005; Ministry of Education, 2006). Many of these new providers are overseas four-year institutions, mainly from the United States. These institutions have either set up their own private operations in Jamaica or formed linkages with Jamaican community colleges and other such institutions to offer baccalaureate degrees (Hall, 2005).

The curriculums these overseas providers use are similar to the ones they use on their home campuses. In addition, the authority for the award of the degree comes from the governing boards of these overseas providers. Consequently, these overseas providers facilitate migration by providing their Jamaican students with certification equivalent to those offered to students on their home campuses.

Another recent development is the Jamaican community colleges becoming baccalaureate degree-granting institutions. Each community college offers at least one baccalaureate degree program. However, the Council of Community Colleges of Jamaica (CCCJ), the community colleges' governing body, confers the degrees. These baccalaureate degree programs include studies in business administration, management information systems, tourism and hospitality management, and environmental studies (Council of

Community Colleges of Jamaica, 2008; Evans & Burke, 2007). In most cases, the programs are in direct competition to similar programs offered at the public universities. They provide community college associate degree recipients with a route more accessible to the baccalaureate degree than the route offered by the public universities.

In addition, using the university center approach, the Jamaican community colleges collaborate with the island's public universities to offer greater access to baccalaureate degrees. Through special franchising arrangements with the public universities, the community colleges are able to offer all four years of specified baccalaureate degree programs on their campuses. These baccalaureate degree arrangements are similar to those partnership arrangements existing between several Jamaican community colleges and overseas universities (Carrington, 2002; Grant-Woodham, 2007; Roberts, 2002). In the case of the partnerships with the local universities, these franchising arrangements are mainly for baccalaureate degrees in Nursing and in Teacher Education.

Governance

Each community college has its own governing board. A principal, who reports to the governing board, heads each college. However, the Council of Community Colleges of Jamaica (CCCJ) has overall coordinating responsibility for these colleges. Through this role, the CCCJ promotes linkages among the community colleges. This body alone has the legal authority to award community college associate and baccalaureate degrees.

Community colleges have formal and strong linkages with the Jamaican central government through the Ministry of Education. The major source of funding comes from the

Ministry of Education, which funds between 80 - 90% of the economic cost of a full-time student attending a community college. The community colleges also have linkages with local government (local districts) and with the private sector. However, these linkages are usually limited and inconsistent (Walsh, 2005).

Access, Cost, and Quality

According to the UWI Research and Policy Group (2005), there are advantages to students beginning their baccalaureate degrees in the Jamaican community colleges and similar institutions. The Group suggests that the state could assist these institutions by giving them the national recognition they deserve. One possible way that the state could do this would be to allow the community colleges to provide the early years of postsecondary education at a low cost. The Group further suggests that the state should assist the community colleges with the resources needed to continue developing at least 50% of their programs to the associate degree level. In addition, the state should facilitate the development of new community colleges to at least 14. On the other hand, the group states that community colleges must also address the needs of the community by offering a variety of matriculation modes for students with varying academic skills, life skills, or experience.

Roberts and Brissett (2003) suggest that in order for Caribbean countries to address the issue of access to the baccalaureate degree, it is important to identify the pathways students can take and to understand the nature of the barriers hindering access and progress toward the degree. According to Roberts and Brissett,

Conceptually, the challenges of the pathway to tertiary education may range then from a free flowing escalator to those relating to a steeple chase with several hurdles and pitfalls, and even to those challenges associated with the inefficiencies and frustrations of a journey through a maze with several cul-de-sacs and few connecting tunnels (pp. 1-2).

Jamaican public universities are responding, albeit slowly and reluctantly, to the challenges of access by modifying traditional pathways and creating new ones. Articulation arrangements, franchising, and online education are gaining popularity. However, the traditional pathway for high school graduates to gain entry directly into the public universities continues to be two additional years of high school beyond grade 11 (the final grade after 5 years of high school).

Despite providing opportunities for greater access, community colleges face challenges relating to funding and quality. According to Leo-Rhynie (2007), in the interest of greater efficiency in the management and utilization of resources, the relevant authorities should allow each institution to offer only specific programs. Leo-Rhynie suggests that students might elect to begin their program in a less expensive institution and complete it in another. Community colleges, she further suggests, are the ideal institutions for students to begin their postsecondary education.

However, the Inter-American Development Bank (IDB) cautions against using this approach without doing proper assessment (IDB, 2003a). In its report on the Jamaican postsecondary system, the IDB indicates that community colleges constitute the fastest growing segment of the Jamaican postsecondary system. It further suggests that the rapid

growth of community colleges during the nineties has resulted in challenges of quality, relevance, efficiency, flexibility, and effectiveness. The report recommends that, to become economically viable, community colleges must provide education at an affordable cost with maximum sensitivity and responsiveness to both students' and employers' needs.

Collaboration among Postsecondary Institutions

A 2000 Ministry of Education policy document (Ministry of Education, 2000) highlights the government's commitment to engage the Jamaican citizenry in partnership for development through education and training. The document suggests that, at the postsecondary level, the public is likely to place pressure on the system to increase access and improve quality. The document states that the system needs to become more efficient. It suggests that this can be achieved if there is greater coordination among the various units of the system and stronger linkages with the private sector.

However, the Ministry's 2006 strategic plan (Ministry of Education, 2006) suggests that these objectives are yet to be achieved. According to the strategic plan, there are still major weaknesses within the system. These include limited access, inadequate funding, duplication of programs, and poor quality of instruction. The plan suggests that collaboration between the colleges and the universities is awkward and not standardized across the system. The plan recommends that postsecondary education institutions collaborate more extensively to facilitate a seamless transition of students from one level to the next. This need for greater collaboration within the postsecondary sector has become even more urgent with the

Ministry of Education's stated goal to increase access to postsecondary education for the age cohort 18-24 years from a level of 20% in 1997 to 30% by 2010.

Despite the Ministry of Education's stated intentions, the lack of structural coherence within the postsecondary system militates against effective collaboration (Hall, 2005). According to Hall, it is unlikely that the current system can address issues of access, articulation, and minimization of cost since institutional needs and biases are likely to take precedence over national policy. For example, instead of the universities collaborating with the community colleges to increase access, they restrict demand by imposing both academic and non-academic barriers to entry (Miller, 2005). Miller suggests that by strengthening and broadening affiliations with colleges, the universities could assist in expanding opportunities for students wishing to access baccalaureate degrees.

Notwithstanding these deficiencies, collaborations do exist within the system. A popular collaborative method is articulation. Grant-Woodham (2007) defines articulation as the means by which Jamaican community colleges and similar institutions coordinate their programs with the public universities to facilitate transfer. Peters (1999) suggests that the most important principle of articulation is that the academic integrity of the institutions be protected, their autonomy preserved, and that there is trust among the partners.

Through articulation arrangements, students with community college associate degrees can transfer to the Jamaican public universities and receive placement beyond the first year. Grant-Woodham (2007) suggests that the public universities must use caution regarding the quality of the programs with which they articulate. Quality, Grant-Woodham further suggests, is measured not only by student factors but also by institutional factors.

According to Grant-Woodham, quality may suffer if the non-university institutions are not properly equipped with the necessary facilities and teaching staff to deliver the programs.

When the Jamaican community colleges introduced associate degrees in the 1990s, their status and quality were variable, thus making them difficult to classify (Carrington, 2002). However, since 2000 these community colleges have been requesting and receiving accreditation status for their degree programs from the national accreditation body, the University Council of Jamaica (UCJ). To varying degrees, accreditation has served to standardize community college associate degrees with an accompanying improvement in their status (Carrington, 2002).

Despite this movement toward standardization, the Jamaican community colleges continue to face barriers in articulating their associate degrees with the public universities. With this lack of formal articulation agreements, community college students continue to encounter difficulties when transferring to the universities' upper division. According to Stennett (2005), the public universities have a tendency to devalue community college associate degrees.

Stennett (2005) argues that there is a tendency for postsecondary institutions to emphasize their distinct features, a tendency which militates against unity and integration. Stennett further argues that, for a country with limited resources, the presence of several discrete and independent systems without the efficiency of formal articulation agreements seems a grand waste of personal and public resources. Stennett recommends that Jamaica should establish a coherent system of training and education with clearly defined levels of knowledge and skills, certification, and job levels. Without this coherent system, Stennett

argues, individuals wishing to pursue degrees will continue to be frustrated when they find artificial barriers preventing them from achieving their goals.

The Franchising Arrangement

Franchising in the Jamaican Postsecondary Education System

Franchising is a business arrangement in which a party purchases the right to engage in marketing a particular product or service based on a specified or suggested plan (Grant-Woodham, 2007). Grant-Woodham suggests that the franchise normally involves use of trade name, payment of fees, and rendering some special assistance. In the Jamaican postsecondary education system, franchising usually involves a public university, called the host institution, selling the right to another postsecondary institution, called the requesting institution, to offer some of its programs. Under this arrangement, the public university maintains control over the programs it franchises. The university provides learning materials for the program, stipulates entry qualifications, determines the number of hours, and outlines examination procedures. On the other hand, the requesting institution, usually a community college, is responsible for providing academic instruction and student services.

Carrington (2002) outlines how franchising works in the Jamaican situation. The courses or programs in question belong to the university. These courses would have been previously developed, taught, and assessed at the university in the normal manner. When another postsecondary institution wishes to offer such a program to its students, the university sends an assessment team to the requesting institution to evaluate its academic

suitability to offer the program. If the university assesses the requesting institution as suitable, the two institutions will arrange to offer the requested program(s) at an agreed cost.

Usually the franchise does not involve an entire four-year baccalaureate program. The norm is for the university to franchise the first year or two of such programs. Every aspect of such franchised programs runs concurrently with a similar program at the host university. On completion of the section of the franchised program offered at the requesting institution, the students continue their studies at the host university at the appropriate level just as if they had pursued the entire program with the university itself. At the end of the program, the university awards baccalaureate degrees to the successful students.

Approaches to Franchising

The Jamaican franchising arrangement is similar to university-parallel programs, which are offered in parts of the United States as well as in Latin America. In Latin America, these programs do not offer any curriculum flexibility and there is no room for electives (de Moura Castro & Garcia, 2003). According to de Moura Castro and Garcia, Latin American students do not have any options in moving from the two-year institution to the upper level of the four-year institution. They must take all the prerequisite courses specified by the four-year institution. This is also true in most articulation arrangements between US community colleges and four-year public institutions (Cohen & Brawer, 2003).

The Jamaican franchising arrangement is also similar to dual enrollment and partnership arrangements between some American community colleges and universities. For example, the state of California introduced a dual enrollment system whereby participating

California community colleges pair up with a California State University (CSU) campus (Fisher, 2005). Under this system, students attending the community college take courses compatible with a particular CSU campus. Both institutions enroll these students simultaneously. On completing the associate degree in the community college, these students move on to the junior year of the CSU campus where they had enrolled while in the community college.

A similar program exists in Massachusetts, where the state universities and the Massachusetts community colleges have joint admission arrangements (Bastedo, 2005). Under these arrangements, a Massachusetts community college and a state university admit the students jointly. This system provides seamless transfer to community college students who maintain a 2.5 GPA while at the community college.

Advantages and Challenges of Franchising

According to Roberts (2002), franchising has served as a reasonably efficient pathway to the baccalaureate degree and has widened access. Roberts suggests several advantages of franchising. First, it is cheaper for both the student and the state. Under franchising arrangements, students are able to spend up to two years of their baccalaureate studies at community colleges where tuition and fees are lower. Second, franchising offers advantages such as easier access through the strategic location of the colleges, lack of dependence on expensive technology, and provision of opportunities for strengthening the postsecondary education network. Other possible advantages include increased retention and

graduation rates, decreased transfer shock, enhanced community college - university collaboration, and better use of university resources toward their core mission.

Simultaneously, Roberts (2002) also suggests several challenges to franchising. First, population size, economies of scale, and a limited pool of qualified faculty create cost and quality limitations. Second, the attitude of faculty and administrators to mass education creates barriers for effective change. According to Roberts, many of these traditional stakeholders are of the view that mass education undermines the tradition of highly selective, residential, and pedagogically oriented postsecondary institutions.

Similarly, affordability is a significant barrier to many students' ability to complete baccalaureate programs (Henry-Wilson, 2005). For example, restrictions on student loans and financial aid create challenges for many students. According to Henry-Wilson, current enrollment patterns indicate a clear advantage for the top socioeconomic group. In addition, Jamaican institutions' inefficient use of resources has created challenges to the ability of the government to fund postsecondary education programs. Henry-Wilson argues that low retention rates and high costs characterize the postsecondary education sector.

Administrative arrangements also create challenges for the effectiveness of franchising arrangements (Grant-Woodham, 2007). According to Grant-Woodham, institutions need to address issues such as where prospective students should make applications, how fees should be allocated to institutions, how curriculum is organized, whether there is dual identification, and how resources are shared. Other challenges that could affect collaboration include institutional willingness to embrace change, as well as institutional culture.

Another issue affecting franchising is the likely pressure it could create on class sizes in the public universities' upper division (Carrington, 2002). According to Carrington, large numbers of students transferring from community colleges to the universities' upper division could place severe pressure on the universities' limited resources. However, the Ministry of Education (1996) has countered this by suggesting that the public universities could alleviate the perceived pressure on their upper division classes by franchising the entire lower division of some of their baccalaureate programs to community colleges. This, the Ministry of Education suggests, would then release the universities' resources to be dedicated primarily to upper division programs and research.

The Community College Transfer Function

American Community College Transfer Function

The prevailing emphasis on articulation and collaboration between Jamaican community colleges and the public four-year institutions has been central to the American community colleges' transfer function. Specifically, the transfer function provides a means of increasing access to the baccalaureate degree (de Moura Castro & Garcia, 2003). However, despite the firm establishment of the transfer function in the American postsecondary system, scholars are divided on its significance in relation to baccalaureate degree attainment. For example, supporters of the transfer function suggest that the community colleges' low tuition cost, open admissions policy, and easy accessibility make them the only pathway to the baccalaureate degree for a number of students (Cohen, 1996; Cohen & Brawer, 2003; Eaton, 1994; Laanan, 2001; Townsend, 2007).

On the other hand, other scholars suggest that the community colleges divert students from baccalaureate degree attainment (Anderson, Alfonso, & Sun, 2006; Brint & Karabel, 1989; Dougherty, 1994; McGrath & Spear 1991). According to Brint and Karabel (1989), community college leadership has diverted the aspirations of students from academic achievement by vocationalizing their institutions and emphasizing programs that discourage transfer to four-year institutions. Similarly, Anderson, Alfonso, & Sun (2006) assert that some community colleges critics view the establishment of these colleges as a means of diverting low-income and under-prepared students from the four-year institutions, thus allowing these institutions to maintain quality.

Latin American Community College Transfer Function

According to de Moura Castro and Garcia (2003), in the American system, university-parallel programs depend on the approval of the four-year institution. They suggest that Latin American community colleges must understand that transfers in the American system are less than universal and automatic. They therefore caution community colleges in these Latin American countries to be careful in cloning the American community college system since there are significant differences between the systems.

In Latin America, instead of associate degree programs focusing on general education and elective courses, almost two-thirds of these programs are devoted to specialized, career-oriented courses. This allows associate degree students either to exit the postsecondary education system and enter the workforce after two years or to continue their baccalaureate programs at public universities. However, these diverse curriculums create serious problems

in articulation across the public postsecondary system. For example, the associate degree would have to be an exact copy of the first two years of baccalaureate studies in order for transfer students to gain automatic placement in the upper division of Latin American four-year institutions (de Moura Castro & Garcia; 2003).

Jamaica Community College Transfer Function

The Jamaican postsecondary system, like those in Latin America, was developed from the European system of professional schools. Consequently, the community colleges' associate degree curriculums were developed using a mixture of both general education and specialized courses. Often, these curriculums do not correspond with the lower division curriculums of the public universities.

The public universities, therefore, are reluctant to accept Jamaican community college associate degree students in their upper division classes (UWI Research and Policy Group, 2005). The rationale is that a number of the courses transfer students complete in the community college associate degree programs do not merit transfer credits. Instead, based on the community college transfer students' grade in individual courses and their cumulative GPA, the public universities may use their discretion in giving lower division credits on a course-by-course basis. (Tertiary Level Institutions Unit, 2007). Often, a student completing an associate degree in a Jamaican community college gains exemption from just the first year of a four-year university baccalaureate program. Based on the student's area of specialization, while enrolled at the university, he or she is usually required to repeat a number of courses completed in the associate degree program at the community college.

Transfer arrangements are usually more efficient in articulation arrangements between Jamaican community colleges and private four-year postsecondary institutions than they are with the public universities (Evans & Burke, 2007; Miller, 2005). Generally, a student completing an associate degree in one of the Jamaican community colleges transfers directly into the upper division of the private four-year institution. However, high tuition and limited residential facilities restrict the enrollment of a majority of Jamaican students in these institutions. In addition, students wishing to enroll in these institutions have limited access to government-funded financial aid (Evans & Burke, 2007). These factors act as barriers for many Jamaican students who would wish to enroll in private postsecondary institutions.

On the other hand, students who pursue selected associate degrees at the Jamaican community colleges have the option of completing specific baccalaureate degree programs at these institutions. These students encounter seamless transition into the upper division of these programs, pay lower tuition fees than they would at the universities, and have no difficulty accessing financial aid. However, the perception that Jamaican community college baccalaureate degrees are inferior to those attained at the public universities has weakened the demand for these community college baccalaureate degree programs (Carrington, 2002). This is also a perception held by several American scholars and policymakers in relation to the American community college baccalaureate degree. Referring to the American community system, Glennon (2005) suggests that the perception of inferior quality of the community college baccalaureate degree is likely to have an effect on these graduates' ability to compete for jobs with graduates from university baccalaureate programs.

Approaches to the Transfer Function

According to de Moura Castro and Garcia (2003), there are a number of possible approaches to the transfer function in Latin America and the Caribbean. First, they suggest that the community colleges could clone the first two years of university. However, they caution that some Latin American countries, including Brazil, tried this approach but failed. They argue that the graduates from the Brazilian institutions were unprepared for the labor market after spending two years in the community colleges. Although expressing a preference to enter the job market before continuing their studies, many had to transfer directly to the four-year institutions.

A second approach, de Moura Castro and Garcia (2003) suggest, would be to discontinue the transfer function and allow community colleges to concentrate on areas such as workforce training and developmental education. Some scholars have also suggested this approach for the American community colleges (Brint & Karabel, 1989; Dougherty, 1994). This may not be a viable alternative for the Jamaican postsecondary system.

The island's two public universities are located within close proximity of each other in Jamaica's capital city, Kingston. While this is ideal for students living in, or near, the capital, accessibility is a problem for most prospective students living outside the capital. According to Miller (2005), two public universities, having a combined enrollment of under 25,000 students, are inadequate for a population of over one million in the 18-45 years cohort and over 245,000 students enrolled in secondary institutions.

Notwithstanding the demand for more university seats, due to the harsh economic conditions facing the island, Jamaica is unable to finance the construction of new

universities. However, the strategic location of community colleges provides opportunities for increasing access to baccalaureate degrees at suitable locations around the island (IDB, 2003a). The IDB argues that allowing community colleges to offer baccalaureate degrees is a better alternative than building additional public universities.

According to de Moura Castro and Garcia (2003), the third approach would be to change the four-year programs so that they become flexible enough to allow transfer. Although this alternative seems promising, these authors suggest that the power and status of the universities are likely to make this option impractical. Jamaican universities, like many universities across the world, are resistant to change. In these institutions, the notion of academic freedom and institutional autonomy are closely guarded (Birnbaum, 2000). According to Clarke (2005), Jamaica must preserve the core functions of its public universities and must never compromise their quality. It is therefore unlikely that Jamaican public universities will make any major adjustments to their curriculums to accommodate the community college associate degree transfer students.

The popular approach to the transfer function in the Jamaican system is the franchising arrangement, which attempts to combine the cost effectiveness of the community colleges and the prestige of the public universities' baccalaureate degrees. This approach purportedly eliminates many of the systemic barriers to the transfer function. The major drawback is that transfer students must pursue specific academic majors from their first year of enrollment in these programs. On completing the two years in the community college, students can only transfer their academic credits if they continue in the same academic major and only at the specific franchising institution. Consequently, students who wish to change

majors, or to attend a university other than the one offering the franchise, are often required to retake lower division courses.

Research on Academic Performance

Often, discussion on the community college transfer function centers on the academic performance of transfer students after they enter the senior institution. There is a general perception that when students who begin studies at community colleges are matched on entering characteristics with native university students, the native students are more likely to perform better academically than the community college transfer students do. Several studies on the academic performance of these two groups of students support this view (Cohen & Brawer, 2003; Graham & Hughes, 1994; Laanan, 2001; Pascarella & Terenzini, 2005; Townsend, 2001, 2007). On the other hand, there are also findings that suggest either that there is no difference between the performances of both groups or that some community college transfer students outperform the native university students (Best & Gehring, 1993; Boswell, 1992; Carlan & Byxbe, 2000; Johnson, 2005; Quany, Dixon, & Ridley, 1999).

In the Jamaican context, there is no available literature on the performance of community college students who transfer to local universities. However, the Jamaican community college transfer function has many similarities to the transfer function in American community colleges. For example, studies conducted in the United States consistently show that American students who transfer from a community college to a four-year institution have many characteristics similar to traditional university students (Cohen &

Brawer, 2003; Pascarella & Terenzini, 2005). That is, these students are usually full-time, academically oriented, white, male, and exhibit continuous enrollment.

Although many of these American student background characteristics are different from those of Jamaican students, the underlying assumption is that both Jamaican community college transfer students and native university students exhibit similar characteristics. In particular, in the Jamaican system a majority of the students who enroll in the community college associate degree or franchised programs exhibit the same background characteristics as those enrolling directly into the public universities' baccalaureate programs. That is, these students usually have the same academic entry qualifications, are full-time, normally are of traditional age (between 18-24 years old), and generally exhibit continuous enrollment.

At the institutional level, the public universities in both systems are usually residential while the community colleges are commuter institutions. In addition, the universities are generally more selective than the community colleges are. Differences between the two systems include the fact that in the Jamaican system, students enrolled at both types of institutions are predominantly black, female, and from a low socio-economic background.

A review of the literature comparing the academic performance of community college transfer students and native university students in the American system could provide useful information for understanding the performance of students in the Jamaican system. However, there is no evidence to suggest that findings from these American studies would have the same applicability in the Jamaican system as they would in the American system.

Notwithstanding this observation, stakeholders in the Jamaican system can learn much from these American studies.

Researchers have generally reported findings from American studies on community college transfer and native university students in two broad categories. One group of studies report on community college transfer students' academic performance before and after transfer and compare these with the academic performance of native university students. One particular area of interest for this group of researchers has been the transition effect of moving from a two-year to a four-year institution.

Many of these studies report that students transferring from the two-year to the four-year institution experience a phenomenon called *transfer shock* (Glass & Bunn, 1998; Laanan, 2004; Pascarella & Terenzini, 2005; Tinto, 1993; Townsend & Wilson, 2006). These researchers argue that this transfer shock phenomenon occurs because the transfer student has trouble navigating the social and academic system at the four-year institution. According to some of these researchers, the transition from the community college environment to that of the four-year institution is a form of culture shock (Keeley & House, 1993; Laanan, 1996, 2001, 2004; Pascarella & Terenzini, 2005; Townsend, 1993, 1995). They attribute this culture shock to both institutional and transfer student background characteristics.

A second group of studies report on the academic performance of transfer students and native students as they progress toward the baccalaureate degree. Many of these studies report that the transfer students generally recover from any initial transfer shock and usually end up graduating at the same rate as the native students do. However, some studies also

report that transfer students take a longer time to complete the baccalaureate degree than native students do (Glass & Harrington, 2000; Glass & Bunn, 1998).

Studies on academic performance of transfer and native students often use dependent variables such as GPA, time to degree, and baccalaureate degree attainment as indicators of academic performance. These variables are generally quantitative or dichotomous categorical variables. Independent variables generally include one or more variables selected from institutional characteristics, institutional type, environmental characteristics, academic major, and student background characteristics. Independent variables usually include a mix of quantitative and categorical variables.

Academic Performance as Proxy for Social and Academic Integration

Researchers and scholars have long associated students' persistence and baccalaureate degree attainment with the degree of their academic and social integration at the institution (Pascarella & Terenzini, 2005; Tinto, 1993; Townsend & Wilson, 2006, 2009). According to Tinto (1993), students enter an institution with certain background characteristics and external influences. He suggests that these characteristics and influences have a significant effect on a student's academic and social integration within the institution. By extension, these attributes also influence a student's ability or willingness to persist. Expanding on this theme, Braxton (2000) suggests that academic and social integration affect the formation of institutional commitment and subsequently affect the goal of graduation. According to Braxton, the greater the student's degree of academic and social integration, the greater is the level of subsequent commitment to the goal of graduation.

Tinto's (1993) theory presents academic and social integration as independent but complementary constructs that influence students' ability to adjust to the institutional environment. According to Tinto, academic integration represents satisfactory compliance with the academic norms and values of the institution. On the other hand, social integration represents the extent to which the student finds the institution's social environment amicable to his or her preferences.

Further, Tinto (1993) suggests a three-stage transition process for students integrating into an institution. First, on arrival at the institution, students must separate themselves from past activities and influences. The second stage involves students aligning themselves to new activities within the institution. In the final stage, students have the task of becoming integrated within the new environment. According to Tinto, in the final stage students begin to incorporate or adopt the normative values and behavior of their new environment. Tinto further suggests that a student's persistence and degree attainment relies, to a certain extent, on that student's ability to navigate this transition process. Elaborating on Tinto's theory, Kuh et al. (2007) suggest that students' departure from college is associated with their inability to effectively separate themselves from past activities and adapt to the norms and values of the new environment.

Most scholars studying student persistence agree that social and academic integration have a significant effect on students' persistence and degree attainment. However, there is a view among some scholars that Tinto's (1993) theory failed to account for a number of important factors that affect students' success (Kuh et al., 2007; Bean & Eaton, 2000; Braxton, 2000; Pascarella & Terenzini, 2005; St. John, Cabrera, Nora, & Asker, 2000). For

example, Pascarella and Terenzini (2005) stress the importance of institutional characteristics to a student's success. Similarly, Bean and Eaton (2000) stress a psychological perspective where behavior, attitude, and motivation influence persistence. Further, St. John, et al. (2000) present a human capital perspective where students make college-going decisions based on a cost-benefit approach. However, according to Kuh et al. (2007), unlike Tinto's theory, many of these theories lack explanatory power. Some scholars have even suggested that findings not in support of Tinto's theory might be related to weaknesses in the way researchers operationalized academic and social integration and not to any weakness of the theory itself (Hurtado & Carter, 1997; Tinto, 2000).

Although Tinto's (1993) theory updates two earlier versions (Tinto, 1975, 1987), critics have opined that the newer version continued to focus on traditional students (full-time and generally between the ages of 18-24 years) at residential four-year institutions (Braxton, 2000; Pascarella & Terenzini, 2005). To address the limitations of the earlier versions of Tinto's theory, Bean and Metzner (1985) offered an alternative framework that focused on non-traditional students, identified as part-time, 25 years and older, and commuting to classes. According to Bean and Metzner, a non-traditional student's decision to depart an institution is primarily dependent on four sets of variables: prior academic performance, intent to leave, background characteristics, and environmental factors. In this framework, GPA is used as a proxy for prior academic performance while intent to leave is influenced primarily by psychological and academic factors. In addition, background characteristics include factors such as high school performance and educational goals while environmental variables include factors that directly affect a student's dropout decision.

Based on this emphasis on non-traditional students, Bean and Metzner's (1985) conceptual framework provides a forum for the study of community college students' academic success. However, it may not be as relevant to community college students who do not fit in the non-traditional mold. For example, some scholars suggest that a majority of community college students who transfer to four-year institutions exhibit closer similarities to the traditional students who begin studies at the four-year institution than to their colleagues who do not transfer (Cohen & Brawer, 2003; Pascarella & Terenzini, 2005). According to these researchers, community college transfer students are more likely to come from families with higher SES background, younger, white, male, more academically oriented, attend full-time, more continuous enrollment, and more academically and socially integrated in the institution from which they were transferring. Consequently, a combination of Tinto's (1993) theory and Bean and Metzner's (1985) theory seems appropriate in guiding the theoretical and conceptual frameworks for the academic performance of community college transfer students enrolled in the upper division of four-year institutions.

Relating Integration to Transfer Students' Academic Performance

Most of the persistence studies that have used Tinto's (1987, 1993) theory have focused on students who began baccalaureate studies at four-year institutions. However, with nearly 50% of American postsecondary students enrolled in community colleges, there is an increased interest in how community college transfer students adjust to the environment of the four-year institution and how this adjustment affects their subsequent academic performance. Using the concept of academic and social integration, researchers have

generally reported that, in making the transition to the four-year institution, community college transfer students face strong social and psychological barriers not experienced by native university students (Cameron, 2005; Eggleston & Laanan, 2001; Glass & Bunn, 1998; Johnson, 2005; Laanan, 2001; Pascarella & Terenzini, 2005; Townsend & Wilson, 2006, 2009). According to many of these researchers, native students who have begun their baccalaureate programs at the four-year institution would have already socialized into the institution's environment.

According to Johnson (2005), the challenge to navigate the academic and social environment of the four-year institution is likely to lead to the transfer student initially underperforming academically relative to the native student. In addition, community college transfer students' academic success and persistence at four-year institutions involve the interaction of individual characteristics and institutional variables mediated by environmental conditions (Glass & Bunn, 1998). According to Glass and Bunn, for transfer students to be successful and to persist at the four-year institution, student and institutional variables must coincide to create a receptive environment.

In a 2004 qualitative study, Townsend and Wilson (2006) interviewed 19 community college transfer students enrolled at a large research-extensive state university. The study was designed to understand factors affecting the academic and social integration of community college transfer students. Findings from this study indicate that the large size of the university and the university's institutional mission might be factors that affected the transfer student's behavior. Townsend and Wilson posit that community college transfer students might need more assistance initially than they are given.

In a 2006 follow-up to their 2004 study, Townsend and Wilson (2009) did a qualitative study to discern the importance of academic and social integration to transfer students' persistence. Of the 19 students who participated in the earlier study, 12 were interviewed again for the 2006 study. Based on their findings, Townsend and Wilson suggest that, for these community college transfer students, academic integration seem to have a stronger influence on baccalaureate degree attainment than social integration. According to the authors, a clear indication of these transfer students' academic integration is their persistence to baccalaureate degree attainment. This, they suggest, occurred despite the students' initial feeling of social isolation in the four-year institution.

Further, Townsend and Wilson (2009) suggest that social integration, as it relates to participation in co-curricular activities, might not be very important to community college transfer students. According to these scholars, community colleges generally place little emphasis on student-life activities. Consequently, a majority of transfer students enter the four-year institution placing very little importance on involvement in these activities (Community College Survey of Student Engagement [CCSSE], 2006). Rather, these students appear to be more interested in academically-oriented social activities that facilitate degree completion (Townsend & Wilson, 2009).

GPA as a Measure of Academic Performance

Cohen-Schotanus et al. (2006) conducted a study of students in the faculty of medicine at the University of Groningen, Netherlands and found that high GPA scores were associated with significantly less time to graduation, greater career development, and higher

scientific output. Simultaneously, these researchers found that GPA had no significant effect on dropout rate or on income after graduation. Other researchers have reported students' first year and subsequent grades to be positive and statistically significant predictors of degree attainment even when the effect of other variables, including students' background characteristics and institutional type, are accounted for (Adelman, 1999; Astin, 1993; Kuh, et al., 2007; Pascarella & Terenzini, 2005). According to Pascarella and Terenzini (2005), the positive and statistically significant net effect of grades on persistence and degree attainment seem to be consistent over varying periods.

However, Mouw and Khanna (1993) suggest that GPA is an imperfect measure of academic performance because it reflects an unknown mix of constructs such as study skills, test-taking skills, content knowledge, motivation, and commitment. Additionally, Astin (1993) suggests that grades are imperfect measures of student learning in that they generally reflect students' performance relative to each other rather than how much is learned. Grades can also act as a confounding measure, reflecting a combination of academic ability, intellectual capacity, and personal traits (Pascarella & Terenzini, 2005). Despite these limitations, Pascarella and Terenzini suggest that grades might possibly be the single best predictor of persistence and baccalaureate degree attainment.

Studies Using GPA to Compare Academic Performance

Using GPA as the dependent variable, House (1989) found that community college transfer students coming into the four-year institution after one or two years in the community college experienced a decline in academic performance as compared to native

university students with the same classification. In addition, House found that community college students transferring as juniors earned higher grades, had higher graduation rates, and had lower academic dismissal rates than students who transferred as freshmen or sophomores.

Boswell (1992) compared cumulative grade point averages of community college transfer students, private junior college transfers, and native university students in the upper divisions in the University of North Carolina system. The author compared the academic performance of these three groups at the point of moving into the upper division as well as their academic performance in upper division work. Boswell drew a number of conclusions from this research. First, he concluded that community college transfer students earned significantly higher grade point averages in the lower division than did the private junior college transfers and the native university sophomores. Second, there was no significant difference between the academic performance of community college transfer students and native university students in upper division work. Further, there were no significant differences between the groups in relation to age, gender, or academic major.

Best and Gehring (1993) compared the academic performance of community college transfer and native university students in the College of Arts and Science, School of Business, and School of Education at a major state university in Kentucky. Their study indicated that the mean GPA for community college students who transferred to the upper division of the university (transferred with more than 60 credits) was significantly higher than that of transfer students who entered the university at the lower division (transferred

with less than 60 credits). In addition, there was no significant difference between the GPA of transfer juniors and those of native university juniors.

When Best and Gehring (1993) analyzed graduation rates, they found significant differences among the three groups. While university native students had a graduation rate of 60%, that of community college students who transferred into the university's upper division (junior year) was 40%, and that of students who transferred in the university's sophomore year was 30%. According to Best and Gehring, the findings comparing the mean GPA and graduation rates for transfer juniors and native university students were a bit puzzling. On the one hand, both groups exhibited similar mean GPAs; on the other hand, the graduation rates were significantly different. The authors concluded that while the results provided evidence that community colleges were preparing transfer students adequately for upper division university work, their persistence to graduation was a cause for concern.

Quanty, Dixon, & Ridley (1999) developed a "course-based model for transfer success" (p.1) that Thomas Nelson Community College and Christopher Newport University in Virginia used collaboratively. In this model, Christopher Newport University identified courses requiring prerequisites that students could take either at that institution or at Thomas Nelson Community College. The institutions checked the academic records of students who took the courses requiring prerequisites to determine how well they performed in the course and where they took the prerequisite courses. Findings indicated students who did their course prerequisites at Thomas Nelson Community College did as well or better than students who completed the prerequisites at the Christopher Newport University.

Carlan and Byxbe (2000) used stratified random sampling to select community college transfer and native university students entering the upper division of a university in the southern United States over a three-year period 1989-91. Findings from this study indicated transfer students experienced a decline in GPA on entering the senior institution. In addition, the researchers performed regression analysis and found that, when they adjusted for student characteristics, community college attendance did not have a significant influence on upper level GPA.

Further, Carlan and Byxbe (2000) did separate prediction equations for native and transfer students to determine if there were different variables accounting for the GPAs. They found the variables contributing most to transfer students' success were lower division GPA (community college GPA) and academic major, accounting for 27 percent and 10 percent of the variance respectively. In particular, they found that students in business and science performed the worst and that those in education and psychology performed the best. They also found that race and age were significant, but each accounted for less than one percent of the variance. Gender, associate degree attainment, and full-time or part-time enrollment did not contribute significantly to the prediction model. The model for native students found the same significant predictors, but their influence on the dependent variable was different. For example, race accounted for 14 percent of the variance, lower division GPA accounted for 5 percent, and college major accounted for 4 percent. In addition, native students enrolled in business and science majors experienced fewer problems than did transfer students in the same disciplines.

Building on the work of Quany et al. (1999), and Carlan and Byxbe (2000), Whitfield (2005) did a study on the performance of community college transfer students and native university students enrolled in organic chemistry and biochemistry at Washington State's flagship research university. Both groups were required to take these two courses prior to enrollment in the university's upper division. The university also offered these courses in the upper division. T- tests and chi-square statistics were the measures used to analyze the difference in performance of the groups both in the prerequisite courses and in the advanced section of these two courses.

Findings from the Whitfield (2005) study indicated that both transfer and native students compared reasonably well in the organic chemistry prerequisites but their performances were significantly different in the biochemistry prerequisites. When Whitfield compared the groups' performances in the upper division in both courses, her findings indicated that there were minor differences in the organic chemistry grades but the gap was much greater in biochemistry. In the case of biochemistry, transfer students' grade declined in the first quarter after transfer and did not recover throughout the rest of the program. Whitfield concluded that in addition to institutional factors, the students' academic performance might be due to curricular factors.

On the other hand, Johnson (2005) did a study of students enrolled in Natural Resources and in Science at a mid-size public west coast university. Johnson found no statistical evidence of any difference in the academic performance of native university students and community college transfer students enrolled in these courses. Johnson used the students' GPA at the point of graduation as the measure of academic performance. Findings

indicated that both unadjusted GPA and GPA adjusted for pre-college variables were statistically indistinguishable between the native and the transfer students.

Studies Using Baccalaureate Degree Attainment as Dependent Variable

Baccalaureate degree attainment has always been an important issue to community college transfer and native university students. Both the time each group takes to complete the degree and the percentage of each group receiving the degree have been debated keenly (Glass and Harrington, 2002). Researchers have used a variety of variables and analytical techniques to predict the likelihood of students attaining the baccalaureate degree.

Using the 1995 High School and Beyond Sophomore Cohort longitudinal data set, Christie and Hutcheson (2003), used logistic regression to conduct a study on a group of students who graduated from high schools in spring 1982 and enrolled full-time in postsecondary institutions the following fall. The study included only students who indicated baccalaureate degree attainment as their minimum goal. The dependent variable was baccalaureate degree attainment while the independent variables were institutional type and student background characteristics. The regression model controlled for the student background characteristics. Findings indicated that the net effect of enrolling at a community college reduced the probability of baccalaureate degree attainment by just over 10%. The researchers concluded that while community college attendance does have a negative effect on baccalaureate degree attainment, it is far from being the most important factor.

While most studies comparing baccalaureate degree attainment of transfer and native students support Christie and Hutchinson's (2003) findings, the net effect of institution type

on attaining the baccalaureate degree varies. Koker and Hendel (2003) reported that enrolling as a university freshman had a more positive effect on completing the baccalaureate degree than enrolling in a community college. Cejda and Rewey (1998) reported that academic performance at the four-year institution is associated with community college GPA. Cejda and Rewey found that the graduation rate for transfer students having community college GPA above 3.0 was similar to that of university native students and was 13 percent higher than that of their community college cohorts with a GPA of less than 3.0.

Studies Associating Transfer Shock with Academic Performance

Transfer shock refers to the tendency of students transferring from one institution to another to experience a temporary dip in GPA during the first or second semester at the new institution (Hills, 1965). Most studies on transfer shock have reported that this phenomenon does exist among community college students who transfer to four-year institutions. However, findings from several of these studies suggest that when the researchers adjusted for student background characteristics and institutional characteristics, the effect of transfer shock was either minimal or negligible (Carlan & Byxbe, 2000). In addition, findings from some studies even suggested that some transfer students experienced transfer ecstasy, defined as a significant increase in GPA during the first or second semester after transfer.

Keeley and House (1993) did a study on transfer shock at a public university in Illinois. Variables used included time of transfer, gender, race, academic major, and age. Findings indicated that students who transferred after one year in the community college experienced a greater level of transfer shock than those who transferred after two years. This

was generally the case whether or not the students transferring after two years earned the associate degree before transferring.

Further, Keeley and House (1993) found that the category of students having the least transfer shock were older students, females, and those who earned associate degrees before transferring. Simultaneously, students categorized as business majors had the highest mean transfer GPAs but also showed the most dramatic drop in mean GPA at the end of the first semester in the university's upper division. These business majors showed declines in mean GPA from a transfer GPA of 3.27 to a first term upper division GPA of 2.68.

In a study of 100 community college transfer students at a private four-year liberal arts college, Cejda (1997) also reported a significant dip in mean GPA among transfer students majoring in business as well as a number of other disciplines. These students completed 24 or more credits at the community colleges before enrolling full-time at the college. Cejda found that business majors as well as those majoring in mathematics and sciences experienced significant transfer shock when compared with the entire sample. On the other hand, post-transfer GPAs for majors in education, the humanities, and social sciences were higher than their respective pre-transfer GPAs.

In addition to studying the transfer shock phenomenon, Glass and Harrington (2002) also compared community college transfer and native university students in relation to time to degree. Using stratified random sampling, Glass and Harrington (2002), did a study of 200 community college transfer and native university students in the College of Arts and Sciences at a large public university in North Carolina. The study compared students' mean GPA at the end of the second year in the community college for transfer students and at the

end of the sophomore year for native students. In addition, the study compared students' mean GPA at the end of the first semester in the junior year and at the end of the second semesters in both the junior and senior years.

The Glass and Harrington (2002) study found that transfer students experienced a significant decline in mean GPA while moving from year two in the community college to the upper division at the senior institution. There was no significant decline for native students moving from sophomore to junior year. According to the researchers, this provided evidence of transfer shock for the community college students. However, their findings also showed that both groups had higher, but similar, mean GPAs at the end of the spring semester of the senior year. This, they claimed, provided evidence that the community college students had recovered from the transfer shock.

The Glass and Harrington (2002) study also looked at transfer and native students' persistence to graduation. Their findings indicated that transfer students had lower retention and graduation rates than native students had. However, for those who persisted to graduation, the mean GPAs of the transfer students were the same or better than those of the native students. When Glass and Harrington disaggregated students who enrolled in the senior year from the rest of the sample, they found that at the end of the senior year the graduation rate for the native seniors was higher than that for the transfer seniors. However, by the end of the summer and fall semesters after the senior year, almost 100 percent of the students from both groups had graduated. The researchers concluded that four-year institutions need to offer programs and services to assist transfer students in overcoming

transfer shock since, once recovered, they perform just as well academically as native students do, albeit they may take a bit longer to graduate.

While the Cejda (1997) study looked at community college transfer students at a liberal arts college, other studies looked at transfer students at public universities (Glass & Harrington 2002; Keeley & House, 1993). All of these studies concluded that transfer shock existed. However, these were single institution studies. Findings might have been different using a national sample.

Academic Performance of Transfer and Native Students in Other Countries

In a longitudinal study of community college transfer and direct-entry high school students to universities in Ontario, Canada, Bell (1998) found that community college transfer students do as well academically, and in some cases, better academically, compared to direct-entry (native) university students. However, the community college transfer students took longer to achieve the baccalaureate degree than the native students did. In addition, the transfer students were more likely to depart the university before completing the degree and were less likely to graduate compared with the native students.

In another Canadian study, Heslop (2004) conducted a study on the academic performance of a sample of British Columbian postsecondary students who entered Simon Fraser University (SFU), either through direct-entry (native students) or through community college transfer. Heslop found that, regardless of the route through which the students entered SFU, those admitted with the same high school achievement level performed equally well in terms of baccalaureate degree completion, early departure rates, and performance in

upper level courses. However, the study found that among high school students with low achievement levels, those who transferred from British Columbian community colleges outperformed those who entered SFU directly on measures such as lower course failure rate, fewer unsatisfactory grades received, and overall average grades in SFU courses. Among the upper high school achievers, there was no difference in the performance of direct-entry students and college transfer students on any of the measures used.

The Australian equivalent of the American community college is the Technical and Further Education Institutes (commonly called TAFE). According to the TAFE, New South Wales (NSW) website (TAFE NSW, n.d.), TAFE courses provide practical, work-related skills that provide excellent training to enter a job. The website further states that TAFE courses also offer recognized pathways to university. Specifically, TAFE diploma-to-degree programs offer guaranteed entry to a number of degree programs with advanced standing at leading Australian universities.

In a study of the academic performance of TAFE transfer students and direct-entry Australian university students, Tickel and Smyrnios (2005) found that transfer shock was apparent for the TAFE-to-university transferees. The researchers suggest that, in accepting TAFE transfer students, universities need to have dedicated university orientation programs for transfer students. In addition, they suggest that the universities should have closer collaboration with the academic departments from which the TAFE students are transferring.

In another Australian study, Dickson (1999) found that TAFE graduates experienced difficulties adjusting to the organizational and academic expectations of university study. This qualitative study of 12 New South Wales TAFE Associate Diploma in Social Science

graduates who enrolled in university teacher education programs found that the students were confronted with adaptation issues at the department, faculty, and university levels. Overall, the study identified several specific administrative, academic, and environmental variables that affected the TAFE graduates' experience and subsequent performance at the university. These variables included: orientation to university facilities; adaptation to different styles of teaching and learning; adjusting to the level and expectations of assignments; establishing appropriate staff- student interactions; lack of contact with students undertaking the regular program; the importance of support from their fellow TAFE graduates; and, minimal use of campus student support services.

Findings from these Canadian and Australian studies seem quite similar to studies done in the United States. In general, these findings suggest that transfer students in countries other than the United States seem to be experiencing the same phenomenon of transfer shock as their counterparts in the United States. In addition, these findings suggest that students in these countries who begin studies in two-year colleges before transferring to four-year institutions perform just as well academically as those who begin their studies at the four-year institution.

Chapter Summary

Scholars describe Jamaica as having a diverse postsecondary education system lacking structural coherence. This has resulted in issues of access, cost, and quality. While community colleges offer opportunities for greater access and reduced costs, one issue of particular concern is the perception that students who begin studies at Jamaican community

colleges do not perform as well academically as students who begin at the four-year institution. To address these issues, the public universities and the community colleges have established special partnership arrangements similar to those in countries such as the United States and Latin America. These special arrangements, called franchising arrangements in the Jamaican system, account for a significant portion of Jamaican community college students transferring to its public universities.

However, there is no published research analyzing the performance of Jamaican community college transfer students and native university students enrolled under these special arrangements. A review of literature on the performance of transfer and native students in the United States and other countries provides opportunities for analysis. First, the performance of these students was examined within the framework of Tinto's (1993) theory of student attrition and Bean and Metzner's (1985) model of nontraditional student attrition. These theories suggest that students' academic and social integration within the institution appear to have a significant effect on their academic performance.

Second, the chapter reported on American studies that compared the academic performance of community college transfer students and native university students in relation to cumulative GPA, time to degree, and baccalaureate attainment. A majority of the findings from these studies suggested that community college students experienced transfer shock on entering the universities' upper division, but those who persisted to the senior year recovered to graduate at more or less the same rate as university natives. Researchers have attributed transfer shock to the transfer students' initial inability to navigate the social and academic environment of the four-year institution.

The next chapter on methodology explains the study's research design, population and sample, data collection, variables, and data analysis.

CHAPTER THREE

Methodology

The American community college model is gaining popularity in many developing countries. In providing low cost postsecondary education, community colleges offer opportunities for a wider cross-section of the population in these countries to be trained at the postsecondary level. In particular, the community college's transfer function provides opportunities for students to begin baccalaureate studies at these institutions.

However, in Jamaica, there is a perception that students who begin baccalaureate studies at community colleges do not perform as well academically as students who begin at the public universities. Consequently, these universities are reluctant to enroll community college transfer students in their upper divisions. Rather, they promote franchising arrangements with the community colleges. A review of the literature, however, illustrates the lack of published research on the academic performance of Jamaican community college transfer students and native university students enrolled under these types of arrangements.

The purpose of this study, therefore, was to compare the academic performance of transfer students who began their baccalaureate studies at Jamaican community colleges under franchising agreements between the community colleges and the public universities with the academic performance of students who began their baccalaureate studies at the public universities. From this purpose, five research questions were derived. Table 1 summarizes the research questions along with the methods of analysis used to answer them. Further, the chapter describes the research design, setting for the study, population and sample, variables, data collection, and data analysis.

Table 1

Research Questions and Analytical Method

Question #	Description	Analytical Method
1	Is there a significant difference between Jamaican community college transfer students ^a mean semester GPA at the end of the semesters immediately before and immediately after transfer to the upper division of a Jamaican public university?	<i>Paired-samples t-test</i>
2	Is there a significant difference between Jamaican community college transfer students and native university students with respect to their mean semester GPA at the end of the first semester of the junior year?	<i>Independent samples t-test</i>
3	Are there significant differences between Jamaican community college transfer students who experienced transfer shock, Jamaican community college transfer students who did not experience transfer shock, and Jamaican native university students with respect to their mean upper division cumulative GPA at the end of the senior year?	<i>One-Way ANOVA</i>
4	For Jamaican students who complete the baccalaureate degree within six years of beginning baccalaureate degree studies, are there significant differences between community college transfer students who experienced transfer shock, community college transfer students who did not experience transfer shock, and native university students with respect to their mean time to degree?	<i>One-way ANOVA</i>
5	What is the effect of student characteristics and institutional type on the likelihood that a Jamaican student will complete the baccalaureate degree within six years of beginning baccalaureate degree studies?	<i>Logistic regression</i>

^a community college students enrolled in baccalaureate programs under special franchising arrangements between Jamaican community colleges and public universities.

Research Design

The research design was non-experimental and cross-sectional (Johnson, 2001). While non-experimental studies are limited in their ability to provide evidence of causality, they have the advantage of allowing the researcher to study what naturally occurs or has already occurred (Kovacs Burns, 2005). Researchers also refer to this type of study as having an ex post facto (or causal-comparative) design because two groups were compared and the experiment could not be manipulated since it occurred prior to the research being conducted. The design was also explanatory in that the purpose was to analyze the effect of different variables on students' academic performance (Johnson, 2001). Figure 2 depicts the overall conceptual model employed in this study.

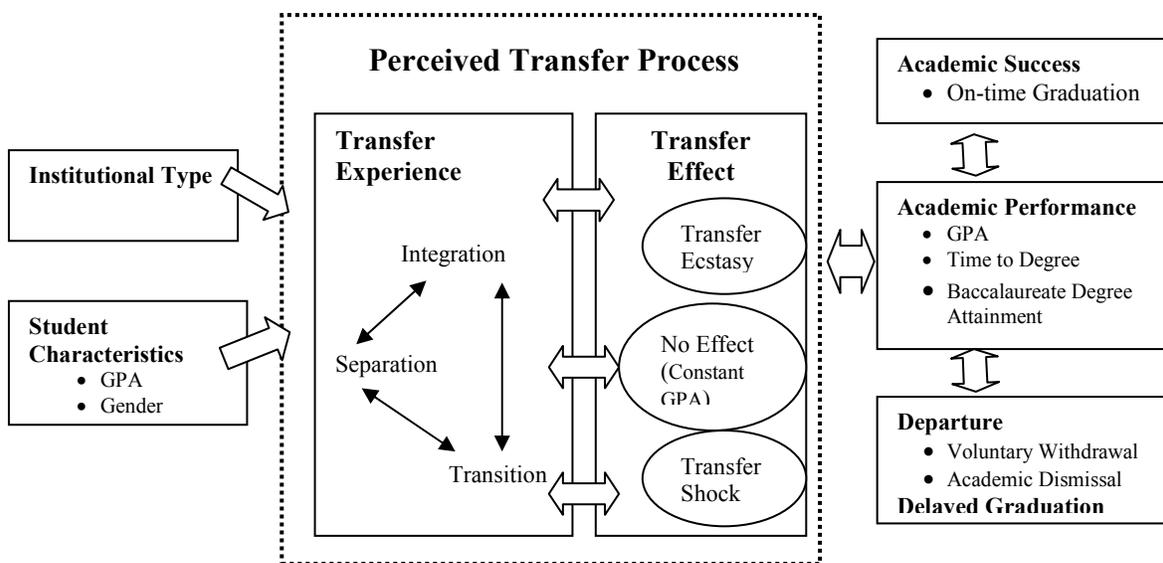


Figure 2. Conceptual model depicting the relationship between student characteristics, institutional type, and students' academic performance, mediated by the students' perceived transfer process.

Setting

The setting for this research was the Faculty of Business and Management at the University of Technology (UTECH), Jamaica. This institution is one of two public universities located in Jamaica and the only one wholly owned and controlled by the Jamaican government. Chartered in 1995 as a public university, UTECH sees its mission as promoting lifelong learning, personal development, and service to the community (UTECH, n.d.). UTECH owes its origins to the Jamaica Institute of Technology, which started in 1958. In 1959, the name of the institution was changed to the College of Arts, Science, and Technology (C.A.S.T). After several changes in mission, CAST was formally accorded university status in 1995 and was renamed the University of Technology (UTECH). Currently, UTECH has a student population of approximately 10,000 enrolled in six faculties (also called colleges). Forty percent of the students are enrolled as part-time students and the other 60% attend full-time. In addition, the institution has a gender distribution of 45% male and 55% female (University of Technology, 2008).

The Faculty of Business and Management is the largest faculty in the institution, enrolling approximately 50% of the university's student population (University of Technology, 2008). The School of Business, one of the two schools in the faculty, enrolls 3900 students, which is just under 40 % of the institution's total student population. It is the largest school within the university, having about four times the population of the next largest school. The school offers majors in accounting, finance, administrative management, management, and marketing. The Bachelors in Business Administration (BBA) was started in 1999. Simultaneous with the introduction of its BBA degree, the faculty started a

franchising arrangement with the community colleges, allowing students to complete the first two years of the BBA program while enrolled at one of these community colleges. On successful completion of the first two years, these students may then transfer to the junior year at UTECH.

Target Population and Sample

The target population for this study consisted of all full-time juniors enrolled in the School of Business at the University of Technology, Jamaica, during 2004-2005. The estimate for this population was 500 students, with approximately 350 being native university students and the other 150 being Jamaican community college transfer juniors enrolled under a franchising arrangement between the community colleges and UTECH.

This study used the technique of stratified random sampling to select equal numbers of Jamaican community college transfer juniors and native university juniors from the cohort of students who matriculated into UTECH's Bachelors of Business Administration program in fall 2002. Stratified sampling ensures the sample has adequate representation of the key subgroups in the target population (Creswell, 2003). Further, it divides the population into homogenous groups, thereby reducing within-group variance (Babbie, 2001; O'Rourke, Hatcher, & Stepanski, 2005).

The total sample was 200 full-time UTECH juniors enrolled in the School of Business at UTECH. This group consisted of 100 community college transfer juniors enrolled under a franchising arrangement between UTECH and the community colleges and 100 native UTECH juniors. This sample size is consistent with several existing studies

comparing transfer and native students (Glass and Harrington, 2002; Cejda & Rewey, 1998; Whitfield, 2005). The study excluded community college transfer students who entered the Faculty of Business and Management with less than 54 credits or who were not enrolled under the franchising arrangement between the community colleges and UTECH. In addition, transfer students from institutions other than the community colleges and part-time students were excluded.

As a rule of thumb, researchers generally base their sample sizes on a selection of between 10 and 30 participants for each variable used in a regression model (Peng, Lee, & Ingersoll, 2002; Wilson-VanVoorhis & Morgan, 2007). In addition, Wilson-VanVoorhis and Morgan suggest that, as a rule of thumb, a minimum of 30 participants per group is recommended for tests involving the measurement of group differences. These include paired samples t-test, independent samples t-test, and Analysis of Variance (ANOVA). Consequently, the study's sample size of 100 students in each of the two groups was significantly larger than the minimum researchers suggest. In addition, this sample size was large enough to accommodate student attrition during the period under investigation.

Data Collection

Data for this study were collected from the student record database at the UTECH, Jamaica. Data not available from the electronic database were extracted manually from students' files. Both sets of data were then combined. Students' files were kept in the university's Student Records Office. This researcher, supervised by Records Office personnel, extracted the required data from the students' files. Extracted data were stored on

the researcher's personal computer. Students' names and identification numbers were not extracted. Rather, the researcher used a code sheet prepared by the Records Office so that only coded data were entered on the researcher's personal computer. The Records Office supervisor kept the code sheet in confidential storage at the Records Office and made it available to the researcher only when needed. Based on the codes used, it was not possible to identify any of the students sampled. Both the Institutional Review Board (IRB) of North Carolina State University and the Ethics committee of the UTECH's Graduate School approved this study (see appendices A to C).

Notwithstanding the excellent assistance of personnel at the UTECH, there were several challenges that affected the speed of data collection. First, the university had only recently acquired a new electronic student database system. At the time data were requested for this research study, personnel in the university's Records Office had just started entering students' data into this new system. Consequently, it took several months before the Records Office was able to provide the data requested. In addition, only data for students who enrolled as juniors beginning fall 2004 were available electronically. This affected the speed of data collection as well as the researcher's ability to use more than one cohort of students.

Second, the university provided grades and number of credits for each course a student completed but did not calculate the student's semester GPA. However, it calculated cumulative GPA for its graduates. With assistance from persons in the Records Office, this researcher used an excel worksheet to calculate required GPAs. These GPAs were calculated using the same formula the university used to calculate the students' cumulative GPA. The procedure for calculating GPA is explained further in the next section.

Variables

This study used several dependent and independent variables to answer the five research questions posed. The dependent variables were cumulative GPA, time to degree, and baccalaureate degree attainment. The independent variables were gender, lower division GPA (community college GPA), type of institution, and transition type.

Dependent Variables

Cumulative GPA. Cumulative GPA is the mean numerical grade for all courses a student completes at a stipulated point. It is computed on a 4.0 scale as follows: Multiply the numerical grade obtained for each course completed by the number of credits assigned to that course. These numbers are then added and their total divided by the total number of credits for all courses completed. The cumulative GPA is an interval variable.

Semester GPA. Semester GPA is computed at the end of each semester applying the same technique used to compute cumulative GPA. However, unlike cumulative GPA, which is computed using all courses with numerical grades completed up to a given point, semester GPA is computed using only courses completed in a specified semester. Semester GPA is an interval variable.

Time to degree. Time to degree measures the number of years a student spends in the baccalaureate degree program from initial matriculation to baccalaureate degree attainment. In the case of a community college transfer student, enrollment begins at the time the student enrolls in the first year of the franchised program, while for the native university student it

begins at the point the student enrolls as a freshman. Like previous studies, this study used time to degree as both a categorical and an interval variable.

Baccalaureate degree attainment. A student pursuing a baccalaureate degree must satisfy a specific set of criteria in order to complete the program successfully. The minimum time a student can take to complete successfully the course of study leading to the baccalaureate degree is four years. However, most students take between four and six years, with some taking even longer than six years. Consequently, most four-year institutions report their baccalaureate degree graduation rate based on a six-year completion time.

This study used six years as the average period a student is expected to take to complete the baccalaureate degree. Consequently, baccalaureate degree attainment measures whether a student completed the baccalaureate degree within six years or did not complete the baccalaureate within that period. Therefore, it is a categorical variable having two levels.

Independent Variables

The independent variables used for this study were gender, lower division cumulative GPA, type of institution, and transition type. Lower division GPA is an interval variable, while gender, type of institution, and transition type are all categorical variables.

Lower division GPA. Lower division GPA is an interval variable, representing a student's cumulative GPA at the end of the semester prior to enrolling in the university's upper division. For the community college transfer students, this is the pre-transfer GPA received after successful completion of two years of studies in the Bachelors of Business Administration (BBA) franchised program. This involved completion of a minimum of 54

credits toward the BBA. For native students, this is the cumulative GPA at the end of the sophomore year.

Type of institution. According to Pascarella and Terenzini (2005), the characteristics of an institution are associated significantly with a student's academic performance. Based on this assertion, it was postulated that the characteristics of Jamaican community colleges are significantly different from those of the public universities. Consequently, like several American studies, institutional type was used as a proxy for institutional characteristics (Christie & Hutchinson, 2003). Type of institution, therefore, represented the postsecondary institution where a Jamaican student first matriculated for baccalaureate studies. It is a categorical variable having two levels - community college and public university.

Transition type. It was postulated that a transfer student pursuing baccalaureate studies was likely to encounter a transition effect in moving from the community college to the upper division of the four-year institution. Previous studies suggest that a majority of these students are likely to encounter a dip in semester GPA in the first or second semester after transfer (Glass & Harrington, 2002). Many of these studies suggest that this decline in academic performance was due to the academic and social environment the transfer student must navigate on entering the four-year institution (Cameron, 2005; Johnson, 2005; Pascarella & Terenzini, 2005; Townsend & Wilson, 2006, 2009). In this study, no attempt was made to measure social and academic integration. However, it was considered reasonable to use academic performance as a proxy for academic and social integration.

In order to explore the transition effect on transfer students and to compare their performance with that of the native students, the variable institution type was recoded to

create a new variable, transition type. This was done by keeping the native students as a single group and separating the transfer students into two groups; those experiencing a semester GPA decline of .3 or more on transfer to the university and those whose semester GPA declined by less than .3 on transfer. In general, researchers refer to students experiencing GPA declines of .3 or more during the semesters immediately before and immediately after transfer as experiencing transfer shock (Hills, 1965). Consequently, the group of transfer students whose semester GPA declined by .3 or more at the end of the first semester after transfer was described as experiencing transfer shock. In general, transfer students who experienced an improvement in semester GPA immediately after transfer are described as experiencing transfer ecstasy. However, this study aggregated this group with those students whose semester GPA declined by less than .3 at the end of the first semester after transfer. This combined group was described as not experiencing transfer shock.

Gender. Findings from several studies on the academic performance of traditional-aged students enrolled in baccalaureate programs suggest that there is a significant relationship between gender and academic performance (Keeley & House, 1993). On the other hand, some studies indicate that there is no relationship (Carlan & Byxbe, 2000). This study used gender as a categorical variable to test its effect on baccalaureate degree attainment.

Table 2 provides a description of how the dependent and independent variables were operationalized in each of the five research questions associated with this study.

Table 2

Description of Variables Utilized in this Study

Variable Name	Label	Description	Operational-ization of variables	Measure
Question 1				
Dependent Variables				
Junior year, first semester GPA	JSGPA	Semester GPA at end of the first semester in the upper division	Continuous, ranging from 0.0 to 4.0	<i>Continuous, single item measure</i>
Lower division final semester GPA	LSGPA	Semester GPA at end of the final semester in the lower division	Continuous, ranging from 0.0 to 4.0	<i>Continuous, single item measure</i>
Independent Variables				
Transfer Students	TRANS	Students transferring from the community college to the university	Categorical	<i>Categorical, single item measure</i>
Question 2				
Dependent Variable				
Junior year, First semester GPA	JSGPA	Semester GPA at end of the first semester in the upper division	Continuous, ranging from 0.0 to 4.0	<i>Continuous, single item measure</i>
Independent Variable				
Institution Type	INST	Institution where student first matriculated for baccalaureate studies	Categorical	<i>Categorical, with two levels</i>
Question 3				
Dependent Variable				
Upper Division Cumulative GPA	UDGPA	Cumulative GPA at end of the senior year	Continuous, ranging from 0.0 to 4.0	<i>Continuous, single item measure</i>
Independent Variables				
Transition Type	TRANS	Native students, transfer students who experienced transfer shock, and transfer students who did not experience transfer shock ^a	Categorical	<i>Categorical, with three levels</i>

Table 2 (Continued)

Variable Name	Label	Description	Operational-ization of variables	Measure
Question 4				
Dependent Variable				
Time to degree	TIME	No. of years between matriculation and baccalaureate attainment	Continuous, ranging from 4 to 6	<i>Continuous, single item measure</i>
Independent Variables				
Transition Type	TRANS	Native students, transfer students who experienced transfer shock, and transfer students who did not experience transfer shock ^a	Categorical	<i>Categorical, with three levels</i>
Question 5				
Dependent Variable				
Baccalaureate Attainment	BACC	Attainment of baccalaureate degree within 6 years of matriculation	Binary Measure 0 = Did not attain degree within 6 yrs 1 = Attained degree within 6 yrs	<i>Dichotomous, dummy coded</i>
Independent Variables				
Lower division GPA	LDGPA	Cumulative GPA at end of the lower division ^b	Continuous, ranging from 0.0 to 4.0	<i>Continuous, single item measure</i>
Institution Type	INST	Institution where student first matriculated for baccalaureate studies	Binary Measure 0 = Community College 1 = University	<i>Categorical, dummy coded</i>
Gender	GENDER	Student's gender	Binary measure 0 = male 1 = Female	<i>Categorical, dummy coded</i>

^a Transfer shock describes transfer students with a dip in GPA of .3 or more of a grade point on transfer.

^b For transfer students, cumulative Pre-transfer GPA.

Data Analysis

This study used both descriptive and inferential statistical methods to analyze the sample. First, univariate descriptive statistics were used to identify the characteristics of the analytic sample. Second, bivariate analyses were performed to identify possible relationships among the dependent and independent variables. Third, inferential statistics were used to answer the five research questions.

Descriptive Statistics

Univariate statistics. The characteristics of an analytic sample often determine how well the sample data can be used to make inferences about the population from which the sample is taken. According to Agresti and Finlay (1997), the more information a researcher knows about the characteristics of a sample, the more confident he or she will be in making inferences about the target population. Further, Hill (2008) suggests that a major objective of descriptive statistics is to identify tendencies or irregularities that could complicate the interpretation of inferential statistics. Descriptive statistics generally include both univariate and bivariate descriptions.

Researchers use univariate descriptive statistics to summarize numerical data on individual variables. O'Rourke et al. (2005) suggest that univariate statistics are useful for at least three important purposes. First, they allow the researcher to identify outliers and obvious errors. Second, by exploring the shape of the distribution, the researcher will be able to identify how close the variable approximates to a normal distribution. Third, O'Rourke et al. suggest that univariate statistics might provide answers to research questions involving

statistics such as averages, quartiles, and standard deviations. This study utilized univariate descriptive statistics such as frequency distributions, means, standard deviations, and measures of normality. Normality tests included tests for skewness and kurtosis.

Bivariate statistics. This study utilized bivariate descriptive statistics to provide correlation summaries of possible relationships among the study variables. In the case of the categorical variables, chi-square tests of independence were used to test the strength of the relationship between pairs of these variables. Similarly, Pearson's correlation coefficient, R , was used to test the strength of linear relationships among the interval variables.

Multicollinearity. When there are a number of interval independent variables influencing the outcome of a dependent variable, each independent variable may have a different effect on the dependent variable when acting alone than when combined with other independent variables (O'Rourke et al., 2005). This is called multicollinearity. This study used an intercorrelation matrix to test for multicollinearity among independent variables. Intercorrelation provides information on the relationships among independent variables and thus provides the same result regardless of the regression model used to predict the dependent variable (Menard, 1997). Multicollinearity among independent variables is problematic because it inflates the variances of the coefficient estimates for the independents (Allison, 1999). According to Allison, multicollinearity may lead to lack of statistical significance of individual variables even in cases where the overall regression model is significant.

In addition to the intercorrelation matrix, multicollinearity diagnostics were used to test for multicollinearity among the independent variables. Multicollinearity diagnostics

provide estimates of the relative importance of each variable in the model (O'Rourke et al., 2005; Hair, Black, Babin, Anderson, and Tatham, 2005). These diagnostics include Tolerance (TOL) and Variance Inflation Factor (VIF). TOL lies between 0 and 1 with values close to 0 indicating high multivariate correlation. VIF is the reciprocal of TOL and always has a value greater than 1. According to Allison (1999), although there is no formal cut-off point for VIF, for weaker regression models such as logistic regression, values of VIF above 2.5 may be a cause for concern.

The purpose of descriptive statistics is to provide information about the characteristics of a sample. On the other hand, researchers use inferential statistics to make speculations about the target population. Using the analytic sample of 200 transfer and native students, inferential statistics were used to answer the five research questions posed by this study.

Research Question 1

Is there a significant difference between Jamaican community college transfer students' mean semester GPA at the end of the semesters immediately before and immediately after transfer to the upper division of a Jamaican public university?

This question tested the null hypothesis that, within the target population of Jamaican public university juniors, there is no difference between community college transfer students' mean semester GPA at the end of the semesters immediately before and immediately after transfer. A paired-samples *t*-test was used to test this hypothesis. The paired-samples *t*-test was performed by matching each transfer student's semester GPA at the end of the semesters

immediately before and immediately after transfer to the four-year institution. The dependent variable was the difference between the transfer students' semester GPA at the end of the semesters immediately before and immediately after transfer. The single categorical independent variable was community college transfer students. The null hypothesis was represented symbolically by:

$$H_0: D = M_1 - M_2 = 0, \text{ against the alternative hypothesis,}$$

$$H_a: D = M_1 - M_2 \neq 0.$$

M_1 represented the transfer student's mean semester GPA during the final semester in the community college; M_2 represented the mean semester GPA at the end of the first semester after transfer to the university's upper division; and D represented the difference between these mean semester GPAs. A paired samples t -test was appropriate because observations from both samples were compared in a meaningful way (O'Rourke et al., 2005). O'Rourke et al. suggest that the strength of the paired samples t -test over the independent samples t -test is that in situations where the two samples can be paired in a meaningful way the paired samples t -test makes the differences between the pairs easier to detect. It was assumed that the samples were randomly selected, the distribution was normal, and the variances were equal.

A significance level of $\alpha = .05$ was used. This alpha level was used as the upper limit to reject the null hypothesis. That is, findings for the t -statistics indicating $p < .05$ provided evidence to reject the null hypothesis. The p -value is the probability, if the null hypothesis were true, of observing a value more extreme than the actual value observed.

Cohen's "d" effect size was also calculated. According to Cohen (1988), effect size measures the magnitude of the mean difference between sample means. It is used to determine if the mean difference is significant from both a statistical and a practical perspective.

Cohen's "d", while reported as a number, is usually interpreted as small, medium, or large. Cohen (1988) provides a guideline of .20, .50, and .80 as rough estimates of small, medium, and large effect size. Where a *t*-statistic indicates that the difference between two means is statistically significant but Cohen's "d" indicates that the effect size is small, most researchers usually consider the difference between the means as not having practical significance. Consequently, for this research question, benchmarks of $p < .05$ and effect size of $d > .5$ were used to determine statistical and practical significance, respectively.

Research Question 2

Is there a significant difference between Jamaican community college transfer students and native university students with respect to their mean semester GPA at the end of the first semester of the junior year?

This research question tested the null hypothesis that, within the target population of Jamaican university juniors, there is no difference between community college transfer students and native university students with respect to their mean semester GPA at the end of the first semester of the junior year. The interval dependent variable for this question was semester GPA at the end of the first semester of the junior year. The categorical independent

variable was type of institution. This variable had two levels: community college and university. The null hypothesis was represented symbolically by:

$H_0: M_1 = M_2$, against the alternative hypothesis,

$H_a: M_1 \neq M_2$, where M_1 represented the mean first semester junior year GPA for Jamaican community college transfer students and M_2 represented mean first semester junior year GPA for Jamaican native university students.

An independent samples *t*-test was used to analyze the difference between the transfer and native students mean semester GPA at the end of the first semester of the junior year. An independent samples *t*-test was appropriate because the dependent variable was an interval variable and the single independent variable was a categorical variable having two levels (O'Rourke, et al., 2005). In addition, the semester GPA for the transfer students was unrelated to that for the native students. Normal distribution and equal variances were assumed.

The significance level used for the independent samples *t*-test was $\alpha = .05$. This alpha level was used as the upper limit for the rejection of the null hypothesis. That is, findings for the independent-samples *t*-test indicating $p < .05$ provided evidence to reject the null hypothesis.

Cohen's "d" effect size was also calculated. Cohen's "d," while reported as a number, is usually interpreted as small, medium, or large. For this research question, benchmarks of $p < .05$ and effect size of $d > .5$ were used to determine statistical and practical significance, respectively.

Research Question 3

Are there significant differences between Jamaican community college transfer students who experienced transfer shock, Jamaican community college transfer students who did not experience transfer shock, and Jamaican native university students with respect to their mean upper division cumulative GPA at the end of the senior year?

This research question tested the null hypothesis that, within the population of Jamaican university juniors, community college transfer students who experienced transfer shock, community college transfer students who did not experience transfer shock, and native university students had equal mean upper division cumulative GPA at the end of the senior year. The interval dependent variable was mean upper division cumulative GPA at the end of the senior year. The categorical independent variable was transition type. This variable had three levels: native university students, transfer students who experienced transfer shock, and transfer students who did not experience transfer shock. Transfer shock is defined as a decline in semester GPA of .3 or more between the end of the last semester in the community college and the end of the first semester in the universities' junior year (Hills, 1965). The null hypothesis was represented symbolically by:

$H_0: M_1 = M_2 = M_3$, against the alternative hypothesis

$H_a: M_1 \neq M_2 \neq M_3$ (At least one pair of M_1 , M_2 , or M_3 was different).

M_1 represented the mean upper division cumulative GPA for transfer students who experienced transfer shock, M_2 represented the mean upper division cumulative GPA for transfer students who did not experience transfer shock, and M_3 represented the mean upper division cumulative GPA for native students.

A one-way Analysis of Variance (ANOVA) between-subjects design was used to measure the differences in mean cumulative GPA among the three groups. One-way ANOVA was the appropriate measure to use since the dependent variable was an interval variable and the single independent variable was a categorical variable having more than two levels (O'Rourke et al., 2005). Normal distribution, independent samples, and equal variances were assumed. However, O'Rourke et al. suggest that use of the ANOVA *F*-test will still produce valid results even when the assumption of normal distribution is violated.

ANOVA F-test. Using the ANOVA *F*-test, the null hypothesis was tested that the mean upper division cumulative GPAs of the three groups were equal. The ANOVA *F*-test is a measure of how the means of the different samples vary about the overall mean to how the observations in each sample vary about the sample mean (Agresti & Finlay, 1997). To test the null hypothesis, a significance level of $\alpha = .05$ was used. This alpha level was used as the benchmark to determine rejection or acceptance of the null hypothesis that there was no significant difference between the mean cumulative GPAs of the three groups.

Post hoc tests. According to O'Rourke et al. (2005), the ANOVA *F*-test only tells the researcher whether at least one pair of mean cumulative GPAs of the three groups is different; that is, if the difference between at least one pair of mean cumulative GPA is statistically significant. It does not tell which means are different, pairwise. When an ANOVA *F*-test indicates significant differences between pairs of means, post hoc tests are conducted to indicate which pairs are significantly different. This study used Tukey's Honestly Significant Difference (HSD) post-hoc test to identify the pairs of mean cumulative GPAs that were different. Tukey's HSD test is popular among researchers because it is a

powerful test for doing pairwise comparisons and it reduces the probability of committing a Type I error; that is, rejecting a null hypothesis when it is true (Bastick & Matalon, 2007).

Effect size. Reporting effect size is also critical in a one-way ANOVA. For this purpose, the most popular measures of effect size are R-squared (R^2) and Eta-squared (η^2). R-squared, also called the coefficient of determination, is a popular measure in correlation analysis. In the case of a one-way ANOVA, researchers interpret R-squared as the proportion of variance explained by the model (Levine, Page, Braver, & MacKinnon, 2003). R-squared can be used to determine if results from ANOVA *F*-test that are statistically significant are also meaningful (O'Rourke et al., 2005). According to Levine et al., in one-way ANOVA, both R-squared and Eta-squared produce the same results and are interpreted in the same way. For this research question, R-squared was used to measure effect size.

Research Question 4

For Jamaican students who complete the baccalaureate degree within six years of beginning baccalaureate degree studies, are there significant differences between community college transfer students who experienced transfer shock, community college transfer students who did not experience transfer shock, and native university students with respect to their mean time to degree?

This research question tested the null hypothesis that, within the population of Jamaican university juniors, community college transfer students who experienced transfer shock, community college transfer students who did not experience transfer shock, and native university students had equal mean 'time to degree.' The interval dependent variable was

time to degree. It is defined as the time (in years) taken for a Jamaican community college transfer student or a native university student to complete a baccalaureate degree from the point of initial matriculation to the point of graduation. The categorical independent variable was transition type. This variable had three levels--native university student, transfer student who experienced transfer shock, and transfer student who did not experience transfer shock. The null hypothesis was represented symbolically by:

$H_0: M_1 = M_2 = M_3$, against the alternative hypothesis,

$H_a: M_1 \neq M_2 \neq M_3$ (At least one pair of M_1 , M_2 , or M_3 was different). M_1 represented the mean time to degree for Jamaican community college transfer students who experienced transfer shock, M_2 represented the mean time to degree for Jamaican community college transfer students who did not experience transfer shock, and M_3 represented the mean time to degree for Jamaican native university students.

A One-way Analysis of Variance (ANOVA) F -test was used to measure the differences in time to degree among the three groups. The one-way ANOVA F -test was the appropriate measure for this research question since the dependent variable was an interval variable and the single independent variable was categorical with three levels (O'Rourke et al., 2005). Normal distribution, equal variances, and independence were assumed.

The ANOVA F -test is a measure of how the means of the different samples vary about the overall mean to how the observations in each sample vary about the sample mean (Agresti & Finlay, 1997). To test the null hypothesis, this study used a significance level of $\alpha = .05$. This alpha level was used as the benchmark to determine rejection or acceptance of

the null hypothesis that there was no significant difference among the mean time to degree of the three groups.

This study used Tukey's Honestly Significant Difference (HSD) post-hoc test to identify the pairs of mean cumulative GPAs that were different. Tukey's HSD test is popular among researchers because it is a powerful test for doing pairwise comparisons and it reduces the probability of committing a Type I error; that is, rejecting a null hypothesis when it is true (Bastick & Matalon, 2007). In addition, R-squared was used as the measure of effect size.

Research Question 5

What is the effect of student characteristics and institutional type on the likelihood that a Jamaican student will complete the baccalaureate degree within six years of beginning baccalaureate degree studies?

The dichotomous dependent variable for this question was baccalaureate degree attainment. This variable had two levels: attaining the baccalaureate degree within six years of initial matriculation into baccalaureate degree studies and not attaining the degree within six years. The independent variables were lower division GPA, gender, and type of institution. The variables section in this chapter provides a description of these variables.

A logistic regression model was used for this analysis. Logistic regression is appropriate in situations where the dependent variable is categorical with more than one level and the independent variables are either interval, categorical, or a mixture of both (Hosmer & Lemeshow, 2000). According to DesJardins (2001), logistic regression is a popular technique in higher education research where researchers are studying issues like the decision to apply

to an institution or not, persistence to graduation, and the influence of financial aid on enrollment. DesJardins further asserts that the prevalence of this method in higher education could be related to the fact that educational researchers often study dichotomous outcomes. Following a brief description of the logistic regression model, this chapter describes the model used for research question 5.

The logistic regression model. The logistic regression model was developed from a concept taken from probability, called odds. The odds of an event occurring are defined as the ratio of the number of times the event is expected to occur to the number of times it is expected not to occur. In general,

$$\text{Odds} = \frac{P(\text{success})}{P(\text{failure})} = \frac{P(X = 1)}{1 - P(X = 1)} = \frac{P}{1 - P}.$$

The logistic regression equation is formed from the odds by taking the logarithm of the odds and setting the results equal to a linear function of the independent variables. That is,

$$\text{Log} \left[\frac{P}{1 - P} \right] = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_iX_i,$$

where “a” represents the vertical intercept of a linear equation, x_i represents both interval and categorical independent variables, and b_i represents the coefficients of the independent

variable, x_i . The expression, $\text{Log} \left[\frac{P}{1 - P} \right]$ is generally written as $\text{Logit}(\pi)$ with π

representing the odds of the dependent variable being successful. Hence, the logistic regression equation becomes:

$$\text{Logit}(\pi) = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_iX_i. \quad (1)$$

In the case of logistic regression equations with a dichotomous dependent variable, the general technique in developing the model is to code the two categories of the dependent variables as 0 or 1, representing the absence (failure) or presence (success) of the characteristic, respectively (Hosmer & Lemeshow, 2000). According to Hosmer and Lemeshow, in the case of categorical independent variables, the technique is to use dummy variables to convert each level of each independent variable to a variable of its own. That is, if there are k levels of a categorical variable, the number of dummy variables is $(k-1)$ with the excluded level serving as the reference category.

Once the categorical variable is converted into dummy variables, dummy coding can then be used to identify the different levels (Hosmer & Lemeshow, 2000). Dummy coding uses only zeros and ones, with the reference category coded as zero. According to Hosmer and Lemeshow, each dummy variable is uniquely defined by assigning the value 1 to that category and a value of 0 to all other categories. In regression analyses, the coefficient of a given dummy variable compares that particular dummy variable with the reference category. The use of dummy variables allows a researcher to use a single regression equation instead of a separate equation for each level of each categorical independent variable (Agresti & Findlay, 1997).

In order to model the relationship between the outcome variable and the independent variables in a logistic regression model, researchers use a technique called odds ratio. Odds ratio is a measure of how much more likely an individual having a particular set of background characteristics will experience a particular outcome relative to an individual without those characteristics (Allison, 1999). In the logistic regression model, the odds ratio

for an individual predictor is computed by exponentiating the coefficient estimate for that particular predictor. Hosmer and Lemeshow (2000) suggest that the interpretation of the odds ratio depends on a number of factors. These include whether there is one or multiple independent variables, whether the variables are interval or categorical, and whether there is interaction or no interaction between the independent variables.

When the independent variable is measured on the interval scale, the odds ratio indicates the effect on the likelihood of success of the dependent variable that a one-unit change in the independent variable would produce (Karp, 2001). In the case of a dichotomous independent variable, dummy variables are used to convert the two levels of the variable to variables of themselves (Hosmer & Lemeshow, 2000). One of the dummy variables is assigned a value $x_i = 0$ and is the reference category. The other is assigned the value $x_i = 1$. According to Hosmer and Lemeshow, as a measure of association, the odds ratio approximates how much more likely it is for a particular outcome to be present among those with $x_i = 1$ than among those with $x_i = 0$. Hosmer and Lemeshow further state that when there are multiple independent variables in the model, the explanation for the odds ratio for any given variable takes into account the other variables in the model.

Odds ratio can also be used to explain interaction terms in a logistic regression model. Two variables interact if they produce different results acting in combination than they would when acting independently (CRMportals Inc, 2006). CRMportals suggests that in the case of an interval and a categorical independent variable, the coefficient of the interaction term indicates the effect of the interval independent variable on the dependent variable at the different levels of the categorical variable, controlling for the other variables

in the model. CRMportals also suggests that when there is interaction between two dichotomous independent variables, the coefficients of the individual terms (called main effect terms) are not to be interpreted in the normal way as if there were no interaction. Rather, the interpretation must take into account the fact that variables are now part of an interaction.

Logistic regression model for research question 5. For this research question, the logistic equation model was of the form:

$$\text{Logit (BACC)} = a + b_1 (\text{LDGPA}) + b_2 (\text{INST}) + b_3 (\text{GENDER}) + b_4 (\text{LDGPA} * \text{INST}) + b_5 (\text{LDGPA} * \text{GENDER}) + b_6 (\text{INST} * \text{GENDER}) \quad (2)$$

The dependent variable, baccalaureate degree attainment (BACC) was coded as 1 for students who graduated within six years and as 0 for those who did not graduate within six years. The group of students categorized as those who did not graduate within six years included those who dropped out either in the junior or senior years and those who were still enrolled at the university after six years. In the case of the independent variables, there were one interval and two categorical variables. The categorical variable, institution type, had two levels: community college and university. Using dummy coding, university was coded as 1 and community college, the reference category, was coded as 0. Gender had two levels: male and female. Female was coded as 1 and male, the reference category, was coded as 0. The interval independent variable, lower division GPA was labeled as LDGPA. This logistic regression equation also had interaction terms. The entries ($X_i * X_j$) represented these interaction terms.

The null hypothesis for the logistic regression model was $H_0: b_1 = b_2 = \dots b_k = 0$; that is, none of the independent variables in the model was significant in predicting baccalaureate degree attainment. The alternative hypothesis was $H_a: b_k \neq 0$ for at least one category of one of the independent variables in the model. The alternative hypothesis suggested that at least one of the independent variables in the model was useful in explaining baccalaureate degree attainment.

Researchers generally use several tests to assess logistic regression results. When used in combination, these tests determine the suitability of the logistic regression model to predict outcome (Peng, Lee, & Ingersoll, 2002). According to Peng et al., a good assessment of a logistic regression model should include an overall evaluation of the model, statistical tests of the significance of the individual predictors, goodness of fit statistics, and tests that assesses the predictive power of the model.

The overall assessment of the model is usually conducted using the global test of independence, which tests the null hypothesis that none of the independent variables is useful in explaining the outcome. For this research question, the likelihood ratio test (LRT) was the one used. The likelihood ratio test is a test of the significance of the difference between the likelihood ratio, $-2\log$ likelihood ($-2LL$), for the full model minus the likelihood ratio for the reduced model having no predictors (Garson, 2008). The lower the value of the likelihood ratio test, the better fitting the model (Hair, et al., 2005).

A limitation of the likelihood ratio test is that it tests the significance of the overall model but gives no indication of the significance of the individual predictors (Aldrich & Nelson, 1984). Researchers therefore use the Wald chi-square statistics (also called the Wald

test), which provides information on the significance of each individual predictor in the full model. The value for the Wald test is calculated by dividing the coefficient of each independent variable by its standard error and squaring the result (Allison, 1999; Hosmer & Lemeshow, 2000). Associated with each Wald statistic is a p-value, which determines the significance of each independent variable in explaining the outcome.

In addition to computing the Wald statistics for each independent variable, this study also computed their coefficient estimates and their related odds ratios. However, coefficient estimates are not intuitively appealing (Allison, 1999; Karp, 2001). Consequently, the odds ratio, calculated by exponentiating each variable's coefficient estimate, was used to report the relationship between the independent variables and dependent variable.

Further, the Hosmer-Lemeshow goodness-of-fit test (HL test) was used to assess how well the data fitted the model. This technique, called model fit statistics, is used to evaluate the overall logistic regression model. The HL test compares the observed and predicted values of a dependent variable and determines if there is a good fit between both (Hosmer & Lemeshow, 2000). A high p-value for the H-L test suggests a good fit. According to Hill (2008), a high p-value for the HL test is desirable since it indicates the absence of evidence that the observed and predicted values of a dependent variable are different.

Finally, an assessment was made of how well the independent variables explained the dependent variable. According to Allison (1999), it is possible to have a good fit between predicted and observed values of the dependent variables yet have a model with low predictive power. This study used a pseudo R-squared value to assess the strength of the overall relationship between the independent and dependent variables. Pseudo-R-squared is

analogous to R-squared in linear regression models but has a tendency to underestimate model strength (Garson, 2008).

The most popular measure of association is Cox-Snell R-squared (generalized R^2). This measure is based on the likelihood ratio test for testing the null hypothesis that none of the independent variables is useful in explaining the dependent variable (Cox & Snell, 1989, cited in Allison, 1999). Somers' d is another measure used to assess the strength of the relationship between the independent and dependent variables. Values for Somers' d vary between 0 and 1 with values closer to 1 indicating stronger association.

Methodological Limitations

This study had several limitations. First, there was no previously published study using Jamaican institutions that compared the performance of community college transfer students and native university students. Consequently, the researcher had no guide in relation to prior studies in the Jamaican context. Instead, the researcher had to be guided by studies conducted in the United States. The extent to which these United States studies are relevant in the Jamaican context is unknown.

Second, the study relied on transcript-type data. This placed a severe limitation on variables available for use in the logistic regression model. In addition, the researcher was unable to test reliability and validity.

Third, the target population and sample were narrowly defined. The target population included only university juniors from one faculty at one public institution. In addition, the sample was taken from a single cohort. Consequently, the researcher had to be cautious when

using findings from the study to make inferences outside of this narrowly defined population. This limitation created challenges in terms of making recommendations for both policymaking and practice.

Fourth, while stratified sampling guaranteed adequate representation from each category of students studied, one cannot be certain that this sample was representative of the target population. For example, the number of native university students in the target population was more than twice the number of community college transfer students. However, the study's analytic sample used equal numbers of both groups. While selection of equal numbers of transfer and native students was ideal for using one-way ANOVA, the researcher had to exhibit caution in making inferences about the target population.

Finally, the logistic regression model can only provide evidence of an association between the independent and dependent variables. It cannot determine causation. Consequently, even with a strong relationship between the independent and dependent variables, the researcher was restricted in interpreting the findings and in making conclusions.

Chapter Summary

This chapter covered the statistical methods used in this study. The study was non-experimental and cross-sectional. The target population was full-time university juniors pursuing baccalaureate studies in the Faculty of Business and Management at the University of Technology (UTECH), Jamaica. Stratified random sampling was used to select equal

numbers of transfer juniors enrolled under a franchising arrangement between UTECH and the community colleges and native UTECH juniors pursuing a similar course of study.

The data analysis section covered both the descriptive and inferential statistics used. Descriptive statistics included both univariate and bivariate statistics. Inferential statistics included paired-samples t-test, independent samples t-test, one-way ANOVA, and logistic regression. The next chapter reports on findings from both the descriptive and inferential statistics.

CHAPTER FOUR

Findings

Previous chapters established that the purpose of this study was to compare the academic performance of transfer students who began their baccalaureate studies at Jamaican community colleges under franchising agreements between the community colleges and the public universities with the academic performance of students who began their baccalaureate studies at the public universities. The conceptual framework postulated that the students' academic performance in the university's upper division was dependent primarily on their background characteristics and on the type of institution they previously attended. Further, it was perceived that the students' academic performance in the university's upper division was affected by how well they integrate academically and socially into that division.

No attempt was made to test either Tinto's (1987, 1993) or Bean and Metzner's (1985) models. However, findings from previous studies on the academic and social integration of transfer students (Cameron, 2005; Eggleston & Laanan; 2001; Johnson, 2005; Laanan, 2001; Townsend & Wilson, 2006, 2009) was used as a guide in interpreting possible transition effects the students in this study might have encountered. The study sought to answer the following research questions:

1. Is there a significant difference between Jamaican community college transfer students' mean semester GPA at the end of the semesters immediately before and immediately after transfer to the upper division of a Jamaican public university?

2. Is there a significant difference between Jamaican community college transfer students and native university students with respect to their mean semester GPA at the end of the first semester of the junior year?
3. Are there significant differences between Jamaican community college transfer students who experienced transfer shock, Jamaican community college transfer students who did not experience transfer shock, and Jamaican native university students with respect to their mean upper division cumulative GPA at the end of the senior year?
4. For Jamaican students who complete the baccalaureate degree within six years of beginning baccalaureate degree studies, are there significant differences between Jamaican community college transfer students who experienced transfer shock, Jamaican community college transfer students who did not experience transfer shock, and Jamaican native university students with respect to their mean time to degree?
5. What is the effect of student characteristics and institutional type on the likelihood that a Jamaican student will complete the baccalaureate degree within six years of beginning baccalaureate degree studies?

This chapter presents the results of the data analysis outlined in the preceding chapter. First, it reports relevant descriptive statistics. Second, it reports inferential statistics for each of the five research questions. The chapter ends with a summary of the major findings from the research questions. Appendices D - I provide details of the Statistical Analysis System (SAS[®]) output derived from the data analyses.

Descriptive Statistics

The analytic sample was comprised of 200 students enrolled as juniors in the School of Business at the UTECH, Jamaica during the fall of 2004. The School of Business is one of two schools in the Faculty of Business and Management at the university. It is the largest school within the institution, enrolling nearly 40% of the university's population of 10,000 students. The Faculty of Business and Management is the largest of six faculties in the institution, enrolling approximately 50% of the university's student population. Annually, the School of Business enrolls approximately 150 community college transfer juniors under a franchising arrangement between the university and the Jamaican community colleges. Simultaneously, the School enrolls approximately 350 native university juniors doing a similar program.

Profile of Analytic Sample

Table 3 provides summary descriptive statistics for the categorical variables in the total sample while Table 4 provides details of these variables when the sample is bifurcated by institution type.

Institution type. Institution type is defined in relation to the type of institution where a student first matriculated for baccalaureate studies. Those students who matriculated into baccalaureate studies at the community college and then transferred to the university's upper division were called transfer students, while those who matriculated at the university were called native students. Of the 200 students in the analytic sample, 50% were transfer students and the other 50% were university native students (Table 3).

Table 3

Description of Total Sample in Relation to Categorical Variables (N = 200)

Categorical Variable	Number	% of Total
Institution Type		
Community College Transfers	100	50
University Natives	100	50
Gender		
Female	132	66
Male	68	34
Time to Degree		
Four years	155	78
Five years	11	5
Six years	5	3
> 6 years	10	5
Drop-outs		
Junior year	8	4
Senior year	11	5

Gender. As noted in Table 3, the gender composition of the 200 students in the analytic sample was 66% female and 34% male. When this was bifurcated in relation to the institution type (Table 4), it showed that the gender composition of the community college transfer students was 68% female and 32% male, while that of the native university students was 64% female and 36% male. These figures are considerably higher than the gender composition of the university, which showed a composition of 55% female and 45% male.

Table 4

Description of Categorical Variables Bifurcated by Institution Type

Categorical Variable	CC Transfers N=100	% Transfers	Native Students N =100	% Natives
Gender				
Female	68	68	64	64
Male	32	32	36	36
Time to Degree				
Four years	76	76	79	79
Five years	5	5	6	6
Six years	3	3	2	2
> Six years	5	5	5	5
Drop-outs				
Junior year	3	3	5	5
Senior year	8	8	3	3
Transition Type				
Transfer shock	37	37		
No transfer shock	63	63		

Time to degree. Time to degree was used as one of three proxies for academic performance. The other two were GPA and baccalaureate degree attainment. Time to degree

can be interpreted both as a categorical (ordinal) and as an interval variable. As a categorical variable, it is defined as having four levels: students completing the degree in four years, five years, six years, or more than six years. Table 3 provides results for time to degree when used as a categorical variable.

Overall, 78 % of the analytic sample completed the degree in four years, an additional 5% in five years, and another 3 % in 6 years. This gave an overall figure of 86% of the sample completing the degree within six years. Of the 29 students who did not complete the baccalaureate within 6 years, 28% dropped out in the junior year, 38% dropped out in the senior year, and the remaining 34% were still enrolled in the institution beyond the 6 years period used for this study. As a percentage of the total sample, approximately 4% dropped out in the junior year, 5% in the senior year, and 5% were enrolled beyond 6 years.

When the sample was bifurcated in relation to the categorical variable, institution type (Table 4), the study showed that 76% of the transfer students completed the baccalaureate degree in four years while 24% did not complete within that time. Simultaneously, 79% of the native students completed the baccalaureate degree in four years while 21% did not complete within that time. Another 8% of each group took between five and six years to complete the degree. Overall, this amounted to 84% of the transfer students completing within six years as compared to 87% of the university natives.

Interval variables. Table 5 provides data on the mean (M) and standard deviation (SD) of the interval variables when the sample is bifurcated by institution type. As noted in Table 5, the overall mean time to degree and standard deviation for the 171 students who completed the baccalaureate degree successfully within six years was $M = 4.12$, $SD = 0.41$.

Table 5

Mean and Standard Deviation of Interval Variables

Variables	Classification	N	Mean	SD
Time to Degree	Community College Transfers	84	4.13	.43
	University Natives	87	4.11	.37
	Total	171	4.12	.41
Age (years)	Community College Transfers	99	20.0	1.54
	University Natives	100	21.14	1.47
	Total	199	20.56	1.61
Lower Division Cumulative GPA	Community College Transfers	100	2.61	.35
	University Natives	100	2.69	.40
	Total	200	2.65	.38
Lower Division, Last Semester GPA	Community College Transfers	100	2.74	.42
	University Natives	100	2.88	.48
	Total	200	2.80	.46
Junior Year, First Semester GPA	Community College Transfers	100	2.64	.37
	University Natives	100	2.66	.56
	Total	200	2.65	.48
Junior Year Cumulative GPA	Community College Transfers	100	2.66	.41
	University Natives	100	2.67	.54
	Total	200	2.66	.48
Senior Year Cumulative GPA	Community College Transfers	95	2.93	.32
	University Natives	93	2.97	.37
	Total	188	2.95	.35
Upper Division Cumulative GPA	Community College Transfers	95	2.82	.31
	University Natives	93	2.85	.37
	Total	188	2.83	.34

When this was bifurcated by institution type, it revealed that the 87 university native students ($M = 4.11$, $SD = .37$) who completed the degree within six years, on average, took about the same time to complete as the 84 community college transfer students ($M = 4.13$, $SD = .43$). Table 5 also shows the mean age of both groups of students. On average, the native university students ($M = 21.14$, $SD = 1.47$) were one year older than the community college transfer students were ($M = 20$, $SD = 1.54$).

The study used both cumulative and semester GPAs to determine students' academic performance at different stages as they progressed toward baccalaureate degree attainment. As noted in Table 5, at the end of the lower division, the mean cumulative GPA of the native students ($M = 2.69$, $SD = .40$) was about .08 of a grade point higher than that of the transfer students ($M = 2.61$, $SD = .35$). As both groups of students progressed toward baccalaureate degree attainment, the mean cumulative GPA of the transfer students exhibited small increases during both the junior ($M = 2.66$, $SD = .41$) and senior ($M = 2.82$, $SD = .31$) years. On the other hand, that of the native students first exhibited a small decline in the junior year ($M = 2.67$, $SD = .54$) but recovered slightly in the senior year ($M = 2.85$, $SD = .37$). Despite these fluctuations in the native students' academic performance, they continued to exhibit a slightly higher mean cumulative GPA than the transfer students did.

Tests for Normality

This study assumed that the distribution of each interval variable around its sample mean was approximately normal. Skewness and kurtosis were used as numerical measures to provide evidence of how reasonable the normal distribution assumptions were. Table 6

provides a summary of the skewness and kurtosis of several of the interval variables used in the sample. Values of skewness and kurtosis close to zero provided evidence of normality. As noted in Table 6, values of skewness and kurtosis for all interval variables, except for time to degree, supported the assumption of normality.

Table 6

Skewness and Kurtosis of Interval Variables

Variables	Skewness	Kurtosis
Lower Division Cumulative GPA	.15	-.34
Lower Division, Last Semester GPA	.008	-.55
Junior Year Cumulative GPA	-1.20	2.51
Senior Year Cumulative GPA	-.55	-.013
Upper Division Cumulative GPA	-.39	.034
Time to Degree	3.5	11.9
Age	.91	1.11

Bivariate Association of Dependent and Independent Variables

In determining variables to be used in a regression model, a researcher often uses bivariate associations to identify the strength of the relationships between the variables. If two or more independent variables are highly intercorrelated, the researcher may either combine them into one variable or use only one of these variables in the model. If an independent variable shows a strong relationship with the dependent variable, this provides a

case for including that independent variable in the model. This study used Pearson's correlation for bivariate association to identify the relationship between pairs of interval variables. Similarly, it used chi-square analyses to identify the relationship between pairs of categorical variables.

Correlation of Interval Variables

Correlation analysis was determined for the interval variables in order to identify the strength of the relationship between pairs of these variables. In particular, this researcher performed intercorrelation between pairs of the GPA variables to limit the number of such variables in the logistic regression model. High correlation between any two GPA variables provided support for one of these variables to be removed from the regression model. Table 7 provides summary data on the mean, standard deviation and bivariate association of these GPA variables. Intercorrelations were also performed between each GPA variable and time to degree to determine the strength of these associations. With the elimination of all elements with missing data, the final sample size used for the determination of the correlations was $N= 171$.

The results of the correlation analysis indicated that, at an alpha level of .05, the correlation between the students' GPAs at all the different levels was statistically significant and positive. The highest level of association was between the cumulative GPA at the end of the junior year and the upper division cumulative GPA, $r(169) = .94, p < .0001$. The lowest level of association was between the cumulative GPA at the end of the lower division and the

senior year cumulative GPA, $r(169) = .56, p < .0001$. Even at its lowest value, Pearson's correlation coefficients suggested strong association between the GPA variables.

Overall, the relationships between the GPA variables at the different levels suggested that students who perform well academically at one level were likely to do so at the next level. Similarly, students who performed poorly at one level were likely to perform poorly at the next level. These high levels of association between the GPA variables at the different levels provided support for using only one of the GPA variables as an independent variable in the logistic regression model.

Table 7

Pearson's Correlation Matrix for Interval Variables, N= 171

Variables	1	2	3	4	5	6
1. Lower Division Cum ^a . GPA	1.00					
2. Junior Year 1 st Semester GPA	.67***	1.00				
3. Junior Year Cum. GPA	.73***	.92***	1.00			
4. Senior Year Cum. GPA	.56***	.73***	.78***	1.00		
5. Upper Division Cum. GPA	.69***	.87***	.94***	.92***	1.00	
6. Time to Degree	-.36***	-.31***	-.36***	-.38***	-.34***	1.00

^a Cumulative

** $p < .01$

*** $p < .001$

The correlation between the GPA variables and the variable time to degree was also statistically significant but negatively correlated. As noted in Table 7, the students' academic

performance during the senior year provided the best indication as to the time taken to attain the baccalaureate degree, $r(169) = -.38, p < .0001$. This suggested that a student with a high senior year GPA was more likely to graduate in a shorter time than one with a low senior year GPA would. Although the students' GPA for the first semester of the junior year and their time to degree was also significant and negatively correlated, this GPA had the least effect on time to degree, $r(169) = -.31, p < .001$. This suggested that, among the student's GPA at the different levels, his or her GPA at the end of the first semester of the upper division had the least influence on the time that student was likely to take to finish the baccalaureate degree.

Cross-Tabulation of Categorical Variables

The study also included chi-square tests of independence at an alpha level of .05. These tests were conducted through cross-tabulation of pairs of categorical variables and were used to determine if significant bivariate association existed between these variables. In particular, these tests provided preliminary information on the relationship between the categorical independent variables and the dichotomous dependent variable used in the logistic regression model. In addition, bivariate relationships, which aided in the explanation of the findings, but were not specifically addressed in the research questions, were also analyzed.

First, the categorical variable, institution type, was recoded and converted from two to three categories: transfer students who experienced transfer shock, transfer students who did not experience transfer shock, and native university students. This new variable,

transition type, defined the transition effect on community college transfer students moving to the senior institution.

The relationship between the variables transition type and pre-transfer GPA was analyzed. Table 8 presents results of the cross-tabulation between these two variables. Using the mean pre-transfer semester GPA of 2.8, transfer students were categorized into two groups: students who obtained a high GPA prior to transfer ($M \geq 2.8$) and those who obtained a low GPA prior to transfer ($M < 2.8$). As noted in Table 8, this relationship was statistically significant, $\chi^2 (1, N= 100) = 11.68, p = .001$. When other variables were ignored, transfer students who obtained high pre-transfer GPA were more likely to experience transfer shock than those with low pre-transfer GPA. Approximately 70% of the students who experienced transfer shock were in the high Pre-transfer GPA category while 65% of those who did not experience transfer shock were in the low GPA category.

Second, the relationship between institution type and time to degree was analyzed. In order to satisfy the minimum requirement of five subjects to each cell in the contingency table, time to degree was recoded from a categorical variable having three levels to one having two levels. The two new levels were “students who graduated within four years” and “students who graduated within five to six years.”

Table 8

Cross-Tabulation of Pre-Transfer GPA and Transition Type

Pre-Transfer Semester GPA	Transition Type		χ^2	p
	Transfer students not experiencing transfer shock	Transfer students experiencing transfer shock		
High GPA	22 (35%)	26 (70%)	11.67	.0006
Low GPA	41 (65%)	11 (30%)		
Total	63	37		

Table 9 summarizes the cross-tabulation of institution type and time to degree. As noted in Table 9, at an alpha of .05, there was no statistically significant relationship between institution type and time to degree; $\chi^2(1, N= 171) = .0054, p = .94$. When all other variables were ignored, the difference between the times a transfer student and a native student took to complete the baccalaureate degree was negligible.

Table 9

Cross-Tabulation of Institution Type and Time to Degree

Time To Degree(yrs)	Type of Institution		χ^2	P
	CC Transfers	University Natives		
Graduated Within Four Years	76 (90%)	79 (91%)	.0054	.94
Graduated Within Five to Six Years	8 (10%)	8 (9%)		
Total	84	87		

Third, the relationship between institution type and baccalaureate degree attainment was analyzed (Table 10). As noted in Table 10, this relationship was statistically nonsignificant, $\chi^2(1, N= 200) = .36, p = .55$. When all other variables were ignored, there was no difference in the six-year graduation rate between transfer and native students.

Table 10

Cross-Tabulation of Institution Type and Baccalaureate Degree Attainment

Baccalaureate Degree Attainment	Type of Institution		χ^2	p
	CC Transfers	University Natives		
Graduated Within six years	84 (84%)	87 (87%)	.36	.55
Did not Graduate Within six years	16(16%)	13 (13%)		
Total	100	100		

Fourth, the relationship between transition type and baccalaureate degree attainment was analyzed (Table 11). As noted in Table 11, the association between transition type and baccalaureate degree attainment was statistically nonsignificant, $\chi^2(2, N= 200) = 3.6, p = .16$. When other variables were ignored, the study found no clear distinction among the six-year graduation rates of the three groups.

Table 11

Cross-Tabulation of Transition Type and Baccalaureate Degree Attainment

Baccalaureate Degree Attainment	Transition Type			χ^2	p
	Transfer Shock ^a	No Transfer Shock ^b	University Natives		
Graduated Within Six Years	28(76%)	56 (89%)	87(87%)	3.65	.16
Did not Graduate Within Six Years	9(24%)	7(11%)	13(13%)		
Total	37	63			

^a Students who did not experience transfer shock

^b Students who experienced transfer shock

Finally, the relationship between gender and baccalaureate degree attainment was analyzed (Table 12). As noted in Table 12, the association between gender and baccalaureate degree attainment was statistically significant $\chi^2(1, N= 200) = 4.75, p < .05$. The level of association, as reported by both Cramer's V and the phi coefficient (Φ) was -.15, which is a weak negative relationship. When all other variables were ignored, females were more likely to graduate within six years than were males were.

Table 12

Cross-Tabulation of Gender and Baccalaureate Degree Attainment

Baccalaureate Degree Attainment	Gender		χ^2	Φ
	Male	Female		
Graduated Within Six Years	53 (78%)	118(89%)	4.74*	-.15
Did not Graduate Within Six Years	15(22%)	14(11%)		
Total	68	132		

*p = .05

Multicollinearity Diagnostics

While Pearson's correlation and chi-square tests are used to test the association of combinations of independent and dependent variables, multicollinearity diagnostics are used to test the association of independent variables only. Multicollinearity occurs when there are strong linear dependencies among the independent variables in a regression model (Allison, 1999). According to Allison, one of the effects of multicollinearity among the independent variables is that it can cause these variables to become unstable, thereby making it problematic to discern distinct effects. Consequently, this study tested the existence of multicollinearity among the independent variables using Tolerance values (TOL) and variation inflation factors (VIF).

By calculating TOL and VIF, this study determined the level of multicollinearity among the possible independent variables for the logistic regression model. TOL values

range between 0 and 1. As a measure of multicollinearity, low TOL suggests high multicollinearity. According to Allison (1999), for weaker regression models such as logistic regression, a TOL value below .40 is a cause for concern. VIF is the reciprocal of tolerance; that is, $VIF = \frac{1}{TOL}$.

VIF values range from one to infinity. For logistic regression models, a VIF value above 2.5 is a cause for concern (Allison, 1999). Table 13 provides a summary of VIF and TOL values for possible variables for the logistic regression model. As noted in Table 13, a high level of multicollinearity existed among the GPA variables. This suggested that using more than one of these GPA variables in a logistic regression model could cause some instability in the model.

Table 13

Multicollinearity Diagnostics for Several Independent Variables

Variables	Tolerance	Variance Inflation Factor
Gender	.93	1.075
Lower Division GPA	.42	2.36
Junior Year GPA	.09	11.50
Upper Division GPA	.09	10.50
Institution Type	.97	1.03

Findings from the Research Questions

This section reports the results of the data analysis for the five research questions. Research question 1 used mean semester GPA to determine if transfer shock existed among Jamaican community college students enrolled under a franchising arrangement between Jamaican community colleges and the University of Technology, Jamaica. Research question 2 used mean semester GPA to determine if there was a difference in the academic performance of Jamaican community college transfer students and native university students after one semester in the university's upper division.

Research questions 3 and 4 used upper division cumulative GPA and time to degree to compare the performance of the students categorized as transfer students who experienced transfer shock, transfer students who did not experience transfer shock, and native university students. Finally, research question 5 used a logistic regression model to determine the effect of institutional type and student characteristics on the likelihood of a student completing the baccalaureate within six years.

Research Question 1

Is there a significant difference between Jamaican community college transfer students' mean semester GPA at the end of the semesters immediately before and immediately after transfer to the upper division of a Jamaican public university?

The analytic sample for this study was comprised of a stratified sample of 100 community college transfer juniors and 100 native university juniors registered in the School of Business at the University of Technology, Jamaica, during 2004-2005. This research

question analyzed the academic performance of the 100 community college transfer juniors at the end the semesters immediately before and after their transfer to the upper division of the university. The aim of this question was to determine if the phenomenon of transfer shock existed among Jamaican community college students at the point of transfer to the junior year at a Jamaican public university. Prior to their transfer, these students would have successfully completed two years at a Jamaican community college under a franchising arrangement between the community colleges and the university.

This study analyzed these results using a paired samples *t*-test at an alpha level of .05. The paired *t*-test analysis revealed that the difference between the transfer students' mean semester GPA immediately before transfer ($M = 2.74$, $SD = .42$) and their mean semester GPA at the end of the first semester of the junior year ($M = 2.64$, $SD = .37$) was statistically significant, $t(99) = 2.77$, $p < .05$. These results are displayed in Table 14. As noted in Table 14, the observed difference between the transfer students' mean semester GPA immediately before and immediately after transfer was .10 and the 95% confidence interval extended from .02 to .17. These results suggest that, based on mean semester GPA scores, the transfer students' academic performance in the semester prior to transfer was superior to their academic performance in the semester immediately after transfer.

However, based on Cohen's *d* effect size, the magnitude of the mean difference in the students' semester GPA was small. This effect size was computed as $d = .28$. According to Cohen's (1988) guidelines for *t*-tests, this represents a small effect. This suggests that from a statistical perspective, the difference between the two mean GPA scores was significant but from a practical perspective, it might be considered unimportant.

Based on these findings, there appeared to be some evidence of a significant dip in semester GPA when Jamaican community college transfer students enrolled in the upper division of the university. However, this dip in mean semester GPA of .1 was well below the dip of .3, which is the benchmark researchers use to define transfer shock (Hills, 1965). It is therefore reasonable to conclude that, as a group, the Jamaican community college transfer students did not experience transfer shock.

Table 14

Paired-Samples T-Test for Mean Semester GPA of Transfer Students

Variable	N	Mean GPA	SD	t	Effect Size (d)
Lower Division , Final Semester GPA	100	2.74	.42		
Junior Year, First Semester GPA	100	2.64	.37		
Difference		.10	.36	2.77*	.28

* $p < .05$

Research Question 2

Is there a significant difference between Jamaican community college transfer students and native university students with respect to their mean semester GPA at the end the first semester of the junior year?

Data for this research question were gathered from a stratified random sample of 100 community college transfer students and 100 native university students registered as juniors

in the School of Business at the University of Technology (UTECH), Jamaica, during fall 2004. An independent samples t-test at an alpha level of .05 was used to compare the transfer and native students' mean semester GPA at the end of the first semester of the junior year. The null hypothesis for this research question indicated that there was no difference between the academic performance of Jamaican community college transfer junior and native university juniors with respect to their mean semester GPA at the end of first semester of the junior year. Levene's test for the equality of variances indicated that the difference of variance was significant ($F [99, 99] = 2.26, p < .0001$). Hence, the t-test was conducted using unequal variances t-test.

This analysis revealed that the difference between the mean semester GPA of the transfer and native students was nonsignificant, $t (172) = -.25, p = .80$. The sample means are displayed in Table 15. As noted in Table 15, the mean semester GPAs of the native students ($M = 2.66, SD = .56$) and transfer students ($M = 2.64, SD = .37$) were extremely close. The observed difference between means was $-.02$ and the 95% confidence interval for the difference between means extended from $-.15$ to $.11$. These results suggest that, based on mean semester GPA scores, at the end of the first semester in the university's upper division, the academic performance of both the transfer and the native students was about the same. Although the t-test indicated that the academic performance of the two groups of students was statistically indistinguishable, results from Table 15 suggests that the native students slightly outperformed the transfer students.

Table 15

Independent-Samples T-test for Mean Semester GPA of Transfer and Native Students

Classification	Sample Size (n)	Mean First Semester Junior Year GPA	SD	t	p
Institution Type					
Community College	100	2.64	.37		
University	100	2.66	.56		
Difference		-.02	.48	-.25	.80

Research Question 3

Are there significant differences between Jamaican community college transfer students who experienced transfer shock, Jamaican community college transfer students who did not experience transfer shock, and Jamaican native university students with respect to their mean upper division cumulative GPA at the end of the senior year?

Research question 3 addressed the overall academic performance of both the transfer students and the native university students at the end of the senior year. Upper Division cumulative GPA was the measure used as proxy for academic performance. In this analysis, the transfer students were bifurcated into those who experienced transfer shock and those who did not experience transfer shock, while the native students were kept as a single category. Together, these three groups comprised a new variable, transition type, which was used as the independent variable for this question. Based on previous research, a student was

categorized as experiencing transfer shock if he or she experienced a decline in semester GPA of .3 or more during the semesters immediately before and after transfer (Hills, 1965). Otherwise, the transfer student was categorized as not experiencing transfer shock

For this research question, the study used a one-way ANOVA between-subjects design to compare the mean upper division cumulative GPA of Jamaican community college transfer students who experienced transfer shock, those transfer students who did not experience transfer shock, and native university students. The alpha level used was .05. Using the ANOVA *F*-Test, the study found the mean upper division cumulative GPA of the three groups to be statistically nonsignificant, $F(2, 185) = .25, p = .77$. These results are displayed in Table 16. These results suggest that, based on the students' cumulative upper division GPA at the end of the senior year, the academic performance of the three groups of students was about the same. Specifically, those transfer students who experienced transfer shock and those who did not experience the phenomenon were performing just as well, academically, as the native students were.

Although statistically indistinguishable, there were small differences among the upper division GPA of the three groups. These differences are displayed in Table 17. As noted in Table 17, the mean upper division cumulative GPA for the native university students ($M = 2.85$), was slightly higher than those for the students who did not experience transfer shock ($M = 2.82$) and for those who experienced transfer shock ($M = 2.82$).

Table 16

ANOVA Table Investigating Transition Type and GPA

Source	DF	SS	MS	F Value	p
Model (Transition Type)	2	.06	.03	.26	.77
Error (Within Group)	185	21.71	.12		
Total	187	34.30			

Table 17

Tukey's Post-Hoc Test for Upper Division GPA

Variables	Mean
Transfer Shock	2.82
No Transfer Shock	2.82
University Natives	2.85

Research Question 4

For Jamaican students who complete the baccalaureate degree within six years of beginning baccalaureate degree studies, are there significant differences between community college transfer students who experienced transfer shock, community college transfer students who did not experience transfer shock, and native university students with respect to their mean time to degree?

The study used a one-way ANOVA between-subjects design to compare the mean time to degree of the three levels of the independent variable, institution type. The three levels were: Jamaican community college transfer students who experienced transfer shock, transfer students who did not experience transfer shock, and Jamaican native university students. This analysis included only the 171 students who completed the degree within six years. Of the group of 29 non-completers, 10 were enrolled beyond the six-year period used for this study, 8 dropped out in the junior year, and 11 dropped out in the senior year.

Using the ANOVA *F*-Test at an alpha level of .05, the study found the pairwise difference between the mean time to degree for the groups to be statistically nonsignificant, $F(2, 168) = 1.17, p = .3$. These results are displayed in Table 18. These results suggest that, based on time to degree, the academic performance of the three groups of students was about the same. Specifically, those transfer students who experienced transfer shock and those who did not experience transfer shock took about the same amount of time to complete the baccalaureate degree as the native students took.

Although statistically indistinguishable, the mean time to degree for students who experienced transfer shock ($M = 4.04$) was slightly lower than that of the native students ($M = 4.11$) and that of the transfer students who did not experience transfer shock ($M = 4.18$). These results are displayed in Table 19.

Table 18

ANOVA Table Investigating Transition Type and Time to Degree

Source	DF	SS	MS	F Value	p
Model (Transition Type)	2	.39	.20	1.17	.31
Error (Within Group)	168	28.03	.17		
Total	170	28.42			

Table 19

Tukey Post-Hoc Test for Time to Degree

Variables	Mean
Transfer Shock	4.04
No Transfer Shock	4.18
University Natives	4.11

Research Question 5

What is the effect of student characteristics and institutional type on the likelihood that a Jamaican student will complete the baccalaureate degree within six years of beginning baccalaureate degree studies?

For this particular research question, a logistic regression model was used to determine the effect of institutional type and student characteristics on the likelihood of a Jamaican student attaining the baccalaureate degree within six years. The reader is referred to chapter three, which provides a summary of the logistic regression model. This summary

includes the mathematical principle on which the model was developed and an explanation of all the major terms and concepts used in reporting logistic regression. Chapter three also provides a description of the dichotomous dependent variable, as well as the interval and categorical independent variables used for this research question.

The dichotomous dependent variable was baccalaureate degree attainment (BACC), which is coded as $BACC = 1$ for students who graduated within six years and $BACC = 0$ for students who did not graduate within six years. SAS[®] uses dummy coding to code the two categorical independent variables, institution type (INST) and gender (GENDER). The categorical variables institution type had two levels, community college and university. Community college is used as the reference level and was coded as $INST = 0$ while university was coded as $INST = 1$. For the categorical independent variable gender, the reference category of male is coded as $GENDER = 0$, with female coded as $GENDER = 1$.

The interval independent variable used was lower division cumulative GPA (community college GPA), labeled as LDGPA. Based on previously reported high levels of intercorrelations among the GPA variables (Table 13), lower division cumulative GPA was used as a proxy for the other GPAs. This variable was selected because it represented the students' overall academic performance during the first two years of the baccalaureate program. In particular, it represented the transfer students' overall academic performance at the community college. Collinearity diagnostics involving tolerance and variation inflation factor conducted on all the variables used in the model indicated that multicollinearity among the independent variables was negligible (Table 20).

Table 20

Multicollinearity Diagnostics for Variables Used in Logistic Regression Model

Variables	Tolerance	Variance Inflation Factor
Gender	.99	1.009
Lower Division GPA	.99	1.009
Transition Type	.99	1.003

Interaction. While it was established that multicollinearity among the independent variables did not pose a problem for this model, no assumption was made about interaction among these variables. Rather, the study explored all possible pairwise interactions as possible predictors of baccalaureate degree attainment. These interaction terms were created in the logistic regression model using cross-products. The overall model, which included the interaction terms and dummy variables, is described herein:

$$\text{Logit (BACC)} = a + b_1 (\text{LDGPA}) + b_2 (\text{INST}) + b_3 (\text{GENDER}) + b_4 (\text{LDGPA} * \text{INST}) \\ + b_5 (\text{LDGPA} * \text{GENDER}) + b_6 (\text{INST} * \text{GENDER})$$

Table 21 presents the results of the logistic regression model with the interaction terms included. As noted in Table 21, none of the interaction terms was significant. Consequently, the interaction terms were removed from the model and the data analysis performed with the main effect terms only. Tables 22- 24 present the results of the logistic regression model with the interaction terms removed.

Table 21

Logistic Regression Results for Degree Attainment (With Interaction)

Independent Variables	Parameter Est. (β)	S.E. ^a	Wald χ^2	p	Odds Ratio Exp(β)
Intercept	-7.81	3.5	4.9	.03	
GENDER (Female =1)	-2.21	4.50	.24	.62	.11
INST (University = 1)	-1.21	4.41	.08	.78	.30
^b Lower Division GPA (LDGPA)	3.48	1.43	5.95	.01	32.49
GENDER* INST	-1.42	.97	2.13	.14	.24
GENDER* LDGPA	1.54	1.89	.66	.42	4.65
INST* LDGPA	.91	1.84	.24	.62	2.48

^aStandard error of parameter estimate^bIncludes community college GPA

Global test of independence. The global test of independence tests the global null hypothesis that none of the predictors is useful in explaining the dependent variable; that is, all the coefficients of the predictors are equal to zero. Table 22 reports several global tests. However, the likelihood ratio test, which is analogous to the global F -test in a linear regression analysis, is the most popular (Allison, 1999) and was the one this study used as its guide. The likelihood ratio test was significant with a value of 44.4 ($df = 3, p < .0001$), indicating that at least one of the predictors in the model was useful in explaining baccalaureate degree attainment. According to Allison, a significant result for the likelihood ratio test suggests that the researcher has obtained a good fit. SAS[®] also reported two other global tests: The Score test and the Wald test. Both of these tests produced similar results to the likelihood ratio test, providing further evidence that the model with predictors was a better fitting model than the intercept-only model.

Table 22

Model Fit Statistics Testing the Significance of the Model

Model Fit Test	df	χ^2	p
Overall Model Evaluation			
Likelihood Ratio Test	3	44.39***	<.0001
Score test	3	37.18***	<.0001
Wald test	3	27.94***	<.0001
Goodness-of-fit test			
Hosmer-Lemeshow	8	3.3	.91

*** p-value significant

Assessing model fit. The study also reports on how the logistic regression model fits the data. This analysis, called model fit statistics or goodness-of-fit statistics, gives an indication of how well the observed values of the dependent variable fit the estimated expected values. The Hosmer-Lemeshow (H-L) goodness-of-fit test (specified by the LACKFIT option in SAS[®]) is the most popular test in this category and provides evidence of how well the model fits the data. A failure of the H-L test to reject the null hypothesis that there is no difference between the observed and the estimated predicted values of the dependent variable provides evidence that the model fits the data well (Wang, 2009). That is, large values for the H-L test, with $p > .05$, suggest a good fit (Peng & So, 2002). As noted in Table 22, the H-L test results was $\chi^2(8) = 3.3$, $p = .91$. This suggested that the model was a good fit.

Significance of individual predictors. While global tests, such as the likelihood ratio tests, are useful in assessing the significance of the overall model, researchers are also interested in the significance of the individual predictors. In order to assess the significance of each predictor in determining the likelihood of a student attaining the baccalaureate degree within six years, this study reports the Wald chi-square statistics (Wald statistics). Table 23 reports the parameter estimates, Wald statistics, and the corresponding p-value for each of the independent variables in the model. Table 23 also reports the odds ratio and the 95% confidence interval for the odds ratio.

As noted in Table 23, among the population of university juniors identified in this study, when other variables in the model are taken into account, the likelihood of attaining a baccalaureate degree within six years was significantly associated with lower division cumulative GPA ($\chi^2 = 25.29, p < .0001$). The odds ratio was 83.5 and the confidence interval of the odds ratio extended from 14.9 to 468.6. Accounting for the other variables in the model, a one-unit increase in lower division cumulative GPA increased the likelihood of a student attaining the baccalaureate degree within six years by a factor of approximately 84. In the case of GPA, a one-unit increase on a 4.0 scale may be too large to report. By multiplying the GPA score by 10, the scale was converted to units of tenths. By recalculating the odds ratio, in units of tenths, a one-unit increase in lower division cumulative GPA is associated with an increase in the odds of earning the baccalaureate degree in six years by a factor 1.56, controlling for other variables in the model. That is, for every .1 unit increase in lower division GPA, the student's likelihood of attaining the baccalaureate degree increased by 56%, controlling for other variables in the model.

The study found gender and institution type as nonsignificant when controlling for other variables in the model. This suggests that gender and institution type had no significant effect on the likelihood of a student attaining the baccalaureate degree within six years, controlling for other variables in the model. In the case of gender, the p-value of .08 is close to the benchmark .05, suggesting some level of caution is required when interpreting the findings. In particular, chi-squared analyses indicated that when other variables are ignored, a significant relationship existed between gender and baccalaureate degree attainment. In summary, the study found that, when other variables are taken into account, lower division GPA had a major effect on baccalaureate degree attainment but gender and community college attendance had minimal or no effect.

Table 23

Logistic Regression Results for Degree Attainment (N = 200)

Independent Variables	Parameter Est. (β)	S.E. ^a	Wald χ^2	p	Odds Ratio	95% CI
Intercept	-9.76	2.12	21.11	<.0001		
GENDER (Female =1)	.83	.47	3.13	.08	2.30	.91 – 5.77
INST (University = 1)	.22	.47	.22	.64	1.24	.50 – 3.16
Lower Division GPA (units in tenths)	.44	.09	25.30	<.0001	1.56	1.31 – 1.85

^a Standard error of parameter estimate

Statistical power. According to Allison (1999), a good fitting model does not guarantee that the model has a high predictive power. Consequently, tests are developed to determine how well the independent variables predict the dependent variable. In particular,

Somers' d and generalized- R^2 are tests that measure the association between independent and dependent variables. Table 24 reports on these and other tests. As a measure of association, values of Somers' d range from -1.0 to 1.0 while generalized- R^2 values range between 0 and 1. Values close to one suggest a high level of dependence between the independent variables and the outcome (Menard, 1997). As noted in Table 24, the value for Somers' d was .70.

Table 24 also reports a Cox and Snell's generalized- R^2 value and a max-rescaled R^2 . Unlike the coefficient of determination in linear regression models, the generalized- R^2 in logistic regression cannot be interpreted as the amount of variance in the dependent variable explained by the independent variables (Menard, 1997). Rather, it is used simply to indicate strong or weak association between the dependent and the independent variables. The max-rescaled R^2 , which is the original R^2 divided by its upper bound (Allison, 1999), also provides a useful measure of model strength. As noted in Table 24, the generalized- R^2 value for the model is .20 and the max-rescaled R^2 is .35. Using values for Somers' d, generalized- R^2 values, and max-rescaled R^2 , this study reports a moderate association between the independent variables institutional type, gender, and lower division GPA and the dependent variable, baccalaureate degree attainment.

Table 24

Association of Predicted Probabilities and Observed Responses

Measures of Association	Score	Measures of Association	Score
Percent Concordant	84.0	Somers' D	.70
Percent Discordant	14.4	Gamma	.71
Percent Tied	1.6	Tau-a	.17
Pairs	4959	c	.85
Generalized-R ²	.20		
Max-rescaled R ²	.35		

In reporting the results of the logistic regression model, this study presented findings in relation to an overall evaluation of the model, statistical significance of the individual predictors, goodness-of-fit statistics, and an assessment of the predictive power of the model. These tests provided evidence to show that the overall model was significant in predicting the likelihood of a Jamaican student attaining the baccalaureate degree within six years. However, in testing the significance of the individual predictors, the results showed that the institution where a student first matriculated for baccalaureate studies was not significant in predicting the likelihood of academic success at the baccalaureate level.

Chapter Summary

In addition to reporting on descriptive statistics relating to the analytic sample, this chapter also reported on findings comparing the academic performance of community college transfer students and native university students enrolled in the university's upper division. Based on the descriptive statistics, it was ascertained that both the community college transfer students and the native university students had similar characteristics in relation to variables such as gender, age, time to degree, GPA, and baccalaureate degree attainment. Bivariate analyses suggested a high level of correlation between GPA at the different levels, as well as between GPA and time to degree. In addition, the study did not find any significant multicollinearity among the independent variables in the logistic regression model.

Research question 1 compared the academic performance of community college students at the end of the semesters immediately before and immediately after transfer. Findings suggested that the transfer students experienced a statistically significant decline in post-transfer GPA but the small size of the effect suggested that this might not be of practical significance. In addition, the overall small mean decline in semester GPA suggested that the group, as a whole, did not experience transfer shock.

Research question 2 compared the academic performance of transfer students and native university students in relation to their GPA in the first semester of the upper division. Findings indicated that at the end of the first semester in the upper division, the academic performance of both the transfer and the native students were about the same. Using GPA and time to degree as proxies, the senior year academic performance of the students was also

analyzed in questions 3 and 4. Students were categorized as transfer students experiencing transfer shock, transfer students not experiencing transfer shock, and native university students. Findings indicated that there was no significant difference between the academic performances of the three groups.

Research question 5 reported on the logistic regression model. Findings indicated that the model with predictors was better than the intercept-only model. Simultaneously, the H-L test suggested that there was a good fit between observed and estimated predicted values of the dependent variables. The Wald statistic was used to determine the significance of the individual predictors. This test indicated that, when the other variables in the model were taken in account, lower division cumulative GPA was statistically significant in predicting the likelihood of baccalaureate degree attainment within six years. On the other hand, findings suggested that, when the other variables in the model were taken into account, gender and institutional type were not significant in predicting the likelihood of academic success at the baccalaureate level.

CHAPTER FIVE

Conclusions, Implications, and Recommendations

Jamaica established the first of its eight community colleges in the mid 1970s to provide opportunities for a wider cross-section of the Jamaican population to access postsecondary education and training (Walsh, 2005). Through their lower tuition costs, more accessible locations, and diversified curriculum, these institutions have become firmly entrenched in the Jamaican postsecondary education landscape. However, there is a perception that these colleges offer lower quality academic preparation when compared with the Jamaican public universities. Consequently, some policymakers and university administrators are reluctant to encourage and facilitate large numbers of transfers from community colleges to the public universities.

The purpose of this study, therefore, was to compare the academic performance of transfer students who began their baccalaureate studies at Jamaican community colleges under franchising agreements between the community colleges and the public universities with the academic performance of students who began their baccalaureate studies at the public universities. By using concepts from Tinto's (1993) theory of student attrition and Bean and Metzner's (1985) conceptual model of nontraditional undergraduate student attrition, it was postulated that a Jamaican student's academic success in the upper division of the university is dependent on a mixture of institutional and student characteristics. In the case of the Jamaican community college transfer students, it was further postulated that their academic performance in the university's upper division is mediated by a transition effect that could lead either to early departure or to academic success.

This chapter interprets the study results and suggests possible conclusions that might be drawn from each of the five research questions reported in chapter four. These results are discussed in the context of findings from previous studies conducted in postsecondary systems in countries such as the United States and Canada. In addition, the implications of the findings are explored. Following this, the researcher makes recommendations for policy, practice, and future research.

Discussion and Conclusions

Descriptive Statistics

Cohen and Brawer (2003) suggest that community college transfer students are closer in background characteristics to native university students than to community college students that do not transfer. Findings from this study support this view. While the background characteristics of Jamaican community college students who did not transfer are unknown, the characteristics of those who transferred were almost indistinguishable from those of the native university students in the analytic sample. However, it must be emphasized that the requirements of the franchising arrangement almost guaranteed that both groups of students would share common characteristics. This may not be the case for community college students who transferred under other types of articulation arrangements. Consequently, this researcher does not draw any specific conclusion about the background characteristics of transfer students who did not enroll under the specific franchising arrangement described in this study.

A particular background characteristic that stood out was the gender ratio, with both groups showing a female to male ratio of about two to one. This high percentage of females to males is consistent with the gender ratio in the Jamaican postsecondary education system (Bailey, 2003). In light of Jamaica's high crime and unemployment rates, the low percentage of Jamaican males accessing postsecondary education is a cause for concern.

In the American system, the mean age of community college students is generally higher than that of native university students. For researchers unaware of how the Jamaican postsecondary education system works, the higher mean age of the native university students, as compared to the community college transfer students, might seem a bit unusual. However, this is typical for full-time students enrolled in baccalaureate programs in these Jamaican institutions.

The public universities usually have extremely high demands for the few spaces available in their baccalaureate programs and, in some cases, have waiting lists that extend to several years. Rarely are these institutions able to enroll students immediately after they graduate from the high schools. On the other hand, with fewer students wishing to begin baccalaureate degree studies at the community colleges, these colleges are able to enroll students in the fall of the same year that they graduate from the high schools. Consequently, high school students who elect to begin baccalaureate studies at Jamaican community colleges are more likely to earn places in one of these colleges at least one year earlier than they would if they elect to begin such studies at one of the public universities.

Research Question 1

Is there a significant difference between Jamaican community college transfer students' mean semester GPA at the end of the semesters immediately before and immediately after transfer to the upper division of a Jamaican public university?

This question tested the null hypothesis that, for Jamaican community college transfer juniors, there was no difference in semester GPA during the semesters immediately before and immediately after transfer to the university's upper division. Most American studies on the academic performance of community college transfer students report that these students experience a decline in mean semester GPA during the first or second semester after transfer to the four-year institution (Carlan & Byxbe, 2000; Cejda, 1997; Glass & Harrington, 2002; Townsend & Wilson, 2006). Using Tinto's (1987, 1993) theory to explain their findings, some researchers attribute this initial decline in GPA to the failure of the transfer student to navigate the social and academic environment of the four-year institution (Laanan, 2004; Pascarella & Terenzini, 2005; Townsend & Wilson, 2006). Other researchers suggest the likelihood of grade inflation in the community college as a possible reason for the decline in semester GPA upon transfer to the four-year institution (Carlan & Byxbe, 2000).

Using a paired samples *t*-test at an alpha level of .05, this study found that the transfer students experienced a statistically significant decline in mean semester GPA during their first semester in the university's upper division. However, the small effect size suggested that the result might not be significant from a practical perspective. Notwithstanding the small effect size, the statistically significant decline in semester GPA suggested that the transfer students' transition to the four-year institution did have some negative effect on their

academic performance. An issue of particular concern was whether it was reasonable to attribute this transition effect to the phenomenon called transfer shock.

While results indicated that some of the transfer students did experience major declines in their semester GPA, overall, the decline of .1 for the group was below the benchmark of .3, which many researchers use to define transfer shock (Hills, 1965). In addition, the case for transfer shock would be strengthened if the native students did not experience similar semester GPA declines. The Glass and Harrington study (2002) found a significant decline in the post-transfer semester GPA of the community college students but did not identify a similar decline in semester GPA of the native students. Consequently, these researchers attributed the decline in semester GPA of the transfer students to transfer shock.

Using a paired samples *t*-test, a similar exercise was conducted for the Jamaican native university students. Like the transfer students, the native students in this study also experienced a statistically significant decline in semester GPA on entering the upper division. Therefore, it is reasonable to conclude that there was a transition effect on both groups when they entered the university's upper division. While the transition effect on each group might be different, the results of this study suggest that, as a group, the transfer students did not experience transfer shock.

In addition, grade inflation can be reasonably ruled out as a possible cause for the decline in the transfer students' post-transfer semester GPA. This is so because, overall, the native university students had higher mean lower division GPA than the pre-transfer GPA of the community college students. Further, the native students experienced a greater decline in mean semester GPA on entering the upper division.

Since both transfer and native students experienced declines in GPA during their first semester in the upper division, there might be common attributes that could possibly have contributed to these declines. For example, it is possible that upper division courses were academically more challenging than lower division courses. Thus, curricular issues could have contributed to both groups experiencing GPA declines.

Academic and social integration could also have affected the students' academic performance on entering the upper division. For example, due to limited housing accommodation at the university, on entering the upper division, a majority of the native students were required to find private housing accommodation off-campus. This often proved to be difficult as housing accommodation near to the university was also limited. Thus, many upper division students had to travel long distances to attend classes. In addition, the crime rate in the areas surrounding the university was high. This could have affected these students ability to participate in academic and social activities that took place in late afternoon or evening. For students who had become accustomed to living on campus, these changes could possibly provide a partial explanation for the initial decline in their academic performance.

On the other hand, the university provided on-campus housing for a majority of the transfer students. This was likely to have provided increased opportunities for both academic and social integration. These increased opportunities could have possibly moderated the negative effect associated with their transition from the community colleges. The decline in the transfer students' first semester GPA suggests that factors associated with a negative transition effect seemed to have outweighed those factors associated with a positive effect.

Research Question 2

Is there a significant difference between Jamaican community college transfer students and native university students with respect to their mean semester GPA at the end of the first semester of the junior year?

Studies on the academic performance of transfer and native students generally report that native students significantly outperform transfer students during their first semester in the university's upper division (Glass & Harrington, 2002; Laanan, 2001). Researchers typically attribute this difference in performance to the social and academic challenges facing the transfer students on entering the four-year institution (Eggleston & Laanan, 2001; Pascarella & Terenzini, 2005). According to these researchers, on entering the four-year institution, transfer students face many challenges not faced by the university native students. Often, these challenges have a negative effect on the transfer students' academic performance.

This study conducted an independent samples *t*-test on a stratified sample of 100 community college transfer students and 100 native university students. The purpose was to compare the mean semester GPA of both groups at the end of the first semester in the upper division. Findings suggest no difference in academic performance between the two groups. This result conflicts with the general findings from similar American studies.

There are a number of possible explanations for the difference in findings between the American studies and this study. First, under the franchising arrangement in the Jamaican system, both the transfer students and the native university students pursued a common curriculum. In addition, the university had regulations regarding the academic qualifications

and experience of the community college faculty who taught in the franchised program. The university also monitored how the curriculum was delivered at the community colleges to ensure that it was comparable to how it was delivered at the university. Consequently, in relation to curriculum and instruction, there seemed to be little difference in the quality of the academic program offered to both groups prior to their enrollment in the university's upper division.

Second, both groups underwent similar assessments. The grading system was also similar across all the institutions. As a result, when the community college students were transferred to the university's upper division they were already familiar with both the university's method of assessment and its grading system. In addition, community college and university faculty met regularly to discuss both academic and nonacademic issues associated with the franchising arrangement. This provided opportunities for collaboration on issues such as the university's academic expectations and the services it offered. According to Rhine, Milligan, and Nelson (2000), collaboration among community college and university faculty serves to ease the transition process.

Third, each community college had a franchised program coordinator who met the students regularly and consulted regularly with the university's franchised program coordinator. Students met the university's franchised program coordinator at least once per semester and were able to get details on relevant issues. As Laanan (1996) suggests, the transition process can be facilitated if transfer students are provided with an information and support network that addresses many of their transition issues.

In addition, about 30 students from each of the community colleges participating in the franchising arrangement transferred each year to the upper division of the Faculty of Business and Management at the university. Consequently, these students entered the university's upper division already involved in a social network. Further, during their two years in the community colleges, the transfer students enrolled in the same sequence of courses and attended the same classes at their respective college. This provided opportunities for the creation of natural learning communities. According to Tinto (1997), in a natural learning community, students learn to work in groups, collaborate on projects, and develop improved communication.

Based on these features of the franchising arrangement, the transfer students in this study's analytic sample were different from those identified in a majority of the American studies. In these American studies, the transfer students usually represent a wider cross-section of community college students. Thus, the franchising arrangement provided opportunities for the seamless transition of the Jamaican community college transfer students to the university's upper division. These students arrived on the university's campus well informed about the university's programs and services, were familiar with the university's assessment methods, and were in sufficient numbers to form their own social networks. Consequently, they were well conditioned to adjust quickly to the university's environment. This resulted in their performing as well as the native university students did, from the point of their initial entry into the university's upper division.

Research Question 3

Are there significant differences between Jamaican community college transfer students who experienced transfer shock, Jamaican community college transfer students who did not experience transfer shock, and Jamaican native university students with respect to their mean upper division cumulative GPA at the end of the senior year?

Previous studies comparing the academic performance of community college transfer students and native university students reported that by the end of the senior year, the mean cumulative GPA of the transfer and native students were statistically indistinguishable (Best & Gehring, 1993; Glass & Harrington, 2002; Johnson, 2005). Some researchers attributed this to the ability of transfer students to survive the initial transfer shock by navigating successfully the social and academic environment of the four-year institution (Pascarella & Terenzini, 2005). According to these researchers, the weaker transfer students, unable to integrate into the university's environment, are likely to depart prior to the senior year. Those who survive normally improve their academic performance. However, a majority of these studies aggregated the transfer students as a single group without attempting to identify if there was a difference between the academic performance of those transfer students who experienced transfer shock and those who did not experience the phenomenon.

Without separating the transfer students into these groupings, a researcher is less certain of the composition of the group of transfer students who are enrolled at the end of the senior year. For instance, academic dismissal or probation of the transfer students who are weaker academically, possibly those who experienced transfer shock, could improve the mean GPA of those remaining without any significant improvement in students' individual

performances. Simultaneously, if the native students exhibit a higher retention and graduation rate than the transfer students do (Best & Gehring, 1993; Glass and Harrington, 2002), it is conceivable that a larger number of the academically weaker native students could be progressing to the senior year, thereby moderating the mean GPA of this group.

In comparing the students' academic performance in the senior year, this study separated the transfer students into two distinct groups while leaving the native students group as a single category. The intention was to determine whether there was a statistically significant difference in the academic performance of these three groups. A one-way ANOVA *F*-test at an alpha-level of .05 was conducted to address this question. Using mean cumulative upper division GPA as a proxy for academic performance, the study found no statistically significant difference in the academic performance of the three groups. This result supports findings from previous American studies on this subject. In this respect, the Jamaican community college transfer students and native university students in this study exhibited similar academic accomplishments to their American counterparts.

However, similarity in accomplishments does not necessarily equate to similarity in the characteristics of the groups. Unlike many of the American studies, findings from this study suggest that the Jamaican transfer students who experienced transfer shock were mainly the ones who achieved high pre-transfer semester GPAs. Based on Bean and Metzner's (1985) theory and findings from Townsend and Wilson's (2009) study, perhaps academic integration was more important than social integration for these transfer students. If this were indeed the case, it would be expected that those transfer students who adjusted quickly to the academic environment of the university would be more likely to achieve

academic success than those who did not. Based on the large percentage of high-performing transfer students in this analytic sample who experienced transfer shock, it was not surprising that, for a majority of these students, the adjustment to the academic environment of the upper division seemed relatively easy.

The apparent ability of the students to adjust quickly to the environment of the university's upper division seemed to have contributed to their consistently good academic performance in the upper division. This was evidenced by the fact that only 4% of the total sample dropped out in the junior year. This total sample consisted of 5% of those who experienced transfer shock, 2% of those who did not experienced transfer shock, and 5% of native university students. While it is not known why these students dropped out in the junior year, it is reasonable to conclude that a majority was due to academic dismissal. Consequently, the composition of the groups in the senior year would be a bit stronger academically than they would be in the junior year. This could have contributed to the groups' improved academic performance in the senior year. Finally, with both transfer and native students exhibiting similar characteristics and both groups performing equally well in the junior year; the expectation of equal performance in the senior year was confirmed.

Research Question 4

For Jamaican students who complete the baccalaureate degree within six years of beginning baccalaureate degree studies, are there significant differences between community college transfer students who experienced transfer shock, community college transfer

students who did not experience transfer shock, and native university students with respect to their mean time to degree?

Time to degree is an important measure because it is linked to institutional success and accountability, student success, time investment, and cost (California Postsecondary Education Commission, 2006). Previous American studies have reported that, in relation to mean time to degree, transfer students take a longer time to complete the baccalaureate degree than native students do (Bell, 1998; Cuccaro-Alamin, 1997; Dougherty, 1994; Glass & Bunn, 1998; Glass & Harrington, 2002; Pascarella & Terenzini, 2005; Townsend & Wilson, 2006). In these American studies, the researchers suggest that because transfer students need time to adjust to the academic and social environment of the university, they will take a bit longer to graduate than the native students who would have adjusted previously. Consequently, although most transfer students recover from an initial transfer shock, it is expected that they might take a little longer to graduate than native students.

On the other hand, a majority of these American studies do not take into account the possible difference in performance of different categories of transfer students. Consequently, this study examined time to degree categorized by transfer students who experienced transfer shock, transfer students who did not experience transfer shock, and native university students. Time to degree was calculated using only students who completed the baccalaureate degree within six years. Students who dropped out in either the junior or senior years as well as those who were still enrolled in the program after six years were not included. Using a one-way ANOVA *F*-test at an alpha-level of .05, the study found no statistically significant difference in the time to degree of the three groups identified. These findings are not

consistent with findings from a majority of American studies that report on this subject. However, based on the features of the franchising arrangement, which ensured both transfer and native students had similar background characteristics and were exposed to comparable curriculum delivery, these results were not surprising.

Although the findings were statistically indistinguishable, there were small differences among the time to degree of the three groups. Surprisingly, the transfer students who experienced transfer shock, on average, took a shorter time to complete the degree than both their counterparts who did not experience the phenomenon and the native students. Based on bivariate analyses, approximately 75% of the students who experienced transfer shock completed the degree within six years. Simultaneously, 70% of the students experiencing transfer shock had high pre-transfer GPA. If one assumes that the academically stronger students were the ones who completed the degree within six years, it would seem evident that the completers who had experienced transfer shock were the ones with high-pre-transfer GPA scores. Consequently, this subgroup seemed to have overcome transfer shock quickly, improved their GPA scores in the senior year, and completed the degree within a relatively short time.

This might not be the case for the transfer students who did not experience transfer shock, where 65% of the group had low pre-transfer GPA scores. With just fewer than 90% of this group completing the degree within six years, it was evident that a high percentage of the completers from this group had low pre-transfer GPA scores. Consequently, if it is assumed that students with high pre-transfer GPA scores were likely to complete the degree in a shorter time than those with low pre-transfer GPA scores, those completers who did not

experience transfer shock were likely to take a slightly longer time than those who experienced the phenomenon. When these two groups were combined, as expected, their time to degree was slightly longer than that of the native students. It appears that, as a group, the transfer students took a slightly longer time to adjust to the university's upper division than the native students did.

There is a perception that the academically weaker transfer students are more likely to experience transfer shock than the academically stronger ones. Findings from this research were contrary to this perception. Perhaps researchers need to revisit the *transfer shock* phenomenon to re-examine the relationship between transfer shock and GPA. For some groups of students, this relationship might be extremely weak or even non-existent.

Research Question 5

What is the effect of student characteristics and institutional type on the likelihood that a Jamaican student will complete the baccalaureate degree within six years of beginning baccalaureate degree studies?

Baccalaureate degree attainment is a very important reason students enroll in postsecondary studies. Studies addressing baccalaureate degree attainment of community college transfer students and native university students consistently report that student background characteristics, institutional type, and environmental factors affect a student's ability to attain the baccalaureate degree within a specified time (Bean & Metzner, 1985; Pascarella & Terenzini, 2005; Tinto, 1987, 1993). In the case of the variable institutional type, findings consistently show that students who begin studies at community colleges are

less likely to obtain a baccalaureate degree than students who begin studies at the four-year institution (Brint & Karabel, 1989; Pascarella & Terenzini, 2005). In relation to gender, some studies have reported gender as having a significant effect on the baccalaureate degree attainment of transfer and native students (Wang, 2009). Further, in the case of GPA, researchers have consistently found that lower division GPA (or community college GPA) has been an extremely important variable for predicting baccalaureate degree attainment (Adelman, 2006; Cejda & Rewey, 1998; Pascarella & Terenzini, 2005; Wang, 2009).

Having identified institutional type and student characteristics as important variables for predicting baccalaureate degree attainment in the American context, this study used these variables to determine whether they would have the same effect on Jamaican community college transfer students and native university students. Using a stratified sample of transfer and native students, a logistic regression model was employed in response to research question 5. The purpose was to determine the effect of student characteristics and institution type on the likelihood that a Jamaican student enrolled in baccalaureate studies would complete the degree within six years. The study found lower division GPA to be significant in predicting the likelihood of baccalaureate degree attainment. This is consistent with findings from similar studies on baccalaureate degree attainment of American students. This finding suggests that Jamaican authorities need to ensure that students are provided with the necessary resources to perform well in the earlier years of baccalaureate studies.

The study found gender was not significant. However, when the other variables were accounted for, the p-value for gender was .08. This is very close to the benchmark of .05. In addition, bivariate correlation suggests that, when other variables were ignored, gender was

significantly associated in some unknown way with baccalaureate degree attainment. Though weak, there seemed to be some evidence that women were completing the baccalaureate degree faster than men were. This suggests that females might be adjusting to the environment of the upper division better than men were. Future studies could explore further the relationship between gender and baccalaureate degree attainment.

Findings also indicated that the type of institution where students began their baccalaureate studies was not significant in predicting the likelihood of degree attainment. This is a particularly important finding for the Jamaica postsecondary education sector. This finding is contrary to the perception in the Jamaican system that community college attendance is a deterrent to baccalaureate degree attainment.

Some stakeholders in the Jamaican system suggest that the quality of students, academic instruction, facilities, and services at the community college is less than that at the public universities. There may be good, if not compelling, reasons to posit these views. However, the finding that the type of institution where students begin baccalaureate studies does not affect baccalaureate degree attainment is likely to provide support for those persons proposing that Jamaican community colleges should be used to offer the first two years of baccalaureate degree studies. The case for using these community colleges for the first two years of baccalaureate studies becomes even stronger when it is taken into account that these institutions offer greater access at a lower cost.

Summary of Major Conclusions

A summary of the major conclusions from this study follows. First, in relation to the franchised programs, findings suggest that the characteristics of both the transfer and native students were indistinguishable. In addition, the quality control mechanism set up by the university to monitor the program seemed to have ensured that the quality of both the academic instruction and the assessment given to both groups were on par.

Second, the transition to the four-year institution had a small but significant effect on the transfer students' first semester academic performance. As a group, the transfer students did not experience transfer shock. In addition, the transition effect on these students' academic performance dissipated quickly. This could be due to both institutional and student characteristics.

Third, in relation to GPA, time to degree, and baccalaureate degree attainment, community college attendance did not seem to be a significant factor in predicting a student's academic success. It is therefore reasonable to conclude that Jamaican community colleges could have an important role to play in increasing access to Jamaican students wishing to pursue baccalaureate degrees. Based on the findings of this study, there is evidence to suggest that Jamaican community colleges are capable of offering, at minimum, the first two years of a baccalaureate degree program.

Fourth, lower division (pre-transfer) GPA was significant in predicting baccalaureate degree attainment. This is an indication that once a student performs well during the first two years of baccalaureate studies, it is reasonable to expect that student to complete the program successfully, regardless of whether he or she first matriculated at the community college or at

the public university. Overall, the franchising arrangement appears to be an effective method in preparing transfer students for success in baccalaureate studies.

Implications

Findings from this study highlight several important implications for access, cost, and quality of postsecondary education in Jamaica. First, the overall sample of community college transfer students exhibited a statistically significant decline in semester GPA when moving from the community college to the university's upper division. Therefore, it might be necessary for the community colleges and university to revisit the franchising arrangement to identify possible reasons for this initial decline. While this type of arrangement appears to be effective, there appears to be some challenges that the institutions will need to address.

While the small dip in semester GPA of the group suggested that transfer shock did not exist for the group, some students in the group did experience the phenomenon. Although transfer ecstasy was not specifically analyzed, some students might have experienced this phenomenon. If both phenomena existed among the transfer students, these subgroups would have experienced major, but contrasting, transition effects. The changes in the post-transfer semester GPA of these subgroups would serve to nullify changes to the overall post-transfer GPA of the group. With institutions not seeing any major changes in the group's post-transfer GPA, they might not see the urgency to implement intervention services to assist the many students at risk of academic failure in the group.

Second, findings suggest that the franchising arrangement did not compromise the quality of academic instruction received by the transfer students while they were enrolled at

the community college. It is therefore possible that access to baccalaureate degrees could be increased through expansion of franchising arrangements. However, with the community colleges offering their own baccalaureate degree programs, there is no evidence to suggest that they would have the resources necessary to accommodate any major increase in enrollment in the franchised programs.

Simultaneously, the universities might see the loss of some of their lower division programs as a loss of revenue and might be reluctant to divest these programs. Consequently, decisions to divest programs might need to be either state-mandated or state-facilitated. As in the American system, several articulation arrangements between community colleges and public universities are state-mandated (Townsend & Ignash, 2000). While such state-mandated systems provide mixed results in relation to the success of transfer students (Anderson, Sun, & Alfonso, 2006), the implication for this type of system in Jamaica is to ensure greater access to a wider cross-section of students wishing to pursue baccalaureate degrees. To address the issue of lost revenue, the public universities might be able to replace this lost revenue by expanding enrollment in their upper division, and expanding research. In addition, the community colleges would not be able to accommodate all lower division programs so the universities would still be able to offer many of their lower division programs.

Third, findings suggest that both the transfer and native students in the analytic sample performed equally well in the university's upper division. Therefore, it appears that the type of institution where a student begins baccalaureate studies does not substantially affect his or her ability to attain the baccalaureate degree. This finding provides support for

persons who are proposing that postsecondary educational administrators undertake broader collaborations to increase access to students wishing to pursue baccalaureate studies.

Fourth, lower division GPA (or community college GPA) appears to be significant in predicting the likelihood of baccalaureate degree attainment. In addition, based on the transfer students' academic performance at the different levels, academic integration appears to be more important than social integration for this group. This highlights the need for these colleges to offer programs and services that will provide its students with the best possible academic experience, particularly during the first two years of baccalaureate studies.

Fifth, gender did not appear to be a significant variable in baccalaureate degree attainment. However, based on available evidence, female appeared to be graduating at a slightly faster rate than male. Consequently, institutions might need to revisit programs designed to assist males in attaining the baccalaureate degree.

In addition, based on findings from the descriptive statistics, the ratio of females to males in the analytic sample is a cause for concern. Based on these findings, males do not appear to be as attracted to business administration as females do. This seems to be a general trend in the Jamaican postsecondary system. According to the Inter-American Development Bank (2003b), the Jamaican education system needs to reduce the disengagement of males from the educational system. This disengagement appears to be a major factor in relation to several social and economic challenges currently facing the Jamaican society. In particular, there appears to be an association between the island's high percentage of undereducated males and its high levels of unskilled labor, unemployment, and crime.

Finally, the study was institution-specific. Based on this, there is no evidence to suggest that findings are applicable to other institutions. Consequently, Jamaican policymakers and educational administrators might not be convinced sufficiently that these findings can be generalized across postsecondary institutions. This could have implications in relation to how these stakeholders accept the study's recommendations.

Recommendations

Previous chapters highlight several issues relating to challenges facing Jamaica's postsecondary sector. An issue of particular concern was the perception that students who begin studies at the community colleges do not perform as well as those who begin at the public universities. However, the island does not have the resources to provide enough seats at the public universities to accommodate the large number of students who wish to study at these institutions. Consequently, there is an urgent need for the island's postsecondary sector to devise strategies to produce the critical mass of postsecondary students needed to drive economic growth (Ministry of Education, 2006).

Based on findings from this study, several strategies are recommended to address issues relating to access, cost, and quality of postsecondary education in Jamaica. These recommendations relate specifically to the island's community colleges and public universities. However, it is acknowledged that the study had several limitations and delimitations. These are likely to have implications in relation to the acceptance of these recommendations, both at the policy and at the institution levels. Consequently, the section

on recommendation for future research offers some suggestions as to how researchers can address some of these limitations and delimitations in future research.

Recommendations for Policy

The lack of clearly defined postsecondary education policies is creating several challenges for Jamaica's postsecondary education sector (Hall, 2005). It is therefore imperative that the island's policymakers develop a clear and coherent set of policies to drive this sector. First, there is an urgent need to increase access to the baccalaureate degree (Ministry of Education, 2006). Jamaican policymakers should therefore develop strategies to increase enrollment in the community colleges of students wishing to pursue baccalaureate degrees. These policymakers should set clear guidelines for the public universities to divest portions of their lower division courses to the community colleges and similar institutions. In order to obtain the universities' support in this venture, it might be necessary for policymakers to highlight the long-term benefits that an increase in intake of baccalaureate-seeking students into the community colleges will have on the universities. For example, an increase in enrollment in baccalaureate studies is likely to result in a greater demand for upper division enrollment at the universities as well as for graduate studies and research.

Consequently, policymakers should either provide the funding for these institutions to increase their capacity at the upper division level or, at minimum, assist them in sourcing funding for this purpose. They should also facilitate the universities by providing additional funding for research. It is possible that such funding could be sourced from international

funding agencies. If these are loans, instead of grants, the Jamaican government could facilitate the universities by providing loan guarantees to these lending agencies.

Second, there is no evidence to suggest that community colleges have the resources to accommodate large numbers of students wishing to pursue baccalaureate degrees. Consequently, policymakers should commission an audit of the resources of the community colleges to determine these colleges' capability to accommodate a major increase in enrollment of these students. While it is known that Jamaica lacks the financial resources to fully develop its postsecondary sector, policymakers could assist these colleges in accessing funds from the local private sector or from international funding agencies. Additionally, it might be necessary for policymakers to facilitate these institutions by offering assistance to faculty who might require further training to be able to deliver courses at the baccalaureate degree level.

Recommendations for Universities

By increasing their collaboration with community colleges and similar institutions, the Jamaican public universities can play a major role in increasing access to the baccalaureate degree. First, they should collaborate with these institutions to increase franchising arrangements. Based on findings from this study, the franchising arrangement appears to be effective in preparing community college transfer students for the universities' upper division. However, Roberts (2002) suggests that these community colleges do not have the pool of qualified faculty and administrators to accommodate increased access to the baccalaureate degree in these institutions. Consequently, the public universities will need to

assist these colleges by offering graduate programs designed specifically to upgrade academically those community college faculty members who do not have the requisite skills to teach at the baccalaureate degree level. Simultaneously, the universities will need to develop graduate programs to upgrade the administrative capability of those community college administrators who require such training.

Second, the universities should assist the community colleges in strengthening their associate degree programs. Currently, the community colleges' associate degree programs do not appear to cover adequately the first two years of the universities' baccalaureate degree programs. This is creating issues in relation to the seamless transfer of students from the community colleges' associate degree programs to the universities' upper division. A possible long-term strategy is for both types of institutions to develop a common course catalogue for the first two years of baccalaureate studies. Such a strategy could possibly facilitate the universities' divestment of some lower division courses to the community colleges.

Third, males seem to be disengaged from Jamaica's postsecondary education system (Inter-American Development Bank, 2003b). In relation to baccalaureate degree attainment, females also appear to be outperforming males. The public universities could assist in addressing this issue by working with the community colleges and similar institutions to devise strategies to attract and retain more males.

Finally, the public universities appear to be conducting little or no institutional research on transfer students. While a majority of the transfer students appear to be integrating well into the universities' upper division, many of those who experienced transfer

shock seem to be departing the institution without graduating or their graduation is delayed beyond six years. Consequently, the universities need to conduct institutional research to identify the characteristics of these students and devise programs and services to improve their retention and graduation rates.

Recommendations for Community Colleges

Jamaican community colleges were established to offer postsecondary access to a wider cross-section of the Jamaican population. More recently, the increasing demand for students wishing to enroll in baccalaureate studies have placed these colleges at center stage in the Jamaican postsecondary system. However, these colleges must overcome several challenges if they are to be the engine of growth in the Jamaican postsecondary sector (Hall, 2005, Ministry of Education, 1996). First, they should collaborate with the public universities to ensure that their associate degree programs are rigorous enough to satisfy the universities' requirements for full academic credit. While the franchising arrangement appears to be effective, the programs offered under these arrangements belong to the universities. If community colleges are to grow as autonomous institutions, they need to strengthen their own associate degree programs and ensure that they articulate seamlessly into the universities' baccalaureate degree programs.

Second, in order for community colleges to become the engine of growth in the Jamaican postsecondary education sector, they must be able to acquire additional resources or share resources. For example, in addressing limitations in their physical and human resources, these colleges should pool their resources and offer online programs. Thus, if a

college does not have the resources to offer a particular course, its students could enroll online at another college and complete that course. The Council of Community Colleges of Jamaica (CCCJ), which is the certifying body for a majority of the programs offered at the community colleges, should be given coordinating responsibility for this venture. Further, the CCCJ should offer in-house professional development courses for both faculty and administrators as well as collaborate with the public universities to offer professional development programs at the graduate level.

Lack of funding is also a factor inhibiting the growth and development of Jamaican community colleges. However, the Jamaican government is unable to find the financial resources necessary to fund the required expansion of these institutions. In addition, the recent global economic meltdown seemed to have fueled a major contraction of the Jamaican economy. This is likely to place increased pressure on parents and students to pay tuition fees. Consequently, community colleges can no longer rely solely on tuition income and on government subsidies to fund their activities. Rather, they will need to identify alternative funding sources. They should explore funding opportunities such as partnerships with the private sector, formation of college foundations, building strong alumni, and accessing low-interest loans from international funding agencies such as the IDB and the World Bank.

Third, community college associate degree programs face strong competition from high school “sixth forms,” which are considered the gold standard for Jamaican traditional-aged students wishing to enroll at the public universities (Roberts & Brissett, 2003). In arguing that community colleges were poor substitutes for these sixth forms, Minott (Gleaner, 2005a) implored policymakers to place less emphasis on community colleges and

more on sixth forms. Based on these types of assessments, it is necessary for community colleges to devise strategies to highlight their successes to the Jamaican public. In particular, through major public relations campaigns, the colleges should highlight their many successes. A particular success that deserves to be highlighted is the franchising arrangement with the public universities.

Recommendations for Future Research

This research is the first published study on Jamaican community college transfer students. Opportunities therefore exist for its findings to be used to initiate further studies. First, the study's limitations and delimitations serve to curtail the generalizability of its findings. Future studies will need to address these limitations and delimitations. For example, the target population and sample were narrowly defined. Future research should expand the target population to include students from other faculties (colleges), other two and four-year institutions, multiple cohorts, and different types of transfer programs. In addition, this study did not provide data on those students who dropped out during the first two years of baccalaureate studies. Future studies should expand the target population to include cohorts of transfer and native students, including dropouts and stop-outs, from the time they first matriculate in baccalaureate studies to the time they graduate.

Future researchers should also revisit the sampling technique used. While the stratified random sampling technique used in this study guaranteed equal representation from each stratum, the groups were not represented equally in the target population. This could distort the results. As an alternative, future research could use proportionate stratified

sampling to ensure that each stratum is represented in the sample in the same proportion as it is represented in the target population.

Additionally, the study relied on transcript-type data. This limited the number and types of student background variables available for the logistic regression model. Further, because it was a type of retrospective study, this researcher had no control over the variables to be used. Future research should expand both the number and types of variables used. In particular, if a wider range of variables, representing student background characteristics, is used in the logistic regression model, it would provide a better understanding of the type of student characteristics that influence baccalaureate degree attainment.

Second, Jamaican researchers as well as researchers from other developing countries should conduct further research on transfer arrangements between their country's public universities and community colleges or similar institutions. While the franchising seems effective, there are several weaknesses. For example, a particular franchising agreement is usually specific to a particular department at a particular university. Consequently, transfer students enrolled under a particular franchising arrangement are awarded full transfer credits only if they pursue the same program of study at the university as they pursued while enrolled at the community college. In addition, if these student wish to transfer from the community college to a four-year institution other than the franchising institution, they would be given no transfer credit and would be required to enroll as freshmen. Further, there is no evidence that other transfer arrangements are not just as effective as, or even more effective than, the franchising arrangement. Consequently, future studies should compare students' academic performance under different types of transfer arrangements.

Third, gender issues seem to be a cause for concern in Jamaica's postsecondary education sector. Future research should therefore investigate issues surrounding gender. These could include comparing the academic performance of male and female community college students in relation to GPA, time to degree, and baccalaureate degree. Such research should also investigate gender in relation to transfer shock and transfer ecstasy. In addition, researchers should do qualitative studies to identify possible reasons for the apparent disengagement of males from the postsecondary system.

Fourth, the university instituted quality control mechanisms to ensure that the methods used to deliver the curriculum to transfer students under the franchising arrangement were comparable to those used for native students. However, this study did not investigate issues relating to how the community colleges implemented or delivered curriculums offered to other types of transfer students. Future research should compare the implementation and delivery of curriculums developed by the community colleges with those the universities develop under the franchising arrangement. Findings might assist policymakers and university administrators in determining the readiness of the community colleges to expand their transfer programs.

Finally, this study did not attempt to define or to measure academic and social integration. Rather, findings from previous studies were used to identify a proxy for academic and social integration. These findings might not be relevant to academic and social integration in the Jamaican context. Consequently, future research should place emphasis on both quantitative and qualitative research. These research projects should attempt to identify

issues associated with students' academic and social integration. These might include curricular, emotional, psychological, and environmental issues.

Concluding Remarks

The community college concept is gaining in popularity in the expansion of postsecondary education in many developing countries. This study could act as a catalyst to encourage similar studies in these countries. Its findings could be relevant to both current and future collaboration among postsecondary institutions in these countries.

For Jamaica, community colleges, although not a panacea, have proven to be effective in increasing access to postsecondary education to a wide cross-section of the island's population. However, for the island to escape the quagmire of persistent underdevelopment, these community colleges need to be given the opportunity to play an increased role in preparing the Jamaican workforce to be globally competitive. Although the island can learn much from the operations of community colleges in North America, it is necessary to develop these institutions within the context of the Jamaican education system and culture.

To this end, the franchising arrangement detailed in this study seems an excellent arrangement for other Jamaican postsecondary institutions to replicate. However, this can only be possible if stakeholders are prepared to embrace the reality that postsecondary education in developing countries is no longer just for the financial, social, and academic elite. Rather, postsecondary education is fast becoming a necessity for a country's survival in a global society.

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Appendices

Appendix A: IRB Consent

North Carolina State University is a land-grant university and a constituent institution of The University of North Carolina

**Office of Research
and Graduate Studies**

NC STATE UNIVERSITY

Sponsored Programs and
Regulatory Compliance
Campus Box 7514
2701 Sullivan Drive
Raleigh, NC 27695-7514

919.515.7200
919.515.7721 (fax)

From: Joseph Rabiaga, IRB Coordinator
North Carolina State University
Institutional Review Board

Date: July 24, 2008

Project Title: An Analysis of the Academic Performance of Jamaican Community College Transfer Students and Native University Students Enrolled in University Baccalaureate Programs

IRB#: 285-08-7

Dear Mr. Buckle:

The research proposal named above has received administrative review and has been approved as exempt from the policy as outlined in the Code of Federal Regulations (Exemption: 46.101.b.4). Provided that the only participation of the subjects is as described in the proposal narrative, this project is exempt from further review.

NOTE:

1. This committee complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU projects, the Assurance Number is: FWA00003429.
2. Any changes to the research must be submitted and approved by the IRB prior to implementation.
3. If any unanticipated problems occur, they must be reported to the IRB office within 5 business days.

Please provide your faculty sponsor with a copy of this letter.

Sincerely,

Joseph Rabiaga
NCSU IRB

Appendix B

Request to the University of Technology, Jamaica

September 3, 2009

Earl Buckle
P.O. Box 222
Mona
Kingston 7

Dr Cynthia Onyefulu
Research Ethics Chair
University of Technology

Dear Dr. Onyefulu:

I am Earl Buckle, a Jamaican Fulbright scholar and doctoral candidate at the North Carolina State University. I am also Vice-Principal (Student Affairs) at Excelsior Community College. I am now in the process of writing my dissertation, which involves the comparison of the academic performance of Community College transfer students enrolled under a franchising arrangement with UTECH with a similar group of direct-entry UTECH students. This comparison will involve transcript-type data only. As there is no intention to identify any student involved, the data will be coded before entry on my computer. Findings will be reported in relation to the group performance.

Further details are enclosed. These include:

1. An edited version of my research proposal, including approval letter from the Institution Review Board at North Carolina State University and a letter of request from my dissertation chair to UTECH.
2. The completed application form to UTECH's Ethics Committee

Thank you.

Yours truly,

Earl Buckle

Appendix D
SAS Output for Paired Samples T-Test

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2009

Paired t-test for Transfer Students

01:36 Tuesday, October 6,

The TTEST Procedure

Statistics

Difference	N	Lower CL Mean	Mean	Upper CL Mean	Lower CL Std Dev	Std Dev	Upper CL Std Dev	Std Err
LSGPA - JSGPA	100	0.0281	0.099	0.1699	0.3136	0.3572	0.4149	0.0357

T-Tests

Difference	DF	t Value	Pr > t
LSGPA - JSGPA	99	2.77	0.0067

Appendix E

SAS Output for Independent Samples T-Test

Paired t-test for Transfer Students 5
 01:36 Tuesday, October 6, 2009

The TTEST Procedure

Statistics

Variable	INSTYPE	N	Lower CL Mean	Mean	Upper CL Mean	Lower CL Std Dev	Std Dev	Upper CL Std Dev	Std Err
JSGPA	COMM	100	2.5677	2.642	2.7163	0.3288	0.3745	0.435	0.0374
JSGPA	UNIV	100	2.5474	2.659	2.7706	0.494	0.5627	0.6536	0.0563
JSGPA	Diff (1-2)		-0.15	-0.017	0.1163	0.4351	0.4779	0.5301	0.0676

T-Tests

Variable	Method	Variances	DF	t Value	Pr > t
JSGPA	Pooled	Equal	198	-0.25	0.8017
JSGPA	Satterthwaite	Unequal	172	-0.25	0.8017

Equality of Variances

Variable	Method	Num DF	Den DF	F Value	Pr > F
JSGPA	Folded F	99	99	2.26	<.0001

Appendix F

SAS Output for One-Way ANOVA (Upper Division GPA)

6

One-way Anova for Upper Division GPA

01:36 Tuesday, October 6, 2009

The GLM Procedure

Class Level Information

Class	Levels	Values
NEWTRANS	3	NoShoc TShock Univer

Number of Observations Read	200
Number of Observations Used	188

One-way Anova for Upper Division GPA

01:36 Tuesday, October 6, 2009⁷

The GLM Procedure

Dependent Variable: UDGPA Upper Div. GPA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.06084217	0.03042109	0.26	0.7719
Error	185	21.71038123	0.11735341		
Corrected Total	187	21.77122340			

R-Square	Coeff Var	Root MSE	UDGPA Mean
0.002795	12.08084	0.342569	2.835638

Source	DF	Type I SS	Mean Square	F Value	Pr > F
NEWTRANS	2	0.06084217	0.03042109	0.26	0.7719

Source	DF	Type III SS	Mean Square	F Value	Pr > F
NEWTRANS	2	0.06084217	0.03042109	0.26	0.7719

Appendix F, Continued

One-way Anova for Upper Division GPA

01:36 Tuesday, October 6, 2009

The GLM Procedure
 Least Squares Means
 Adjustment for Multiple Comparisons: Tukey-Kramer

NEWTRANS	UDGPA LSMEAN	LSMEAN Number
NoShoc	2.81935484	1
TShock	2.81515152	2
Univer	2.85376344	3

Least Squares Means for effect NEWTRANS
 Pr > |t| for H0: LSmean(i)=LSmean(j)

Dependent Variable: UDGPA

i/j	1	2	3
1		0.9982	0.8134
2	0.9982		0.8434
3	0.8134	0.840	

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2009

One-way Anova for Upper Division GPA

01:36 Tuesday, October 6,

The GLM Procedure
 Least Squares Means

NEWTRANS	UDGPA LSMEAN
NoShoc	2.81935484
TShock	2.81515152
Univer	2.85376344

Appendix G

SAS Output for One-Way ANOVA (Time to Degree)

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One-way Anova for Time to Degree

01:36 Tuesday, October 6, 2009

The GLM Procedure

Class Level Information

Class	Levels	Values
NEWTRANS	3	NoShoc TShock Univer

Number of Observations Read 200
Number of Observations Used 1

2009

One-way Anova for Time to Degree

01:36 Tuesday, October 6, 2009¹⁵

The GLM Procedure

Dependent Variable: TIME Time to Degree

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.39190649	0.19595325	1.17	0.3115
Error	168	28.02914614	0.16684016		
Corrected Total	170	28.42105263			

R-Square	Coeff Var	Root MSE	TIME Mean
0.013789	9.907345	0.408461	4.122807

Source	DF	Type I SS	Mean Square	F Value	Pr > F
NEWTRANS	2	0.39190649	0.19595325	1.17	0.3115

Source	DF	Type III SS	Mean Square	F Value	Pr > F
NEWTRANS	2	0.39190649	0.19595325	1.17	0.3115

Appendix G, Continued

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One-way Anova for Time to Degree

01:36 Tuesday, October 6, 2009

The GLM Procedure
 Least Squares Means
 Adjustment for Multiple Comparisons: Tukey-Kramer

NEWTRANS	TIME LSMEAN	LSMEAN Number
NoShoc	4.17857143	1
TShock	4.03571429	2
Univer	4.11494253	3

Least Squares Means for effect NEWTRANS
 Pr > |t| for H0: LSmean(i)=LSmean(j)

Dependent Variable: TIME

i/j	1	2	3
1		0.2883	0.6352
2	0.2883		0.6456
3	0.6352	0.6456	

One-way Anova for Time to Degree

01:36 Tuesday, October 6, 2009 ¹⁷

The GLM Procedure
 Least Squares Means

NEWTRANS	TIME LSMEAN
NoShoc	4.17857143
TShock	4.03571429
Univer	4.11494253

Appendix H

SAS Output for Logistic Regression Model (With Interaction)

Predicting Baccalaureate Degree Attainment Using Logistic Regression
01:36 Tuesday, October 6, 2009

The LOGISTIC Procedure

Model Information

Data Set	WORK.DATA8	
Response Variable	BACC	Baccalaureate Degree Attainment
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	200
Number of Observations Used	200

Response Profile

Ordered Value	BACC	Total Frequency
1	1	171
2	0	29

Probability modeled is BACC=1.

Class Level Information

Class	Value	Design Variables
GENDER	0	0
	1	1
INST	0	0
	1	1

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Appendix H, Continued

Predicting Baccalaureate Degree Attainment Using Logistic Regression

01:36 Tuesday, October 6, 2009

The LOGISTIC Procedure

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	167.575	131.875
SC	170.873	154.963
-2 Log L	165.575	117.875
R-Square	0.2122	Max-rescaled R-Square 0.3769

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	47.6999	6	<.0001
Score	41.0673	6	<.0001
wald	26.8040	6	0.0002

Type 3 Analysis of Effects

Effect	DF	wald Chi-Square	Pr > ChiSq
GENDER	1	0.2406	0.6238
LDGPA	1	5.9481	0.0147
INST	1	0.0750	0.7842
LDGPA*GENDER	1	0.6610	0.4162
GENDER*INST	1	2.1308	0.1444
LDGPA*INST	1	0.2429	0.6221

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	wald Chi-Square	Pr > ChiSq	Exp(Est)
Intercept	1	-7.8134	3.5195	4.9285	0.0264	0.000
GENDER	1	-2.2060	4.4976	0.2406	0.6238	0.110
LDGPA	1	3.4808	1.4272	5.9481	0.0147	32.487
INST	1	-1.2071	4.4086	0.0750	0.7842	0.299
LDGPA*GENDER	1	1.5361	1.8894	0.6610	0.4162	4.646
GENDER*INST	1 1	-1.4198	0.9727	2.1308	0.1444	0.242
LDGPA*INST	1	0.9082	1.8429	0.2429	0.6221	2.480

Appendix H, Continued

Predicting Baccalaureate Degree Attainment Using Logistic Regression
01:36 Tuesday, October 6, 2009

The LOGISTIC Procedure

Association of Predicted Probabilities and Observed Responses

Percent Concordant	85.0	Somers' D	0.717
Percent Discordant	13.3	Gamma	0.729
Percent Tied	1.7	Tau-a	0.179
Pairs	4959	c	0.859

Wald Confidence Interval for Parameters

Parameter		Estimate	95% Confidence Limits	
Intercept		-7.8134	-14.7116	-0.9153
GENDER	1	-2.2060	-11.0211	6.6091
LDGPA		3.4808	0.6835	6.2782
INST	1	-1.2071	-9.8477	7.4335
LDGPA*GENDER	1	1.5361	-2.1670	5.2391
GENDER*INST	1 1	-1.4198	-3.3262	0.4866
LDGPA*INST	1	0.9082	-2.7038	4.5201

Partition for the Hosmer and Lemeshow Test

Group	Total	BACC = 1		BACC = 0	
		Observed	Expected	Observed	Expected
1	21	10	8.97	11	12.03
2	23	15	15.57	8	7.43
3	22	19	18.00	3	4.00
4	20	17	17.64	3	2.36
5	22	19	20.48	3	1.52
6	21	20	20.17	1	0.83
7	20	20	19.53	0	0.47
8	21	21	20.72	0	0.28
9	19	19	18.93	0	0.07
10	11	11	10.99	0	0.01

Hosmer and Lemeshow Goodness-of-Fit Test

Chi-Square	DF	Pr > ChiSq
3.2058	8	0.9208

Appendix I

SAS Output for Logistic Regression Model (Without Interaction)

Predicting Baccalaureate Degree Attainment Using Logistic Regression

The LOGISTIC Procedure

Model Information

Data Set	WORK.DATA3	
Response Variable	BACC	Baccalaureate Degree Attainment
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	200
Number of Observations Used	200

Response Profile

Ordered Value	BACC	Total Frequency
1	1	171
2	0	29

Probability modeled is BACC=1.

Class Level Information

Class	value	Design Variables
GENDER	0	0
	1	1
INST	0	0
	1	1

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Appendix I, Continued

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Predicting Baccalaureate Degree Attainment Using Logistic Regression

The LOGISTIC Procedure

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	167.575	129.189
SC	170.873	142.382
-2 Log L	165.575	121.189

R-Square 0.1990 Max-rescaled R-Square 0.3535

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	44.3863	3	<.0001
Score	37.1817	3	<.0001
Wald	27.9411	3	<.0001

Type 3 Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
GENDER	1	3.1309	0.0768
NEWGPA	1	25.2963	<.0001
INST	1	0.2219	0.6376

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Exp(Est)
Intercept	1	-9.7556	2.1232	21.1114	<.0001	0.000
GENDER	1	0.8311	0.4697	3.1309	0.0768	2.296
NEWGPA	1	0.4425	0.0880	25.2963	<.0001	1.557
INST	1	0.2227	0.4728	0.2219	0.6376	1.249

Appendix I, Continued

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Predicting Baccalaureate Degree Attainment Using Logistic Regression

The LOGISTIC Procedure

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
GENDER 1 vs 0	2.296	0.914	5.765
NEWGPA	1.557	1.310	1.850
INST 1 vs 0	1.249	0.495	3.156

Association of Predicted Probabilities and Observed Responses

Percent Concordant	84.0	Somers' D	0.697
Percent Discordant	14.4	Gamma	0.707
Percent Tied Pairs	1.6	Tau-a	0.174
	4959	c	0.848

Wald Confidence Interval for Adjusted Odds Ratios

Effect	Unit	Estimate	95% Confidence Limits	
GENDER 1 vs 0	1.0000	2.296	0.914	5.765
NEWGPA	1.0000	1.557	1.310	1.850
INST 1 vs 0	1.0000	1.249	0.495	3.156

Partition for the Hosmer and Lemeshow Test

Group	Total	BACC = 1		BACC = 0	
		Observed	Expected	Observed	Expected
1	19	8	7.94	11	11.06
2	21	15	14.06	6	6.94
3	20	16	16.00	4	4.00
4	23	19	20.08	4	2.92
5	22	19	20.23	3	1.77
6	18	18	17.08	0	0.92
7	22	21	21.26	1	0.74
8	21	21	20.55	0	0.45
9	22	22	21.82	0	0.18
10	12	12	11.98	0	0.02

Hosmer and Lemeshow Goodness-of-Fit Test

Chi-Square	DF	Pr > ChiSq
3.3139	8	0.9131