

1-1-2008

## The factors that influence the graduation rates of community college transfer students and native students at a four-year public state university

John Randall Dickerson

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THE FACTORS THAT INFLUENCE THE GRADUATION RATES  
OF COMMUNITY COLLEGE TRANSFER STUDENTS  
AND NATIVE STUDENTS AT A FOUR-YEAR  
PUBLIC STATE UNIVERSITY

By

John Randall Dickerson

A Dissertation  
Submitted to the Faculty of  
Mississippi State University  
in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy  
in Community College Leadership  
in the Department of Instructional Systems, Leadership and Workforce Development

Mississippi State, Mississippi

December 2008

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John Randall Dickerson  
2008

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By

John Randall Dickerson

Approved:

---

James E. Davis  
Assistant Professor and Program  
Coordinator Department of  
Instructional Systems, Leadership,  
and Workforce Development  
(Director of Dissertation)

---

Gary R. Pike  
Associate Professor  
Higher Education and Student  
Affairs  
Indiana University Purdue  
University Indianapolis  
(Committee Member)

---

Edwin M. Keith  
Assistant Professor  
Department of Counseling and Educational  
Psychology  
(Committee Member)

---

Arthur Stumpf  
Associate Professor  
Department of Instructional Systems,  
Leadership, and Workforce  
Development  
(Committee Member)

---

Jerry Mathews  
Associate Professor and Graduate  
Coordinator, Department of Instructional  
Systems, Leadership, and Workforce  
Development

---

Richard Blackburn  
Dean of the College of Education

Name: John Dickerson

Date of Degree: December 12, 2008

Institution: Mississippi State University

Major Field: Community College Leadership

Major Professor: Dr. James Ed Davis

Title of Study: THE FACTORS THAT INFLUENCE THE GRADUATION RATES  
OF COMMUNITY COLLEGE TRANSFER STUDENTS AND  
NATIVE STUDENTS AT A FOUR-YEAR PUBLIC STATE  
UNIVERSITY

Pages in Study: 106

Candidate for Degree of Doctor of Philosophy

The purpose of the study was to investigate the rate at which community college transfer students graduate from the 4 year college and what variables can be used to explain the corresponding graduation rates. In addition, the study attempted to answer the identical question regarding the rate at which native students graduate from the 4 year college and the variables that can be used to explain the native student graduate rates. Finally, the study made comparisons between the community college transfer student variables that explained the corresponding graduation rates and the native student variables that explained their corresponding graduation rates to determine if differences existed between the two groups.

The data collected on the community college transfer and native students at Mississippi State University was analyzed in a two-group logistical regression. For each group, a logistical regression was built, that included the independent variables of the student demographic characteristics (age, gender, race and academic discipline) and the ability measures/lower-level academic success measures (ACT/SAT test score, high school grade point average and lower level college grade point average). The results from the logistical regression for the transfer and native students were compared. Delta-Ps, the change in predicted probability, were calculated for each independent variable and then compared for transfer and native students.

The conclusions of the study were the following native students appear to be better prepared to graduate than community college transfer students, the lower-level grade point average and number of lower-level credit hours earned appear to consistently explain the rates of graduation for both groups, as these two variables were significant for both groups. Transfer and native students in the Science, Technology, Engineering and Mathematics (STEM) category appear to be less prepared to graduate or encounter more obstacles to graduate than students in the other academic discipline categories. Running separate logistic models for each academic discipline category was effective in assessing the particular variables that impact graduation for the community college transfer and native students.

## ACKNOWLEDGEMENTS

I would like to take this opportunity to express my appreciation to those who provided assistance, support, and encouragement throughout this process. Thank you to my parents, Mike (MSU Class of 1958) and Billie Dickerson for their emphasis on education and their example of hard work and doing things the right way. I would like to express my love and appreciation to my wife, Christy Dickerson. Your assistance and encouragement have been tremendous. I could not have done this without you. Thanks to our children, Tyler and Kate Dickerson, who have been a part of this process and have been extremely supportive throughout. Thank you for your understanding and patience. I would like thank my dissertation chair and mentor, Dr. Ed Davis. I appreciate your guidance throughout this process and my career. I would like to thank my committee members, Dr. Eddie Keith, Dr. Gary Pike and Dr. Dan Stumpf, for their support and assistance throughout this project. Your service has been most appreciated. I would like to extend my thanks and appreciation to Ms. Michelle Crace, Dr. Rhonda Smith and Dr. Rickey Travis for all your assistance. Also, I appreciate the assistance of Mrs. Julie Fulgham and Mrs. Kathy Huffman in the Office of Institutional Research at Mississippi State University. Finally, I appreciate the support of my colleagues at Copiah-Lincoln Community College and Mississippi State University.

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## CHAPTER I

### INTRODUCTION

This study examines the graduation rates of community college transfer students and native students at a public four-year state university. The graduation rates of the community college transfer students will be compared to native students, who began their college career at the four-year public state university.

This study comes at a time when there is renewed interest in increasing the number of citizens in the United States who hold bachelor's degrees and in understanding the role that community colleges play in the efforts to raise the bachelor degree attainment levels. The United States Census Bureau (2005) reported that in 2005 workers with a bachelor's degree made an average \$54,689, while workers with an associate's degree on average made \$37,990. In addition, projections for the workforce indicate that the majority of higher-paying jobs added to the job market between 2004 and 2014 will require a bachelor's degree. Predominant categories include jobs in education, business, and information technology (Net Industries, 2004).

Community colleges have become the route to attainment of a bachelor's degree for many students as opposed to enrolling directly out of high school in a four-year college. In 2006, 6.6 million community college students were enrolled in credit programs. These students accounted for 45% of all first-time freshmen and 46%

of all the undergraduates in the United States (American Association of Community Colleges, 2007).

Also, there is evidence that university administrators are recognizing that transfer students are a tremendous potential source of enrollment. Thus, they understand the value of creating a campus environment conducive to transfer students. Bernice Johnson, Vice Chancellor for Academic Affairs at North Carolina Central University, states, “We find they (transfer students) tend to be a lot more mature and a lot more serious about learning.” (*The News and Observer*, 2008).

In the 1980s, 75% of full-time, first-year students in public community colleges indicated a desire to obtain a bachelor’s degree, but the actual transfer rate ranged from 15 to 25% (Cuseo, 2002). In 2005, students enrolled in a community college cited attaining a bachelor’s degree as their goal, yet only 25% of those students managed to enroll at a four-year college, and of those who transferred, fewer than 40% attained the bachelor’s degree (NACAC, 2005).

In addition, Hagedorn, Moon, Cypers, Maxwell and Lester (2006) conducted a follow-up study based upon the Transfer and Retention of Urban Community College Students (TRUCCS) project. The authors found that approximately half of the students who declared transfer as their goal passed any of the course groupings required of freshmen and sophomores at public universities in California in their lower division education requirements. Also, the percentage of actual community college transfers who matriculated to the public university in California in the study was between 3 and 4%.

At the same time, community college enrollments are growing at a rate much higher than that of four-year institutions. Contrary to common perception, three out of every four students enrolled at a community college are of traditional age (between 18 and 24 years of age), and the average age has decreased steadily over the past two decades (Wyner, 2006). Specific examples include Delgado Community College in New Orleans, Louisiana, which reported a 75% increase in the number of 18-24 year olds enrolled from the year 2000 to the year 2005, and the state of Pennsylvania reported that 46% of their community college students in the year 2001 were of traditional age (Cejada & Kaylor, 2001). In addition, Tulsa Community College in Tulsa, Oklahoma, the largest two-year college in the state of Oklahoma, reported that 65% of students in Tulsa County, Oklahoma, began their higher education studies at Tulsa Community College, and 50% of Tulsa Community College graduates transferred to four-year universities in Oklahoma (Christian, 2000).

While research supports the idea that a national trend points toward an increase of overall community college student enrollment, the community colleges provide access to higher education for underserved populations as well. Approximately 50% of all minority students and first-generation college students start their higher education career at a community college (American Association of Community Colleges, 2007). Fifty-five% of Hispanic, Asian/Pacific Islander, and Native American students and 46% of African American students in higher education are in community colleges (Szelenyi, 2000). Thus, to have an opportunity to improve the national bachelor's degree attainment rate for these students, the community college is a vital component.

With the realization that community colleges enroll a significant number of minority students, the National Articulation and Transfer Network (NATN), a federally-funded program, was formed to increase access for students, give additional support to community college counselors and advisors, and provide African-American, Hispanic/Latino, and Native-American students with college-admission information. NATN works to achieve its mission utilizing web-based pathways for college access, enrollment, academic planning and support, financial assistance, transfer facilitation, graduation and career decisions (NACAC, 2005).

Numerous factors at four-year colleges have made community colleges a more practical option for some students. Some of the community college conditions that encourage students to enroll include the following: small class size, lower tuition rate, more scholarship dollars available, and proximity (Montondon & Eikner, 1997). Most private and public four-year colleges also tend to raise their tuition and fees annually.

At the same time, a reduction in federal programs offering grants and work-study opportunities for students together with an increase in loan programs has contributed to the enrollment shift from four-year colleges to community colleges. Grant and work-study programs provide financial assistance that does not burden students with debt upon completion of their college careers. These programs provide opportunities to cover more of the cost at a community college than a four-year college. Thus, the costs associated with earning a bachelor's degree are significantly reduced when the student is able to earn two years' worth of credit at the community college and then transfer to the four-year college (The College Board, 2005).



A number of students choose the community college route to begin their higher education career because of the need to take remedial courses to develop their skills in preparation for college level work. The reduction, and for a number of four-year colleges, the elimination of remedial courses has directed students toward the community colleges to begin their college careers. Additionally, community colleges provide students an option if they are unable to relocate because of the demands of their jobs, income, or family responsibilities (Hungar & Lieberman, 2001).

Community colleges have multiple missions, such as career/technical education, workforce training, economic and community development. However, this study focuses on the community college mission to provide the first two years of college courses that prepare students for academic transfer to the four-year college. Academic success in four-year institutions has been one of the most important evaluation standards for assessing the achievement of community college transfer students. Tobolowsky (1998) defined community college success as “the ability of community college transfer students to transfer and persist in the four-year institution.” Proponents argue that community colleges provide students an opportunity for higher education in an economic and convenient fashion. Critics argue that few community college students transfer to four-year universities, and even fewer attain bachelor degrees. Of all entering community college freshmen 20 to 25% transfer to four-year colleges and 70% of those students who do transfer attain bachelor’s degrees. (Hungar & Lieberman, 2001).

The state of Washington established the Graduation Efficiency Index, a credit-to-degree measure as a means of assessing how four-year colleges are succeeding in their

mission to graduate students (Pooch & Wolverton, 2006). While the length of time it takes a student to complete a bachelor's degree is one measure of graduation, the state of Washington was the only state at that time with a mandated measure that examined credit-to-degree. The state of Washington wanted to measure efficiency based on how close a student came, upon graduation, to accumulating the precise number of credit hours that a program required.

Four-year colleges should attempt to gain an accurate understanding of the needs of students and those factors which are critical to their academic success. Proper assessment of these needs can help the college focus its programs and services to address those needs. It is important for four-year colleges with significant transfer enrollment to develop an assessment program that measures student performance and the factors that affect that performance. Studies that compare native students with transfers can help the four-year college learn about the needs of both groups and how it is meeting those needs. The ability of the four-year colleges to assess and respond to the needs of these students can help those colleges in their recruiting and retention efforts for both groups.

Likewise, quality data on the performance of transfer students is essential for the community colleges. The mission of the community college includes the roles of academic transfer, workforce training, career/technical programs, economic development and community enrichment. While community colleges have multiple roles as educational institutions, the academic transfer function is considered to be one of the most fundamental. Preparing students to transfer to a four-year college remains a central characteristic of the community college mission. This preparation is vital to the

community college's role in higher education because it affirms the community college's claim to a collegiate, academic identity and to a role in broadening access for those historically excluded from a college education (Bradburn & Hurst, 2001).

A general perception exists among the public that that students who begin their college career at a community college are typically less prepared for college than those students who begin their college career at the university (Glass & Harrington, 2002). As community colleges serve as advocates of the transferability of their students, their administrators should be armed with reliable and valid data regarding the performance of their students. Administrators need to know where students are succeeding, as well as what areas need improvement. This knowledge will help them ensure that the academic programs of their community colleges are adequately preparing students for successful transition to the four-year college.

#### Statement of the Problem

Four-year college academic administrators should be informed about how the community college transfer students enrolled at their institutions perform academically. Community college administrators should also be informed about how well their students perform academically upon transfer. One means of assessing the academic performance of community college transfer students at the four-year college is to measure transfer students' graduation rates against the graduation rate of native students. Possessing research results of the graduation rates of both groups and making comparisons is valuable to a certain degree. However, this research alone will not provide the kind of information that can have an impact on implementing programs and policies of change

that can directly impact the student. Research in this area should focus on all the aspects of the student so a model can be developed that will allow an opportunity to explain the graduation rates of community college transfer students at the four-year college. The different areas of emphasis for study include: personal and demographic characteristics, as well as academic major or discipline. Also, the graduation rates of native students should be examined with the same factors and then the rates should be compared to the community college transfer students. By analyzing and comparing the results administrators at both levels can decide if change is necessary and then respond appropriately at their colleges to ensure that the community college transfer students have every opportunity to be successful.

The purpose of the study is to explain what took place academically between the transfers and the native students at the four-year college. Specifically, the study will seek to determine if a statistical significance exists between student characteristics and lower-level success measures of the community college transfer student and their rate of graduation at the four-year college. The same analysis would be performed on native students at the four-year college and then comparisons made between both groups to determine if significant differences exist in the lower level preparation of both groups.

## Research Questions

After reviewing studies including the ones cited in the related research section, it was determined that the purpose of the study will be to answer the following questions:

1. Can demographic and academic variables of community college transfer students at Mississippi's public community/junior colleges be used to explain the graduation rates of the community college transfer students at Mississippi State University?
2. Can demographic and academic variables of native students be used to explain the graduation rates of native students at Mississippi State University?
3. Are there statistically significant differences in the demographic and academic variables that explain the graduate rates of community college transfer students at Mississippi's public community/junior colleges and native students at Mississippi State University?

## Justification for the Study

Numerous studies have been conducted that focus on the academic performance of community college students at four-year colleges (Bogart & Price, 1993; Boswell, 1992, Dickerson, 1993; Bradburn & Hurst, 2001; Christian, 2000; Dupraw & Micheal, 1995; Eggleston & Laanan, 2001; Flagga, 2006; Fletcher, Halpin, & Halpin, 1998; Moumouris, 1997; Piland, 1995; Rhine, Milligan & Nelson, 2000; Solomon, 2001; Underwood, 1999). Likewise, a significant number of studies have been presented that compare the academic performance of community college students with the academic

performance of students (native students) who began their college career at the four-year college (Bogart & Price, 1993; Boswell, 1992; Carlan & Byxbe, 2000; Florida State Department of Education, 1983; Glass & Harrington, 2002; James Madison University, 1998; Montondon & Eikner, 1997; Pascarella & Terenzini, 1991; Townsend, 2001).

While some studies (Cejada, Kaylor & Rewey, 1998; Kozeracki, 2001; Whitfield, 2005) have expanded the research by focusing the study on examining the academic performance of community college transfer students by academic discipline or major, additional studies need to focus on examining the comprehensive factors that may impact academic performance or graduation rates of community college transfer students and native students. This study will analyze the student demographic characteristics (gender, race, academic discipline, and age) as well as the academic ability measures and lower level success measures (high school grade point average, ACT/SAT test score, and lower level grade point average) of the transfer and native students to attempt to identify and explain those factors that appear to influence the level of graduation rates of the transfer and native students. Additionally, the comparisons between the community college transfers and the native students will provide additional insight on which factors may explain what is taking place with each group of students.

#### Limitations

The researcher identified the following limitations for this study:

1. The conclusions that may be drawn from this study will be limited to the community college transfers and native students selected as the populations for the study.

2. The conclusions that may be drawn from this study will be limited to the academic student experience at Mississippi State University.
3. Any generalization to the community college system as a whole will be limited by studying only those community college students who enrolled at the time of the study at Mississippi State University.
4. The results are limited to the time the study will take place.

### Definition of Terms

The following terms will be defined to provide a clear understanding of the terminology used in the study:

1. Community College Transfer Student – A student who transfers a minimum of 48 semester hours or more from the community college to the four-year college.
2. Native Student – A student who entered the four-year college as a first-time freshman (student entered the four-year college the fall semester immediately following graduation from high school) and has attained 48 semester hours at the four-year college.
3. Lower level Grade Point Average – The cumulative Grade Point Average (GPA) earned by community college transfer students while at the community college, provided a minimum of least 48 semester hours were earned at the community college. For native students, the lower-level GPA is defined as the GPA on the first 48 semester hours earned at the four-year college.

4. Upper level Grade Point Average - The cumulative Grade Point Average (GPA) earned by community college transfer students at the four-year college. For native students, the cumulative GPA earned beginning with the first semester following the semester in which 48 semester hours were earned.



## CHAPTER II

### REVIEW OF LITERATURE

#### Introduction

The researcher identified and reviewed relevant research studies to develop a conceptual basis and to educate the reader with the pertinent information from the current literature. The procedure of identifying the current literature was accomplished by using online databases including ERIC, EBSCO, other search engines, as well as the bibliography of The Institute for the Study of Transfer Students, sponsored by the University of North Texas.

The review of the research conducted on the topic of community college transfer student academic performance at the four-year college was organized into three focal subject areas. First, the research revealed that community college transfer students compose a significant percentage of the enrollment at four-year colleges; thus, this population of students is significant enough to four-year college enrollments to warrant additional study. Second, when examining the research of academic performance of transfer students at four-year colleges, the research has produced findings that indicate academic success, as well as academic difficulty among the transfer and native students. While a number of research studies indicate that community college transfer students perform at high levels academically upon transfer, other studies have provided evidence that transfer students performed academically at low levels. In addition, the studies

provided conflicting results when examining the graduation rates of community college transfer students at four-year college.

Third, the research findings of the academic performance comparison studies between community college transfer students and native students at four-year colleges will be presented. A number of the studies verify a generally-held perception that native students perform at higher academic levels than community college transfer students and graduate at higher rates. However, other studies appear to indicate that community college transfer students perform at academically comparable levels to native students, though in some cases, transfer students experience transfer shock during that first semester at the four-year college. Significant differences have been noted in the research between transfers and natives on the basis of gender, race, transfer grade point average, and graduation rates.

#### Community College Student Enrollment at Four-Year Colleges

As Chapter I indicated, almost half of all undergraduates in the United States who attend college attend community colleges (NACAC, 2005). When examining the impact of transfer students on four-year college enrollment, Cohen's (1996) study illustrates the impact that transfer students are having on four-year college enrollments. Cohen's study detailed the Transfer Assembly Project, initiated in 1989 by the Center for the Study of Community Colleges (CSCC) to determine the contribution of community colleges to students' progress towards baccalaureate degrees. In that year, 48 community colleges provided data on students. This study defined transfers as students entering the two-year

college in a given year who had no prior college experience and who completed at least 12 credit hours of college. (Szelenyi, 2002).

In 1992, the project began seeking data from state higher education agencies and university systems, as well as from individual colleges. By 1994, 20 states and over 400 institutions were represented annually in the analysis. In 1996, CSCC gathered data on 543,055 students at 416 colleges who had started their education in 1990, again finding that 21% of these students had transferred by fall 1994 (Cohen, 1996). The 2001 study, which examined students entering community colleges in 1995 and moving on to public in-state four-year colleges by 1999, produced a transfer rate of 25% (Szelenyi, 2002).

The Transfer Assembly has inspired research efforts and programmatic changes at community colleges and four-year college systems. In addition, several major newspapers have accorded recognition to the project's transfer rate (Cohen, 1999). This research effort, and the publicity with the results, demonstrates the importance that is being placed on the enrollment impact of that community college transfer students have on four-year college enrollment.

Cohen's (1999) research focuses on the transfer of students from California community colleges to four-year colleges. Following a brief introduction to laws and procedures specified upon the inception of community colleges in California in 1910 and recognition of the difficulty in student transfer throughout the history of higher education institutions, the article discusses the calculation of transfer rates and their variation among the states. Nationally, rates were low where community colleges have been

organized as vocational centers, as in the state of Indiana, and high where they are closely articulated with the state's university system, as in the state of West Virginia.

Influences on transfer from California community colleges include the following (1) affordability, which enhances access but also allows for inconsistent attendance; (2) disparity between college and university fees; (3) system policies, specifically the prerequisite of two years of full-time study completed prior to transfer; and (4) the dual university system, including liberal arts and non-liberal arts classes. A primary issue of transfer at the time the article was published was whether or not California was interested in having more students transfer from community colleges to the University of California and California State University (Cohen, 1999). The Foundation for California Community Colleges, a nonprofit organization formed in 1998 to advance the educational efforts of the community colleges in California, and the California Community College System Office, joined in 2004 to develop a strategic plan that was completed in 2006. One of the major facets of the plan was focused on increasing the transfer rate from the community colleges to the four-year colleges in California (Foundation for California Community Colleges, n.d.).

Additional studies indicated that community college transfer students were a significant portion of the four-year college enrollment. A study of six public universities in the state of Virginia revealed that 38% of students enrolled at the time of the study had transferred community college credit to the institution that awarded the baccalaureate degree (Cejada & Kaylor, 2001).

Also, community colleges provide minority students with significant opportunities to achieve their higher education goals. In 2001, the Ford Foundation (Hunger and Lieberman, 2001) reported that 50% of all minority students in higher education are in community colleges. The specific breakdown of some of the minority groups is as follows: 55% of Hispanic students, 55% of Asian/Pacific Islander students, 55% of Native American students and 46% of African-American students in higher education were enrolled in community colleges. The Ford Foundation Study (Hunger and Lieberman, 2001) attributed this phenomenon to the community college costs being much more affordable than the four-year college. The study pointed toward the continued rise in four-year college costs and the erosion of financial aid grants as significant contributors to the majority of minority students choosing to begin their college careers at a community college. Thus, these studies demonstrate the role that community colleges play in providing a significant portion of minority students their pathway to the baccalaureate degree. Likewise, four-year colleges can target community colleges for enrollment strategies aimed toward minority students.

While the current research consistently reports that community college enrollment is growing, it must be noted that several studies report that the rate of transfer of those students is quite low. Eggleston and Laanan reported in 2001 that just one out of five community college students transfer and that the transfer rates range from 22 and 25% nationally. Cuseo's study (2002) supports the idea that the transfer rate is consistently low over time, finding that in the 1980s, 75% of full-time first-year students in public community colleges indicated a desire to obtain a bachelor's degree; however, the actual

transfer rate varied from 15 to 25%. Also, his study of community college students in the late 1990s reported that community college students will receive, on average, 15% fewer bachelor degrees than those who begin their higher education career at four-year colleges.

As previously stated, the research revealed that community college students are not transferring at particularly high rates to the four-year colleges, as the range of rate of transfer varies from 15 to 25% nationally (Cuseo, 2002; Eggleston & Laanan, 2001). Dougherty (1992) contends from his study that community college transfer students face obstacles at each stage of their academic journey: surviving in the community college, successfully completing the transfer process to a four-year college, and completing the four-year college. Thus, facing multiple obstacles decreases the likelihood of successfully completing the matriculation to graduation process.

Finally, a study conducted at Chabot College in California reveals additional relatively low rates of transfer for community college transfer students (Arnold & Ugale, 1996). The researchers analyzed the total number of first-time Chabot students who entered one year and earned twelve or more hours of credit, they then calculated the percentage of this group who transferred to the University of California or California State University within four years. The transfer rate based on this formula was 23%. In addition, Arnold and Ugale (1996) calculated a transfer readiness rate of the students. (This rate was calculated as the percentage of students who become transfer ready within four years out of those who were planning to transfer). This rate was much higher, at 40%, though less half of those students who planned to transfer actually had transferred.

Zamani (2001) examined possible barriers that inhibit transfer students from completing the transfer process. Those identified included lack of financial resources, as well as access to those resources, lack of academic preparation, lack of engagement with the campus community, and work and/or family responsibilities. Zamani (2001) proposes a possible solution to address the issues that prohibit transfer students matriculating to the four-year college. The solution centers around the concept of establishing transfer student centers on the community college campus. The state of Illinois provided funding to state community colleges to establish minority transfer centers. These centers focused on fostering an atmosphere and providing support that facilitated the transfer of minority students. As a result, transfer rates for African American and Hispanic community college students increased.

Other examples include Glendale Community College's Transfer Center which focused on providing financial assistance for their students to make campus visits to selected four-year colleges in California. In addition, Glendale's Transfer Center held college fairs and brought four-year college officials to campus to provide information to those students planning to transfer (Zamani, 2001).

If these trends continue, four-year colleges will be challenged to maintain and expand the number of graduates produced in their institutions given the ever increasing number of students who are beginning their higher education careers at a community college. This challenge compels the community college and four-year college administrators to have a better understanding of the factors that contribute to successful

academic performance of those community college students who do transfer to four-year colleges.

### Academic Performance of Community College Transfer Students

The second area of research focuses on the academic performance of community college transfer students they have enrolled at the four-year college. The transfer function remains one of the most important functions of the community colleges, though there is some debate about the current performance of that function. Studies focused on the area of academic performance of transfer students (Moumouris, 1997; Underwood, 1999) in the 1990s reported that community college grade point averages are valid predictors of the transfer students' grade point averages at four-year colleges. When examining the issue of academic performance of transfer students, the issue of transfer shock should be presented, as this phenomenon has been consistently examined by most researchers studying the four-year college academic performance of community college transfer students. Transfer shock, a phenomenon studied for years, is a term that describes a decline in the grade point average of a community college student when he/she transfers from to the four-year institution. In most cases, the decline in grade point average is studied by examining the first-semester grade point average of the community college transfer student at the four-year college.

Consistent with the research on the academic performance of community college transfer students, the study of transfer shock has not generated reliable findings. Solomon (2001) examined a group of 561 students over a five-year period who transferred from Northern Virginia Community College (NVCC) to George Mason



University (GMU) from 1993 to 1997. Solomon focused the research on comparative studies with students who were natives (began their college career at the four-year college) of George Mason during the same time period. Solomon's study yielded no significant differences in the grade point averages of the students from NVCC in their last semester at NVCC and their grade point averages after their first semester at GMU, thus indicating that transfer shock did not appear to take place with these students in this study.

Solomon's (2001) study revealed several other relevant findings. First, the study found no significant differences in grade point average at the time of graduation between the transfer and the native students. Second, age, race, and gender accounted for a small percentage of the variation in graduation grade point averages. Finally, no conclusions could be reached on the impact of race on academic success of the students. However, women did outperform men by considerable margins.

Another factor to consider when examining the academic performance of community college transfer students is the relationship between the academic major of the community college transfer students and their academic performance at the four-year college. In reviewing the literature, there were limited studies that examined this relationship or included academic major as a dependent variable in their research study. One of those studies (Cejada, et al. 1998) examined a sample of 250 students from a public community college system in a Midwestern state who enrolled in a private, liberal arts college in the same state during a seven-year time period (Fall Semester of 1989 – Fall Semester of 1996).

The focus of this study (Cejada, et al., 1998) was to determine if statistical significance existed in the academic performance of the community college transfers in different areas of academic major. The areas that were examined included fine arts and humanities, mathematics and sciences, social sciences, and professions. Researchers tested for significant differences between the means of community college grade point average and the liberal arts college grade point average in each respective academic discipline. In addition, the pre- and post-transfer grade point average means of the respective disciplines were examined.

The results of the study (Cejada, et al., 1998) produced different conclusions as to what may have taken place with the community college transfer students in this study. First, the mathematics and sciences and professions majors did experience some transfer shock, though there was minimal transfer shock recorded in the overall student population studied. Only the mathematics and sciences disciplines experienced a change that was statistically significant, though there were declines and gains in grade point average among the other academic disciplines. Also, the overall student population experienced a grade point average decline, but it was not statistically significant. Second, the grade point average means of fine arts, humanities, and social sciences disciplines actually increased from the community college to the four-year college. Third, the students' academic disciplines did not significantly influence grade point average while the students were enrolled at the community college. Finally, with no significant differences among the pre-transfer grade point average means or among the pre- and post-transfer grade point average mean of the entire population, the researchers

concluded a lack of solid support existed to infer a relationship between the students' academic area and their academic performance at the four-year college.

In another study centered on researching academic performance of community college transfer students by examining the academic discipline, Whitfield (2005) examined chemistry and biochemistry grades of community college transfer students enrolled at a large state university. The focus of the study was to determine if there were statistically significant differences in the grades of community college transfers and native students at the state university in organic chemistry and biochemistry. Whitfield (2005) focused on these two science courses because the courses are generally prerequisites to professional careers in medicine and engineering.

Whitfield (2005) indicated that findings of this study regarding how community college transfers perform in these courses could possibly motivate reform at the course level. This study accessed student records for the period of 1996 through 2002 and concentrated on those community college transfer students from the eleven community colleges within a 100 mile radius of the state university. The remaining community colleges in the state did not transfer significant numbers of students to the university. In addition, the study was limited to students who completed the prerequisite course sequence at the community college. These selection criteria produced a community college transfer student sample of 168 students and the same criteria for native students led to 1,091 students. Whitfield (2005) measured the first quarter and second quarter grades of both groups of students.

The results of the study revealed that community college transfer students experienced some academic successes, but certainly had room for making improvements. The academic performance of the transfer students compared well to the native students when organic chemistry was the subject being examined. The mean of the natives' grade point average was slightly ahead of the community college transfers students. When the results from biochemistry were analyzed, no significant differences were found in the mean course grade point average between the natives and the community college transfers (Whitfield, 2005).

Whitfield (2005) was aware of the recognized phenomena of transfer shock and further examined the biochemistry results to determine if the community college transfer mean grades followed the pattern of transfer shock, resulting in an increase in the mean grades in the second quarter. However, analysis showed that grades actually decreased slightly the second quarter, while the grades of the natives increased slightly. Thus, the achievement gap between the natives and the community college transfers actually widened as they spent more time in the four-year college environment.

The findings of Whitfield's (2005) study support the results of Carlon and Byxbe (2000) that community college transfer students in the sciences experienced decreases in mean GPA after transferring to the four-year college. This study analyzed community college transfer students' academic performances at a major university in the southern United States over a three-year period. The 500 transfer students for the study were selected based on having a minimum of 24 semester hours of credit earned at the community college. The 230 native students were randomly selected with 54 hours or

more earned from the university. The semester hour criterion was used for both groups in order to obtain comparable data for analysis. In addition to analyzing the academic performance of the two groups, descriptive data reflecting the students' demographic characteristics and their relationship to academic achievement were presented in the study. This descriptive data included college major, race, sex, and age. Also, separate prediction models were developed to detect any variables that were important in the long-term success of both the transfer and native students.

In another study (Cejada, 1997), transfer shock is examined in relation to analyzing the impact on the different academic disciplines. Significant differences were found among the academic disciplines; however, the sample did not experience a significant drop in GPA. In fact, the disciplines of education, fine arts, humanities, and social sciences experienced an increase in GPA, while only those majoring in business, mathematics and the sciences experienced a significant decrease in GPA. Native student science majors experienced a reduction of one quarter to one third of a point decrease in their grade point average for upper level courses. The community college transfer students in the science majors experienced grade point average reductions in excess of one-half a letter grade. However, education and psychology majors experienced significant increases, and students in these colleges outperformed all other colleges. Thus, Cejada's (1997) study demonstrates the need to examine the potential impact of academic discipline on the academic performance of community college transfer students at the four-year college.

The findings of both the Whitfield (2000) and Carlson & Byxbe (2005) studies, suggest that the effect on academic performance of a student transferring may be curriculum-based in addition to the institutional interactions that have an impact on the academic performance. These findings certainly demonstrate the importance of examining community college transfer academic performance at the area of academic college and/or discipline/major. Armed with research results that identify the specific academic areas in which transfer students experience academic difficulties, administrators, faculty, and advisors can target their efforts to improve the academic performance in the specific academic areas where assistance is primarily needed instead of targeting transfer students globally.

In a related study (Quanty, Dixon, & Ridley, 1999), a course-based model of measuring transfer success discovered that students who completed prerequisite courses at Thomas Nelson Community College performed at a level that was at least equal to students who completed prerequisites at Christopher Newport University. This research has helped the two institutions identify problems by specific course, thus allowing faculty in these disciplines at both institutions to work collaboratively to seek solutions to the problems.

When examining the academic performance of community college transfer students, identifying the characteristics of those transfer students who graduate from the four-year college is critical. Identifying characteristics of these graduates can assist administrators in targeting support programs for those students who do not possess them. Piland (1995) examined a sample of 300 of the 1,796 graduates from San Diego State

University who began their academic career at a community college. Some of the relevant characteristics of the graduates included average transfer rate of 58 semester hours, 68% were fulltime students, over 50% of the population was female, and only 4% had graduated from the community college. Also, the study revealed that the transfer students with the highest grade point averages (3.5 – 4.0) graduated sooner than those with lower grade point averages. This group of students had the highest overall rates of graduation by almost 2 to 1 over students with the lowest GPAs (less than 2.5). The study found that the grade point averages of the transfer students were almost the same at graduation (3.0) as their community college grade point average was at the time of transfer (3.1).

The findings of this study do not support the findings of some of the previous studies that indicated the academic performance of community college transfer students decreases as they progress in their career at the four-year college. The reader must be cautious in making inferences from Piland's (1995) study, as this study was of a homogenous group of students and not broken down to the academic area and major as the previous studies (Carlson & Byxbe, 2000; Whitfield, 2005). Piland's (1995) study did show a positive relationship between the rate of graduation and the higher mean grade point averages of the students.

When reviewing the research studies focused on the second area of the literature review, the academic performance of community college transfer students, several trends emerge among the findings. First, the research offers differing results when examining the academic performance of community college transfer students. While the

phenomenon of transfer shock appears to be evident in the majority of the studies, a number found that the grade point average of these students tends to rebound to approximately the same as the transferred GPA. Second, the impact of personal characteristics like race, age, and sex varies somewhat from study to study. However, there appears to be a trend in the studies presented indicating that women perform at a higher academic level and graduate at higher rates.

Third, while studies that attempt to measure academic performance across academic disciplines are important and provide valuable information, more research in this area should be focused on examining the impact of academic discipline or major on academic performance. Finally, comparisons to native students tend to be at least a portion of most of the studies, if not the focus. A number of the studies in this review will be examined in greater depth in the third and final area of the literature review.

#### Comparisons of Community College and Native Students

When reviewing the research that focuses on comparisons between community college transfer students and native students, the majority reveals that native students tend to perform at an academically higher level and graduate at higher rates than do community college transfer students. However, as will be explored in this area of the review, some studies show little or no difference in the academic performance of the two groups.

A study by the Office of Institutional Research at James Madison University (1998) illustrates the pattern of the research findings in regard to comparing community college transfer student performance with native student performance at a four-year



college. The study analyzed the 231 students who transferred in the fall of 1996 from Virginia community colleges to James Madison University (1998). The study focused on the comparing transfer students with native students in terms of academic performance overall and by major.

The overall grade point average of the transfer students after the first year at James Madison University (1998) was 2.71, while the overall grade point average of the native students that first year was 3.00. Eighty percent of the transfers were either in Good Standing, on the Dean's List, or the President's List at the end of their first year at James Madison. Variations of the grade point averages did exist among the colleges at James Madison, but the number of students was such a small number that the differences among colleges were not significant. Also, according to the Office of the Registrar at James Madison, 91% of all the undergraduates were either in Good Standing or better; thus it could be inferred that being in Good Standing was considered average for James Madison University (1998).

The James Madison University academic disciplines in which the community college transfers had the highest GPAs were Elementary Education, Nutrition, and Early Childhood Education. Those disciplines in which the GPAs fell below 2.0 were chemistry, mathematics, accounting, and physics. When analyzing the performance of the transfer students compared to the native students in each James Madison University academic discipline, the transfers' academic performance was lower than the James Madison natives in the areas of accounting, biology, chemistry, economics, English, math and psychology (James Madison University, 1998).

This study did not provide pertinent information that should be known to validate the results. First, the study did not provide information on how the community college transfer students were selected. From the information provided, it could be assumed that all first-time community college transfer students were included in the study. When making judgments on how well the transfer students performed, it is critical to know the number of hours that the students transferred from the community college if inferences are going to be made on the quality of academic preparation of the community colleges. For example, the academic performance of a student who transfers 12 hours from a community college will not be as representative of the academic experience at the community college as a student who transfers 48 hours (James Madison University, 1998).

Second, the study did not provide the number of semester hours accumulated by the native students in the study. As with the community college transfer students, comparisons made with native students who had acquired 12 hours from James Madison University are not equivalent to those who have acquired 75 hours from James Madison University. Given these limitations, the study did reveal that while the community college transfers performed well academically overall, some of the students in certain academic disciplines struggled, and the transfers did not perform as well as the native students overall (James Madison University, 1998).

In Glass and Harrington's 2002 study, community college transfer and native students were randomly chosen from the class of 1998 and 1999 from the University of North Carolina System of universities for comparison of academic performance. In each

class, 50 were community college transfer students who transferred to the university in the fall of 1996 and fall of 1997; 50 were native students who had entered the university in the fall of 1994 and the fall of 1995. All students were from the College of Arts and Sciences. These groups of students were compared by grade point averages at the end of the lower division work, which was the sophomore year for natives and the end of the second year of community college work for transfers (Glass & Harrington, 2002).

In addition, students were compared at the end of the first semester in their academic major to determine if transfer shock was evident for transfer students and if a grade point average decline was evident for natives. Lastly, the students' grade point averages were compared at the end of the spring semesters of 1998 and 1999 to determine if there was recovery from transfer shock for the transfers and from the possible decline in grade point average for native students. Retention and graduation rates for both groups were compared (Glass & Harrington, 2002).

The results of the study demonstrated no significant differences between the grade point average of the transfer students and natives on lower division work for the 1998 class. However, significant differences were found for the 1999 class on grade point average in lower division work. The transfer class had a significantly lower grade point average than did the natives (Glass & Harrington, 2002).

The results of Glass and Harrington's (2002) study showed no significant differences in the graduation rates of the transfer students and the native students. There was not a significant difference in the cumulative grade point average for the 1998 class;

however the transfer students had higher grade point averages than the natives in the 1999 class upon graduation (Glass & Harrington, 2002).

For the 1998 class, transfer shock was experienced by the transfer students, as their grade point average did decline the first semester and was significantly lower than the natives. While the natives experienced no such effect, the transfer students' grade point average did rebound after that first semester, such that the grade point average of transfer students at the time of graduation were the same or better than those of the native students. Thus, the academic performance of the transfer students of the class of 1998 was not significantly different than the native students (Glass & Harrington, 2002).

The community college transfer student class of 1999 did not have a significantly lower grade point average than the native students the first semester. However, transfer shock was evident as the grade point average of the community college transfers did fall slightly during their first semester at the university. In both years' studies, transfer students did seem to recover from transfer shock experienced their first semester, as the mean grade point average for the community college transfers and natives were almost identical at the end of the spring semester (Glass & Harrington, 2002).

The findings of Glass and Harrington's (2002) study revealed several tendencies. First, the community college transfer students did experience a decrease in grade point average the first semester; thus, the students experienced transfer shock. Second, the university grade point average of the transfers adjusted to the level of the community college grade point average by graduation, as it was comparable to the native students.

Boswell's (1992) study at the University of North Carolina validates Glass and

Harrington's (2002) research. First, this study found that community college transfer students earned significantly higher grade point averages in the first two years of course work than did the native students. Also, the academic performance of the transfer students was on par with the native student performance at the four-year college (Glass & Harrington, 2002).

Second, the results tend to suggest that the transfer students performed as well or better than the native students at the four-year college, as the grade point average of the transfer students at graduation was comparable or higher than that of the native students. The researcher was not able to give reliable data on which group had higher graduation rates. Also, drawing inferences from this data should be cautioned as samples were confined to students enrolled in the College of Arts and Sciences and not a broad spectrum of the entire campus enrollment. However, as some of the studies in this area (Boswell, 1992; James Madison University, 1998) have focused their efforts, it is imperative that that research on community college transfer and native student academic performance include a focus on the possible impact of the academic disciplines, so specific strategies of improvement and intervention can be developed and implemented (Glass & Harrington, 2002).

The State of Oregon (Arnold, 2001) established a program to provide for the annual assessment of the academic performance of community college students who transferred to one of the public universities in Oregon. This project was a partnership between the Department of Community Colleges and Workforce Development (CCWD) and Oregon University System (OUS). Each year, beginning with the 1995 – 1996

school year, the social security numbers of all community college and public university students were matched and compared. The focus of this assessment was to obtain a broader analysis of the transfer academic performance and the activity of the transfer students upon entering the university.

The project revealed a number of patterns in the area of academic performance of community college transfer students and transfer activity. First, while the majority of community college students transfer to an OUS institution without completing the community college degree, 55% of all students who earned baccalaureate degrees completed the associates' degree. It should be noted that students who transfer to an OUS institution with an associate's degree have satisfied all the lower-division educational requirements of the OUS institution and enter with junior standing (Arnold, 2001).

Second, the grade point average of the community college transfer students in the 1996-97 year was 2.91, while the grade point average of the native students was 2.80. The grade point average of other transfers (those transferred from another institution other than an Oregon community college or had attended an Oregon community college in another year) was 3.06. Thus, the community college transfers' academic performances were comparable with the natives and the other transfers (Arnold, 2001).

Third, the project focused some assessment efforts on the academic performance of the groups by academic discipline, as the mathematic achievement of the students in each group was examined. In 1998-99, the community college students performed better than the natives in College Algebra with a GPA of 2.50 versus 2.35. However, the other

transfers had a slightly higher grade point average of 3.06. When examining all math courses, community college transfers and native students performed at the same level, the respective grade point averages were 2.50 and 2.51, though the grade point average of the other transfers was higher at 2.68. Also, when examining other academic areas, community college transfer students had higher overall grade point averages than the native students, but slightly lower than the other transfers in the areas of arts and letters, sciences, social sciences, and English Composition (Arnold, 2001).

Finally, comparing graduation rates of community college transfer students and native students presents some challenges to find an equitable manner of evaluation. Arnold (2001) contends that a reasonable manner to examine graduation data is to focus on native students who persisted through their first year and community college transfer students who enter OUS with a year or more (45 to 89 quarter hours) of college credits earned at a community college. Arnold examined two cohorts, a 1988-1989 cohort and a 1993-1994 cohort. The graduation rates for the native students were 65.2 and 67.6% respectively. The rates for the community college transfer students were 61.9 and 62.0% respectively (Arnold, 2001).

While this data gives us an idea of the rate of graduation of the students, it must be noted that students, community college transfer or native, do not necessarily maintain enrollment in a linear relationship. Some students are forced to go back and forth between institutions and, in some cases, not enroll some semesters due to financial or personal obligations. This movement has become known as swirling. Other students may take college credit courses through the local community college in a dual enrollment

program while in high school and/or take enroll at the local community college for summer courses to transfer back to the four-year college (Arnold, 2001). Townsend (2001) claims that the increase of community college transfer students who do not complete the Associates in Arts degree leads to a decreased likelihood of academic success at the four-year college. This pattern of student enrollment behavior must be a factor when assessing the academic performance of transfer students and making comparisons to native students (Arnold, 2001).

The results of Arnold's (2001) study demonstrated that community college transfer students perform academically and graduate at levels comparable to native students. While transfer shock was not measured in this study, it is reasonable to assume that if it did occur, a recovery took place based on the comparable grade point averages at graduation of the transfers and native students. The author contends that additional research efforts on community college transfer students should be focused on gathering data on the academic area or major to measure the potential impact it has on the academic performance and graduation rates. (Arnold, 2001).

An additional study partially presented, earlier in the literature review, compares the academic performance of community college transfer students and native students, as well as examines the predictor variables that were vital to student academic success. This study, (Carlan & Byxbe, 2000) was conducted on students who enrolled over a three-year period at a major southern university. The results of the study found that the first semester grade point average of the transfer students was three-tenths of a point less than the cumulative community college grade point average. This was consistent across all six



of the colleges within the university. Native students maintained close to the same upper and lower level grade point averages.

The variables vital for academic success for the transfer students were age (25 years old and older) and race (white), though the most important variables contributing to the transfer student grade point average prediction were lower division grade point average and college of major at 27 and 10% of the variance respectively. The upper division grade point average of the transfers increased almost two-thirds of a letter grade for every one point increase in grade point average transferred from the community college. Gender, associate degree attainment, enrollment status, number of transfer credit hours, and majoring in the arts were variables that did not contribute significantly to transfer student prediction model. Finally, American College Test (ACT) scores did not contribute significantly to the upper division grade point average prediction (Carlan & Byxbe, 2000).

The native students' prediction model identified different variables that appeared to make significant contributions to their academic performance. First, race accounted for 14% of the total variance and represented nearly one-half grade point. Race was a significant variable for transfer students, but it was much greater for native students. Second, as with transfer students, lower division grade point average and college of major contributed significantly to the native students' grade point average. Third, majoring in business and science influenced grade point average attainment significantly in upper level courses as native students experienced fewer academic problems than

transfer students of the same major. Finally, the number of lower division credit hours as well as gender were significant predictors of academic success (Carlan & Byxbe, 2000).

Carlan and Byxbe's study (2000) revealed similar results as some of the previous literature presented in this review. First, the transfer students in the study did not perform at the same academic level as native students based on grade point average. Second, the possible reasons provided for the disparity between the two groups were limited. The ACT scores of the transfer students were lower than the natives, but the lower division grade point averages were approximately the same. Generally, lower ACT scores would correlate with lower grade point averages. However, the authors contend that the reasons for this phenomenon could be an interaction between grade inflation (at the community college) and the struggle to adapt to the challenging environment of the upper level courses.

Finally, like previous studies, this study revealed the importance of examining the academic performance of the transfer and native students by academic discipline, as both groups shared the variable of college of major as a significant predictor variable. For example, the study revealed that transfer students who earned grades of B or higher at the community college appeared to be well prepared for upper division courses. The only exception to this was for those students who majored in business and science disciplines. This research provides those academic disciplines the opportunity to examine further what may be taking place at either the community college level or the four-year college level to produce these results.

The final study (Johnson, 2005), comparing the academic performance of community college transfer students and native students, is presented in this review of the literature. Johnson's (2005) study focused on the academic performance of students enrolled in natural resources majors at a mid-sized public university on the West Coast. The research concentrated on 2,467 graduates in the college of natural resources and sciences during the twelve year period between 1992 and 2003. Humboldt State University, located in a rural county in Northwestern California, was the public university for which the research data were analyzed. It must be noted that Humboldt had a reputation for placing an emphasis on natural resources and sciences, and there were sixteen majors within the college of natural resources and sciences.

In order to make the comparisons, Johnson (2005) first analyzed the grade point average of the transfer students and the native students without adjustment for the pre-college variables listed below. In this analysis, there was no evidence for a difference in the academic performance of native and transfer students. Second, Johnson analyzed the adjusted academic performance of the students while statistically accounting for the pre-college variables of high school grade point average, age at graduation, SAT/ACT scores, and state residency. As Humboldt did not require ACT scores of transfer students, some of the population's ACT scores were not available; thus, a separate analysis was conducted on those students.

In the second analysis (Johnson, 2005), strong evidence was apparent for a positive relationship between the pre-college measures of SAT/ACT score, while high school grade point average and age showed a positive association. When analyzing the

raw grade point averages, non-residents grade point averages were on average 0.16 points higher than residents' raw grade point average. However, when factoring the pre-college variables, the difference fell to 0.06 and was not statistically significant. Also, as with the raw data, the transfers and the natives did not have statistically significant differences for the adjusted grade point averages.

As implications for further study are explored from Johnson's (2005) study, there are several aspects that should be considered. The Humboldt study showed in both analyses that there was no difference in the measurement of the academic performance of the two groups. The author attempts to explain why this may have taken place by offering explanations that Humboldt has some characteristics like community colleges such as small class sizes, rural location, and small campus environment. Also, the science programs allow for more interaction among students; thus, more relationship building to support each other is available. Johnson (2005) recommends that future studies focus on restricting the analysis to schools within a university or statewide system that share common transfer and admission requirements. The study lends credibility to the idea of conducting further research in this area by focusing the research on examining what role the college academic unit plays in academic discipline specific studies. Also, the academic unit can help ensure that the group of students studied is a representative group of students with a like background.

#### Summary

The review of the literature provided a comprehensive overview of the research conducted regarding community college student enrollment trends, rates of transfer to the

four-year college, academic performance, and graduation rates of community college transfer students and native students at the four-year college. The literature revealed three trends in the research of the academic performance of these students. First, the literature was clear on the impact that community college students are having on the overall enrollments of colleges and universities. More and more students who attend college are beginning their college careers at community colleges. However, the literature revealed that small percentages of these students matriculate to four-year colleges and eventually graduate. Thus, gaining an understanding of the academic performance of these students and the factors that lead to graduation is critical to higher education officials in order to increase the number of students attaining the undergraduate degree.

Second, a vast majority of the literature has been primarily focused on assessing academic performance of the community college transfer students in terms of measuring the grade point averages and examining their graduation rates at the four-year college. In addition, numerous studies have focused on comparative research with native students at the four-year college. These studies have been valuable in providing information on what is taking place academically with these students on a global basis. While the majority of the studies in this review tend to reveal that community college students experience academic difficulties and perform at lower levels than do native students, numerous studies were presented that showed that these students did not experience academic problems, and their performance was comparable to native students. The same conclusion can be made regarding the comparison of graduation rates of the transfers and

the native students. These conflicting results should motivate researchers to continue to study the academic performance of these students in an attempt to bring consistency and clarity to the research.

Finally, the review of the literature revealed a very limited number of studies focusing on the impact on the academic performance/graduation rates by academic discipline or major. In order to explain and attempt to understand what is occurring with the academic performance of these students, strong consideration must be given to an examination of the possible impact made by academic discipline/major.

The research findings from the studies that examines the academic performance of a cohort of community college and native students, while important to provide an overall picture of the performance of both groups of students at the four-year college, provide very little direction on which academic disciplines community college transfer students and native students appear to experience academic difficulty and those in which the students appear to perform at satisfactory levels. In order to attain some type of explanation on what is taking place with these students, and hopefully develop some specific intervention strategies for either group of underperforming students, academic discipline should be one of the factors that should be assessed to determine if significant differences exist among these students in the different academic disciplines. Thus, the author focused on examining the four-year college graduation rates of community college transfer students and native students. After the rates of graduation were measured, the author attempted to explain the impact on graduation of the student demographic characteristics (gender, race, age, and academic discipline). In addition, the author

attempted to explain the impact on graduation of the academic ability measures and lower level success measures (high school grade point average, ACT/SAT composite test score, and lower level grade point average).

## CHAPTER III

### METHODOLOGY

#### Introduction

The purpose of this study was to examine how community college transfer students perform academically at the four-year college upon transfer and how their academic performance compares to native student performance. The focus of the study was centered on examining the rates of graduation of the community college transfer students and the native students, and then comparing the rates of the two groups. Once the graduation rates were determined and comparisons made, the researcher attempted to explain some possible factors that may be affecting the rates by examining differences among the student demographic characteristics, academic ability measures, and lower level academic success measures.

The results of this study may be used to assist community college officials in understanding how well their students are performing academically at the four-year college, thus striving for ensuring that their programs are adequately preparing their students. Also, the results of the study may be used by four-year college administrators to gain a better understanding of how transfer students are performing at their institution, as well as how their native students are performing. Thus, this study provides them with information that can help them ensure their programs are transfer friendly and that their natives are being adequately prepared in their lower level classes.



## Research Design

This study utilized a two group logistical regression research design for community college transfer students and native students at the four-year college. Student demographic characteristics, academic ability measures, and lower-level academic success measures were identified and analyzed to determine whether or not an explanation can be provided for the graduation rates of the two groups of students. The student demographic characteristics include age, gender, race, and academic discipline area. The academic ability measures and lower-level academic success measures include ACT/SAT test score, high school grade point average, and lower-level grade point average. Once the analysis of the graduation rates of the community college and native students were obtained, comparisons of the results were made for each of the groups.

Additional clarifications for the student characteristic variables are needed for the understanding of the study. First, age was categorized as either traditional or nontraditional. For the purpose of the study and given the consideration of the population being largely under 22 (Mississippi State Student Enrollment Profile, 2007), the researcher defined traditional as 21 years of age or younger and nontraditional as 22 years of age or older. Second, gender was classified as either male or female. Third, race was classified as either minority or non-minority. With the population of the study being predominantly White American and African American students, with very small numbers of other minorities, the researcher decided to classify the student into the two categories. The other traditional minority populations are too small to produce statistically significant results in the study.

Finally, the academic majors were categorized into five academic discipline areas. Those areas include Agriculture, Humanities, Professional, Social Sciences, and STEM. This categorization helped ensure that statistical significance could be measured in the academic discipline areas, as the number of community college transfer and native students in each of the specific majors were too small to have the opportunity to measure significance.

The grouping of majors into common categories for research purposes has been utilized by other researchers when attempting to conduct similar studies. For example, the 1998 study of Cejada, et al. categorized the majors in the four categories which included fine arts and humanities, mathematics and sciences, social sciences and professions. Also, the grouping of majors into academic discipline areas for this study took into consideration the core classes that were common among the various majors when trying to group the majors into the categories (Undergraduate Bulletin of Mississippi State University, 2008). The researcher utilized these categories of student academic disciplines in order to give the study a better opportunity to yield tangible results and results that future researchers can easily use in future studies.

When using regression applications in behavioral research in higher education, such as in this study, traditionally the research design has been aimed at either explanation or prediction. While the higher education literature contains a number of regression studies focused around prediction, Ethington, Thomas, and Pike (2002) contend that most of the regression functions in higher education research are more appropriate for exploratory intentions. The authors argue that most of the research

questions seek to comprehend and provide clarification on why what is taking place in the study varies from subject to subject. Thus, the study was multivariate as the dependent variable is thought to have a relationship to and influenced by multiple interrelated factors. In addition, the covariance among the independent variables as well as that of the dependent variable with the independent variable were studied (Ethington, Thomas, & Pike, 2002). Therefore, the researcher focused this study on seeking to explain what impact, if any, the student demographic characteristics, the academic ability measures, and the lower-level academic success measures had on the graduation rates of the community college transfer and native students at the four-year college.

#### Participants and Data Collection Procedure

The community college transfer and native student data for this study was taken from Mississippi State University in Starkville, Mississippi. Mississippi State University is a comprehensive doctoral granting degree institution that enrolls approximately 17,000 students (Mississippi State University, 2007).

The author requested and received approval from Mississippi State University's Institutional Review Board (IRB) for the Protection of Human Subjects in advance of the study. A written request was made for the data to be secured from the Office of Institutional Research at Mississippi State University before submission to the IRB at Mississippi State University.

Mississippi State University enrolled approximately 1,200 community college transfer students in the fall semester each year with significant enrollments from each of the fifteen public community and junior colleges in the state of Mississippi (Mississippi

State University, 2007). Thus, the community college transfer enrollment at Mississippi State University provided a significant number of transfer students from the different community colleges in Mississippi to help ensure that the population for the study was representative of the community college experience.

In addition, Mississippi State University enrolled approximately 2,000 freshmen each fall (Mississippi State University, 2007). Thus, this number of freshmen students provided a large enough population of native students to assess their academic performance in upper-level courses and their academic preparation in lower level courses.

This study was conducted using the population of the first-time entering community college transfer students with at least 48 semester hours at the time of entrance to Mississippi State University. The 48 semester hour selection criteria was used so that population consists of students who have had the equivalent of two full years (four semesters of 12 credit hours) of courses at the community college level. The data was taken from those community college transfer students who entered Mississippi State University in the fall semester of 2002. Logistic regression model designs that include samples are subject to sampling errors, as are other statistical designs (Peng, So, Stage, & St. John, 2002). Thus, this research study used the entire population of community college transfers and native students who met the selection criteria. Graduation rates were measured for those students who graduated in 2006-2007 (fall, spring and summer semesters), thus giving the community college transfer students four years to graduate upon enrollment at Mississippi State University.

The native student data were students from Mississippi State University who were coded as first-time entering freshmen in the fall semester of 2000 and had earned forty-eight semester hours at the University prior to the fall semester of 2002. As with the community college transfer students, the graduation rates were measured for the 2006-2007 year (fall, spring and summer semesters). This time frame gave the native students six years (2006-2007) to graduate upon enrollment at the University. The students were selected among all colleges and majors, thus not limiting the population to any specific majors and excluding others.

For both the community college transfer students and native students, student characteristics will be analyzed. Those characteristics include race, age, gender, and academic discipline area. In addition, ability measures and lower level academic success measures will be analyzed. Those measures include ACT/SAT composite test score, high school grade point average, and college lower-level grade point average.

#### Data Analysis

The data was compiled and statistically analyzed using Microsoft's Excel and SPSS. The data collected on the community college transfer and native students at Mississippi State University was analyzed in a two-group logistical regression. Logistic regression is most appropriate for the study of categorical outcome variables (Peng, So, Stage, & St. John, 2002). The first group consisted of the community college transfer students, and the second group was the native students. For each group, a logistical regression was built that included the independent variables of the student demographic characteristics (age, gender, race, and academic discipline) and the ability

measures/lower-level academic success measures (ACT/SAT test score, high school grade point average, and lower level college grade point average).

The results from the logistical regression for the transfer and native students were compared. Delta-ps, the change in predicted probability (Peng, et al. 2002) were calculated for each independent variable and then compared for transfer and native students. For dichotomous variables (graduated and not graduated), the delta-p provides a measure of the extent to which the outcome was likely to change if the community college transfer students or native students graduated from Mississippi State University (Cofer & Somers, 2001). Once the data was obtained, the researcher developed an effect scale for the delta-p Statistic.

## CHAPTER IV

### FINDINGS

The purpose of this study was to measure the graduation rates of the community college transfer students and the native students at Mississippi State University. Once the graduation rates were calculated and compared, the researcher planned to explain some of the factors that could be impacting the rates of graduation for the community college transfer students and native students. The researcher hoped that this study would provide community college and four-year administrators knowledge that could be used to help them better understand those factors that influence graduation for both groups of students. Thus, providing them the information that will give them the opportunity to provide an environment where their students have every opportunity to be successful. Even though this study is limited to the community college and native students at one four-year college, it has provided a representative picture of what is taking place with both groups of students in terms of graduation and the factors that can explain what is taking place.

This chapter presents a description and analysis of the data collected in the study of the graduation rates of the community college transfer students and native students at Mississippi State University and the descriptive demographic and academic variables that were assessed to determine the possible impact on the graduation rates. The data was obtained through the Office of Institutional Research at Mississippi State University in

Microsoft Excel and analyzed with SPSS (SPSS, Inc.) and STATA (STATA CORP, LP). The chapter is divided into the following sections: (1) population and demographic data, (2) statistical analysis, (3) major findings, and (4) research questions.

### Population and Demographic Data

This study was conducted using the population of the first-time entering community college transfer students with at least 48 semester hours at the time of entrance to Mississippi State University. The 48 semester hour selection criteria was used so that the population consisted of students who have had the equivalent of two full years (four semesters of 12 credit hours) of courses at the community college level. The data was taken from those community college transfer students who entered Mississippi State University in the fall semester of 2002. Graduation rates were measured for those students who graduated in 2006-2007 (fall, spring, and summer semesters), thus giving the community college transfer students four years to graduate upon enrollment at Mississippi State University.

The native student population was students from Mississippi State University who were coded as first-time entering freshmen in the fall semester of 2000 and had earned forty-eight semester hours at the University prior to the fall semester of 2002. As with the community college transfer students, the graduation rates were measured for the 2006-2007 year (fall, spring, and summer semesters). This time frame gave the native students six years to graduate upon enrollment at the University, just as the time frame gave the community college transfer students 6 years to graduate. The native students



were selected among all colleges and majors, thus not limiting the population to any specific majors and excluding others.

The population parameters yielded 1,003 community college transfer students and 1,408 native students for the study. For each student in the population, the demographic data consisted of: (1) sex; (2) race; (3) age; (4) graduation status; and (5) academic major. The academic majors were organized into like disciplines to help ensure the possibility of statistical significance. The academic discipline categories consisted of: (1) Agriculture - AGR; (2) Humanities - HUM; (3) Professional - PROF; (4) Social Science - SOCSCI; (5) Science, Technology, Engineering and Mathematics – STEM. The specific majors that correspond to the appropriate academic discipline categories are listed in Appendix 1.

The demographic descriptive data revealed some noteworthy findings. First, there are consistencies of the data among the community college transfers and native students. The percentages of male and female students are identical for both groups. The percentages of both groups for the minorities and non-minorities are very close. In addition, each of the academic discipline category percentages was close for the corresponding category of transfers and the native students.

Second, the one category that was different was the age category. There were no students 22 years and above in the native student category, but 30% of the transfer student population that fit into this category. This data is presented in Table 1.

Table 1

Transfer and Native Population Numbers and Percentages by Academic Discipline,  
Gender, Age and Race

Characteristic	Transfer		Native	
	n	Percentage	n	Percentage
Academic Discipline				
AGR	120	12%	134	10%
HUM	22	2%	59	4%
PRO	579	58%	671	48%
SOCSCI	90	9%	188	13%
STEM	192	19%	356	25%
Gender				
Female	534	53%	743	53%
Male	469	47%	665	47%
Race				
Nonminority	812	81%	1086	77%
Minority	191	19%	322	23%
Age				
22 Years +	305	30%	4	0%
21 Years -	698	70%	1404	100%

When examining the results of the study, general findings are presented. The percentage of community college transfer students who graduated in the time frame was 63%, while the percentage of native students who graduated was 82%. Next, the mean grade point average on the lower-level courses for the community college transfers was 3.01, while the mean number of credit hours was 71. Also, the mean grade point average on the lower-level courses for the native students was 2.93 and the mean number of credit hours earned was 66.

When reviewing the specific graduation data, the community college student analysis yielded some interesting results, which are exhibited in Table 2. First, the graduation rates by academic discipline were all in the 60% range with the Humanities group having the highest graduation percentage of 68%, while the STEM group had the lowest graduation percentage at 60%. Second, the males and females had the same percentage of graduates and non-graduates. Third, the minority students graduated at 52%, while the non-minorities graduated at 66%. Finally, 68% of the students 21 years of age and under had graduated, while only 51% of the students age 22 and older had graduated.

In addition, the analysis of the native student graduation percentages yielded similar results. First, the academic disciplines had higher percentages of graduation than did the academic disciplines of the community college students. However, as with the community college students, the STEM group had the lowest percentage of graduation of 75%, while the Humanities group had the highest rate of graduation at 100%. Second, the percentages of male and female graduates were close at 84% and 81% respectively,

while there was a considerable disparity between the graduation rates of the minority (72%) and non-minority students (85%). Finally, there were no students in the native group of 22 years or older, thus all the students fell into the category of 21 years or younger.

Table 2  
Transfer and Native Graduation Percentages by  
Academic Discipline, Gender, Age and Race

Characteristic	Transfer - Graduated		Transfer - Not Graduated		Native - Graduated		Native - Not Graduated	
	n	Percentage	n	Percentage	n	Percentage	n	Percentage
Academic Discipline								
Agriculture	75	63%	45	37%	119	89%	15	11%
Humanities	15	68%	7	32%	59	100%	0	0%
Professional	377	65%	202	35%	550	82%	121	18%
Social Science	55	61%	35	39%	167	89%	21	11%
Science, Technology, Mathematics, Science	115	60%	77	40%	267	75%	89	25%
Gender								
Female	336	63%	198	37%	624	84%	119	16%
Male	295	63%	174	37%	539	81%	126	19%
Race								
Nonminority	536	66%	276	34%	923	85%	163	15%
Minority	99	52%	92	48%	232	72%	90	28%
Age								
22 Years +	156	51%	149	49%	0	0%	0	0%
21 Years -	474	68%	224	32%	1151	82%	253	18%

## Statistical Analysis

The data collected on the community college transfer and native students at Mississippi State University was analyzed in a two-group logistical regression. The first group consisted of the community college transfer students and the second group was the native students. For each group, a logistical regression was built that included the independent variables of the student demographic characteristics (age, gender, race, and academic discipline). Also included were the ability measures/lower-level academic success measures (American College Test Scores ACT, high school grade point average and lower level college grade point average).

Next, the results from the logistical regression for the transfer and native students were compared. Delta-ps, the change in the predicted probability, were calculated for each independent variable and then compared for transfer and native students. Once the data was obtained, the researcher developed an effect scale for the delta-p statistic.

In addition, the researcher tested for interactions between academic discipline and lower level GPA and the number of hours transferred. Logistic models were run for each academic discipline category. Delta-ps were calculated, and then observed to determine if different patterns were evident across the disciplines groups.

As the statistical analysis was being conducted, several things of note should be included in this report. First, the researcher checked for collinearity among the independent variables and none was present. However, even though ACT scores and native grade point average (GPA) exhibited a relationship, the relationship was not so strong that it could be considered collinear. Second, the variable of age was dropped

from the analysis for natives because there was no variance in the age, as there was only one native student in the population of the study over 22 years of age.

Finally, a challenge arose with the data as a number of the transfer students in the population were missing ACT scores and/or high school GPAs in data set. The group of students 21 years of age and younger had both in the data, but the students 22 years of age and older primarily made up the students missing one or both items. Some simple statistical analysis was conducted among those groups who were missing ACT and/or high school GPA with the group of students who had the ACT and high school GPA in order to determine if those students missing either one of the sets of data should be excluded from the analysis. For example, when looking at high school GPA, those with an ACT score in the data had a 2.9 high school GPA, while those missing the ACT score, had a 2.3 GPA. Those that had the high school GPA had a graduation rate of 65%, while those who were missing the high school GPA had a graduation rate of 61%. Using just the data that contained the ACT and high school GPA could skew the data and cause the analysis to become flawed.

One method to test whether or not the students missing the data are not significantly different from those students containing the data, was to use a predicted GPA formula and categorize the student groups based on ability levels (Pike & Saupe, 2002). A logistic regression producing formula for predicted two-year GPA using the high school overall GPA and ACT scores with the transfer GPA as the dependent variable was calculated, as displayed in Table 3.

The cut points used to generate groups are the 25%, 50% and 75% points. These values are the predicted GPA's and are exhibited in Tables 4 and 5.

Table 3  
Logistic Regression to Explain the Impact of ACT Score and High School Overall GPA on the Two-Year Grade Point Average

	Coefficient	Standard Error	t	P> t	[95% Conf. Interval]	
ACT	0.032543	0.002874	11.32	0	0.026907	0.038179
High School Overall GPA	0.533143	0.024465	21.79	0	0.485161	0.581126
Constant	0.437235	0.072564	6.03	0	0.294915	0.579554

A new variable was created named “quint” which defined all those students with a predicted GPA into one of five categories, as shown in Table 4. The five categories are: Quint 4 (highest predicted GPA), Quint 3 (medium high GPA), Quint 2 (medium GPA), Quint 1 (low medium GPA), and Quint 0 (low GPA). The five categories of “Ability” are created where ability is the predicted GPA category. Note that those labeled “logpa” are the ones missing either ACT or high school GPA.



Table 4

## Five Quintiles of Predicted Grade Point Average

Quintiles	Frequency	Percent	Cumulative
0(Low GPA)	623	25.84	25.84
1(Low medium GPA)	447	18.54	44.38
2 (Medium GPA)	447	18.54	62.92
3(Medium High GPA)	447	18.54	81.46
4(Highest Predicted GPA)	447	18.54	100
Total	2411	100	

Finally, the means of graduation are generated and presented by the five categories of Quint, as shown in Table 5. The mean values are the 5 quintiles of students who graduate. After analyzing the data, it is noted that 62% in the lowest predicted GPA category (Quint 1) graduated. In addition, 61.8% of those with missing ACT or high school GPA date graduated. Given that the students in the Quint 0 category graduated close to the same rate as those in the Quint 1 category, the researcher concluded that there were not significant differences with the Quint 0 students and those who did have data on both ACT score and high school GPA. Thus, the researcher was able to proceed with the regression analysis utilizing all of the students (transfer and native) in the population regardless of whether or not they were missing either ACT or high school GPA.

Table 5

Graduation Means, Standard Error and Confidence Intervals  
of the Predicted Grade Point Average Quintiles

Over	Mean	Standard Error	[95% Confidence Interval]	
0	0.617978	0.019482	0.579774	0.656181
1	0.6219239	0.022961	0.576899	0.666949
2	0.760626	0.020205	0.721006	0.800247
3	0.841163	0.017308	0.807223	0.875104
4	0.919463	0.012885	0.894196	0.944731

### Major Findings

The community college transfer and native student data were tested for interactions between age (21 years and younger/22 years and older), sex (male/female), race (minority/non-minority), American College Test Score (ACT), high school grade point average (GPA), lower level course GPA, and credit hours transferred. Separate logistic models for each academic discipline group were run and then the delta-p statistic was calculated to see if there were different patterns across disciplines.

The first interaction, presented below in Table 6, tested for the community college transfer students was the interaction of the likelihood of another academic category graduating in comparison to the Science, Technology, Engineering and Mathematics (STEM) category. The STEM category is used as a base because the STEM category of students has the lowest graduation rate for each of the academic discipline categories. In

this analysis, age is a significant factor in graduation, while gender and ethnicity are not. When calculating the delta-p statistic, the traditional age students are 14% more likely to graduate than the non-traditional age students with the STEM category as the base.

In addition, when compared to the STEM category, the academic categories of Professional (PROF) and Agriculture (AGR) were significant at the .01 level, while Social Sciences was close to being significant at the .05 level. The delta-p analysis shows that when compared to the STEM category, Professionals are 18% more likely to graduate, Agriculture is 13% and Social Sciences are 14% more likely to graduate.

Finally, the community college transfer GPA and credit hours were significant at the .01 level. The delta-p analysis, detailed in Table 7, yielded a 30% increased likelihood of graduation if the GPA was raised one point. While an increase of one credit hour only increased the likelihood of graduation by .3%.

Table 6

## Logistical Regression of the Community College Transfer Student Graduation Rates

	Coefficient	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	-0.18809	0.15183	1.24000	0.21500	0.48568	0.10950
Ethnic	-0.15247	0.18286	0.83000	0.40400	0.51088	0.20594
Age	0.59783	0.17208	3.47000	0.00100	0.26056	0.93511
Professional	0.75766	0.19581	3.87000	0.00000	0.37388	1.14143
Agriculture	0.55635	0.26120	2.13000	0.03300	0.04441	1.06830
Social Science	0.56443	0.29661	1.90000	0.05700	0.01692	1.14578
Humanities	0.59837	0.51732	1.16000	0.24700	0.41556	1.61230
Grade Point Average	1.30871	0.14494	9.03000	0.00000	1.02464	1.59278
Credit Hours	0.01316	0.00382	3.45000	0.00100	0.00568	0.02064
Constant	-0.25350	0.21349	1.19000	0.23500	0.67193	0.16494

Table 7

Delta-p Analysis of the Significant Variables of the Community  
College Transfer Student Graduation Rates

	Delta-p
Gender	-0.0409
Ethnic	-0.0291
Professional	0.1196
Agriculture	0.1644
Social Science	0.1618
Humanities	0.1408
ACT Score	0.0736
Grade Point Average	0.8197
Credit Hours	0.3238

As the researcher tested for interactions among the different academic discipline categories, the professionals are the first group to be analyzed for the community college transfers. Among the students in the professional category, community college GPA, and community college credit hours transferred were statistically significant at the .01 level, while age was significant at the .05 level. These were the only variables that were statistically significant, as confirmed in Table 8.

Among the professional category, the delta-p analysis, detailed in Table 9, demonstrated that the traditional age students were 10% more likely to graduate than the non-traditional age students. The delta-p analysis yielded a 27% increase in the

likelihood of graduation if the GPA was raised one point. The increase of one credit hour only increases the likelihood of graduation by .3%.

Table 8

Logistical Regression of Graduation Rates of Community College Transfer Students by the Academic Discipline Category of Professionals

	Coefficient	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	0.097754	0.199129	0.49	0.623	-0.29253	0.48804
Ethnicity	-0.00099	0.238262	0	0.997	-0.46797	0.465999
Age	0.452655	0.224104	2.02	0.043	0.013419	0.891891
Grade Point Average	1.5539	0.203137	7.65	0	1.155758	1.952041
Credit Hours	0.015285	0.005547	2.76	0.006	0.004413	0.026157
Constant	0.460024	0.219659	2.09	0.036	0.029501	0.890547

Table 9

Delta-p Analysis of the Significant Variables of the Graduation Rates of the Community College Transfer Students by the Academic Discipline Category of Professionals

	Delta-p
Gender	0.0235
Ethnicity	-0.0002
Age	0.1038
Grade Point Average	0.7657
Credit Hours	0.4656

The second community college transfer student academic discipline category to be presented in the analysis is agriculture. The results of the analysis are presented in Tables 10 and 11. When analyzing those students in the agriculture category, age and community college credit hours were found to be statistically significant. Age was significant at the .01 level, while credit hours were significant at the .05 level. Among the agriculture category, the delta-p analysis demonstrated that the traditional age students were 40% more likely to graduate than the non-traditional age students. Also, an increase of one credit hour only increases the likelihood of graduation by .7% among the students in the agriculture category.

Table 10

Logistical Regression of the Graduation Rates of Community College Transfer Students by the Academic Discipline Category of Agriculture

	Coefficient	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	-0.73564	0.499065	-1.47	0.14	-1.71379	0.242506
Ethnicity	-0.00383	0.732629	-0.01	0.996	-1.43976	1.432093
Age	1.832805	0.556345	3.29	0.001	0.742389	2.923221
Grade Point Average	0.181423	0.421905	0.43	0.667	-0.6455	1.008342
Credit Hours	0.029745	0.014588	2.04	0.041	0.001153	0.058337
Constant	-0.31121	0.513035	-0.61	0.544	-1.31673	0.694324

Table 11

Delta-p Analysis of the Significant Variables of the Graduation Rates of Community College Transfer Students by the Academic Discipline Category of Agriculture

	Delta-p
Gender	-0.1582
Ethnic	-0.0009
AGE	0.406
Grade Point Average	0.101
Credit Hours	0.6215

Community college transfer students in the social science academic discipline category are presented in Tables 12 and 13. When analyzing those students in the social science category, the variables that were statistically significant were transfer GPA and community college credit hours. The transfer GPA was significant at the .01 level, while community college credit hours were close to being significant at the .05 level. The delta-p analysis demonstrated that the traditional age students were 21% more likely to graduate than the non-traditional age students among those students in the social science category. Also, an increase of one credit hour only increases the likelihood of graduation by .7% for those in the social science category.



Table 12

Logistical Regression of Graduation Rates of Community College Transfer Students by the Academic Discipline Category of Social Science

	Coefficient	Standard Error	z	P>z	[95% Conf. Interval]	
Gender	-0.15753	0.524141	-0.3	0.764	-1.18483	0.869768
Ethnicity	0.406499	0.552294	0.74	0.462	-0.67598	1.488976
Age	-0.36773	0.767377	-0.48	0.632	-1.87176	1.136307
Grade Point Average	1.58919	0.480454	3.31	0.001	0.647518	2.530861
Credit Hours	0.036214	0.02057	1.76	0.078	-0.0041	0.076531
Constant	0.881398	0.736427	1.2	0.231	-0.56197	2.324769

Table 13

Delta-p Analysis of the Significant Variables of the Graduation Rates of the Community College Transfer Students by the Academic Discipline Category of Social Sciences

	Delta-p
Gender	-0.0347
Ethnicity	0.0797
Age	-0.0835
Grade Point Average	0.7165
Credit Hours	0.457

Finally, the researcher did not conduct a logistic analysis of the community college transfer students in the humanities category, as the number of students who fell

into this category was too low for an analysis to be conducted. When analyzing the STEM category, gender was slightly significant close to the .05 level and transfer GPA was highly significant at the .01 level. The delta-p analysis demonstrates that STEM was the one academic category where gender appears to have impact. Females are 16% less likely to graduate than males. In addition, the delta-p calculation exhibits the strength of the relationship between the level of the community college transfer GPA and the likelihood of graduation, as an increase of one point in the GPA would increase the likelihood of graduation by 33%. The STEM results are presented in Tables 14 and 15.

Table 14

Logistical Regression of Graduation Rates of Community College Transfer Students  
by the Academic Discipline Category of Science, Technology,  
Engineering and Mathematics

	Coefficient	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	-0.65601	0.371186	-1.77	0.077	-1.38352	0.071498
Ethnicity	-0.77929	0.517024	-1.51	0.132	-1.79264	0.234054
Age	0.282961	0.45203	0.63	0.531	-0.603	1.168923
Grade Point Average	1.819583	0.385658	4.72	0	1.063707	2.575458
Credit Hours	-0.00222	0.008184	-0.27	0.786	-0.01826	0.013821
Constant	0.181927	0.388059	0.47	0.639	-0.57866	0.942508

Table 15

Delta-p Analysis of the Significant Variables of the Graduation Rates of Community College Transfer Students by the Academic Discipline Category of Science, Technology, Engineering and Mathematics

	Delta-p
Gender	-0.161
Ethnic	-0.1915
Age	0.0633
Grade Point Average	0.719
Credit Hours	-0.0949

The native student data was tested for interactions between age (21 years and younger/22 years and older), sex (male/female), race (minority/non-minority), high school grade point average (GPA), lower level course GPA, and lower-level credit hours. Separate logistic models for each academic discipline category were run and then the delta-p statistic was calculated to see if there were different patterns across disciplines.

The first interaction tested was the interaction of the likelihood of another academic category graduating in comparison to the STEM category. As with the community college transfer students, the STEM category was used as a base because STEMs have the lowest graduation rate for native students as well as the community college transfer students.

The academic discipline categories of professional, agriculture and social science were significant at the .01 level, while humanities was significant at the .05 level and

close to being significant at the .01 level. Thus, when compared to the STEM category, students in each of these categories were more likely to graduate among the native students. The delta-p analysis demonstrated that when compared to the STEM category, professional is 11% more likely to graduate, agriculture 16%, social sciences 16%, and humanities 14% more likely to graduate.

Finally, the native student lower-level GPA was significant at the .01 level, while the lower-level credit hours were significant at the .05 level. Neither ACT composite score, gender, or ethnicity were a statistically significant factor in graduation for the native students. The delta-p analysis yielded a 10% increased likelihood of graduation if the GPA was raised one point. While an increase of one credit hour only increased the likelihood of graduation by .3%. The results for the native students are presented below in Tables 16 and 17.

Table 16

## Logistical Regression of the Native Student Graduation Rates

	Coefficient	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	-0.22553	0.165751	-1.36	0.174	-0.55039	0.099337
Ethnic	-0.16273	0.194916	-0.83	0.404	-0.54476	0.219295
Professional	0.935058	0.193927	4.82	0	0.554967	1.315148
Agriculture	1.584967	0.343387	4.62	0	0.911941	2.257994
Social Science	1.536874	0.301229	5.1	0	0.946477	2.127271
Humanities	1.199065	0.515431	2.33	0.02	0.18884	2.209291
ACT Score	0.019885	0.02314	0.86	0.39	-0.02547	0.065237
Grade Point Average	1.628502	0.164293	9.91	0	1.306493	1.950511
Credit Hours	0.04093	0.010118	4.05	0	0.021099	0.06076
Constant	1.273627	0.173623	7.34	0	0.933332	1.613922

Table 17

## Delta-p Analysis of the Significant Variables of the Native Student Graduation Rates

	Delta-p
Gender	-0.0409
Ethnicity	-0.0291
Professional	0.1196
Agriculture	0.1644
Social Science	0.1618
Humanities	0.1408
ACT	0.0736
Grade Point Average	0.8197
Credit Hours	0.3238

When the logistical regression for the native students was analyzed by academic category, the professional is the first group to be examined. The specifics of the analysis are presented below in Tables 18 and 19. As with the community college transfers, the native lower-level GPA and college credit hours were statistically significant for graduation of the professional. These two variables were the only variables that were significant. The lower-level GPA was significant at the .01 level, while the lower-level credit hours were significant at the .05 level.

Among the professional category, the delta-p analysis demonstrated similar results as did the professional category for the community college transfer students.

While age was not a significant factor for the natives, the delta-p analysis yielded a 10%

increase in the likelihood of graduation if the GPA was raised one point. Also, the graduation percentage increased at a minimal rate of .3% with an increase of one credit hour.

Table 18

Logistical Regression of the Graduation Rates of Native students  
by the Academic Discipline Category of Professional

	Coefficient.	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	0.285771	0.230269	1.24	0.215	-0.16555	0.737091
Ethnicity	-0.23043	0.269365	-0.86	0.392	-0.75838	0.297511
ACT Score	-0.01075	0.033244	-0.32	0.746	-0.07591	0.054406
Grade Point Average	1.863787	0.244461	7.62	0	1.384652	2.342921
Credit Hours	0.029391	0.014249	2.06	0.039	0.001465	0.057318
Constant	1.983611	0.187337	10.59	0	1.616438	2.350784

Table 19

Delta-p Analysis of the Significant Variables of the Graduation Rates of Native Students by the Academic Discipline Category of Professional

	Delta-p
Gender	0.0309
Ethnicity	-0.03
ACT Score	-0.0261
Grade Point Average	0.7833
Credit Hours	0.169

When analyzing those native students in the agriculture category, lower-level GPA was the only factor that was slightly significant for graduation. The rest of the independent variables were not statistically significant at either the .01 or .05 level. The delta-p analysis likewise showed only a 7% increase in the likelihood of graduation with a one point increase in GPA. The data analysis is presented in Tables 20 and 21.



Table 20

Logistical Regression of the Graduation Rates of Native Students  
by the Academic Discipline Category of Agriculture

Graduate	Coefficient	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	0.317504	0.582415	0.55	0.586	-0.82401	1.459015
Ethnicity	0.750498	1.136113	0.66	0.509	-1.47624	2.977239
ACT Score	-0.0321	0.08508	-0.38	0.706	-0.19886	0.134649
Grade Point Average	1.088972	0.616422	1.77	0.077	-0.11919	2.297137
Credit Hours	-0.01089	0.041786	-0.26	0.794	-0.09279	0.071006
Constant	1.948979	0.45682	4.27	0	1.053629	2.84433

Table 21

Delta-p Analysis of the Significant Variables of the Graduation Rates of the  
Native Students by the Academic Discipline Category of Agriculture

	Delta-p
Gender	0.0312
Ethnicity	0.0627
ACT Score	-0.0586
Grade Point Average	0.3922
Credit Hours	-0.0571

When analyzing the native students in the social science category, gender and ethnicity were statistically significant at the .05 level, while the lower level credit hours

were close to being significant at the .05 level. None of the other independent variables were statistically significant. Among the social science category, the delta-p analysis demonstrated that changes with the statistically significant variables had marginal impact on the rates of graduation. The analysis, depicted in Tables 22 and 23, indicated that females are 6% less likely to graduate than males and minority students are 2% less likely than non-minorities to graduate. Also, an increase of one credit hour only increases the likelihood of graduation by .05%.

Table 22

Logistical Regression of Graduation Rates of Native Students  
by the Academic Discipline Category of Social Science

	Coefficient	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	-2.30556	1.076737	-2.14	0.032	-4.41593	-0.1952
Ethnicity	-1.40695	0.640188	-2.2	0.028	-2.6617	-0.15221
ACT Score	-0.08115	0.094445	-0.86	0.39	-0.26626	0.103961
Grade Point Average	0.97841	0.610375	1.6	0.109	-0.2179	2.174723
Credit Hours	0.062706	0.034403	1.82	0.068	-0.00472	0.130134
Constant	4.793974	1.090245	4.4	0	2.657133	6.930815

Table 23

Delta-p Analysis of the Significant Variables of the Graduation Rates of the Native Students by the Academic Discipline Category of Social Science

	Delta-p
Gender	-0.0664
Ethnicity	-0.0237
ACT Score	-0.0157
Grade Point Average	0.0246
Credit Hours	0.0205

Unlike the community college transfer student data, there were a considerable (59) number of native students whose major placed them in the humanities category. The single factor that was statistically significant was the lower level credit hours and it was significant at the .05 level. However, the delta-p analysis revealed that an increase in one credit hour would only raise the probability of graduation by 1%. It should be noted that all eight of the students coded as minority in this category graduated, as did all of the students in this category, thus ethnicity was not included in this model. The data analysis for the native students in the humanities category is depicted in Tables 24 and 25.

Table 24

Logistical Regression of the Graduation Rates of Native Students by the  
Academic Discipline Category of Humanities

	Coefficient.	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	0.340791	1.118411	0.3	0.761	-1.85125	2.532835
ACT Score	0.220274	0.178065	1.24	0.216	-0.12873	0.569274
Grade Point Average	0.210385	1.012886	0.21	0.835	-1.77484	2.195604
Credit Hours	0.225583	0.109152	2.07	0.039	0.01165	0.439516
Constant	2.023636	0.88517	2.29	0.022	0.288735	3.758538

Table 25

Delta-p Analysis of the Significant Variables of the Graduation Rates of  
Native Students by the Academic Discipline Category of Humanities

	Delta-p
Gender	0.0119
ACT Score	0.2631
Grade Point Average	0.0204
Credit Hours	0.5682

When analyzing the results of the data from the native students in the STEM category, gender, lower-level GPA and credit hours were statistically significant at the .01 level. The only other statistically significant variable for the students in the STEM

category was composite ACT, which was statistically significant at the .05 level. The data analysis is presented in Tables 26 and 27. The delta-p analysis demonstrates that students in the STEM academic discipline category, as with the community college transfers, were the one category where gender appears to make an impact. Females in the STEM category are 15% less likely to graduate than males. In addition, the delta-p calculation exhibits the strength of the relationship between the level of the native lower level GPA and the increased probability of graduation, as an increase of one point in the GPA would increase the likelihood of graduation by 11%. While an increase in one credit hour, would increase the probability of graduation by just .7%. The STEM category for the natives was the only analysis where ACT was a statistically significant factor for graduation, though the delta-P analysis showed that a one point increase in ACT score would increase the probability of graduation by .9%.

Table 26

Logistical Regression of the Graduation Rates of Native Students by the Academic Discipline Category of Science, Technology, Engineering and Mathematics

	Coefficient	Standard Error	z	P>z	[95% Confidence Interval]	
Gender	-1.02072	0.34029	-3	0.003	-1.68767	-0.35376
Ethnicity	0.253363	0.397564	0.64	0.524	-0.52585	1.032575
ACT Score	0.081429	0.041649	1.96	0.051	-0.0002	0.16306
Grade Point Average	1.946806	0.315683	6.17	0	1.328078	2.565534
Credit Hours	0.069395	0.020066	3.46	0.001	0.030065	0.108724
Constant	1.539987	0.268104	5.74	0	1.014514	2.06546

Table 27

Delta-p Analysis of the Significant Variables of the Graduation Rates of Native Students by the Academic Discipline Category of Science, Technology, Engineering and Mathematics

	Delta-p
Gender	-0.1492
Ethnicity	0.0232
ACT Score	0.1711
Grade Point Average	0.8551
Credit Hours	0.3243

## Research Questions

The study addressed three research questions: (1) Can demographic and academic variables of community college transfer students at Mississippi's public community/junior colleges be used to explain the graduation rates of the community college transfer students at Mississippi State University? (2) Can demographic and academic variables of native students be used to explain the graduation rates of native students at Mississippi State University? (3) Are there statistically significant differences in the demographic and academic variables that explain the graduate rates of community college transfer students at Mississippi's public community/junior colleges and native students at Mississippi State University?

**Research Question 1:** *Can demographic and academic variables of community college transfer students at Mississippi's public community/junior colleges be used to explain the graduation rates of the community college transfer students at Mississippi State University?* The results of the data analysis demonstrated that demographic and academic variables can help explain the rates of graduation for community college transfer students. First, traditional age community college transfer students were more likely to graduate than non-traditional age community college transfer students. This finding contradicts McPhee's (2006) study, which showed that older students graduated at a higher rate than younger or traditional age students. However, none of the other demographic variables were statistically significant in this analysis and thus, did not help explain the graduation rates of the transfer students. Second, students in the academic discipline categories of Agriculture, Professional and Social Sciences were more likely to

graduate than students in the STEM category. Finally, the GPA and number of lower-level credit hours were variables that helped explain the rates of graduation, as students with higher GPAs and more lower-level credit hours at the point of transfer were more likely to graduate.

**Research Question 2:** *Can demographic and academic variables of native students be used to explain the graduation rates of native students at Mississippi State University?*

The results of the data analysis for the native students demonstrated that while several of the academic variables did help explain the rates of graduation for the native students, the demographic variables tested did not help explain the rates of graduation. First, the students in academic discipline categories of professional, agriculture, social science and humanities were more likely to graduate than the students in the STEM category. Second, lower-level GPA and lower-level credit hours were academic variables that did explain the rates of graduation. The analysis demonstrated that students with a higher lower-level GPA or the higher the number of lower-level credit hours increased the likelihood that students completed graduation.

**Research Question 3:** *Are there statistically significant differences in the demographic and academic variables that explain the graduate rates of community college transfer students at Mississippi's public community/junior colleges and native students at Mississippi State University?*

The data analysis demonstrated consistencies and differences between the variables that appear to impact the graduation of the community college transfer students



and those that appear to impact the native students. First, lower-level grade point average and lower-level credit hours were significant for both transfer and native student groups. A second consistency, students in each of the academic discipline groups of Agriculture, Professional, and Social Sciences for transfers and natives were more likely to graduate than students in the STEM group. However, the humanities group was significant for the native student group, but not the community college transfer students. Finally, while age was a demographic factor that helped explain the graduation rates of the community college transfer students, the native population consisted of only students whose age placed them in the traditional category, thus no comparisons could be made.

When comparisons were made among the analysis of the academic discipline categories, there are similarities and differences among the community college transfer student and native student categories. Lower-level GPA and credit hours were statistically significant for most of the academic categories for the transfer student population and native student population with some exceptions. First, lower-level credit hours and age were significant factors for transfer students in the agriculture category, but GPA was the only significant factor for native students in this category.

Second, while lower-level GPA and credit hours were significant factors for the community college transfer and native student population in the professional category, age was the only other statistically significant factor. The traditional age students in the community college transfer student category were more likely to graduate than the non-traditional age students in the professional category. Age was not a factor for the native

student population, as all of the students in the population fell into the traditional category.

Third, lower-level GPA and credit hours were significant for the transfer students in the Social Science category. However, gender and ethnicity were significant for the native students with females less likely to graduate than males and minorities less likely to graduate than non-minorities. Though, neither gender nor race had a strong effect. Also, the community college transfer population of humanities was too small to test for significance and lower-level hours were the only variable that was significant for the native students in the humanities category.

Fourth, some of the same variables were significant for community college transfer and native students in the STEM category. Gender and lower-level GPA were the only significant factors for the STEM category among the community college transfer student population. However, lower-level credit hours were significant for the native students, as was the composite ACT score. The results from the STEM category concurs with the three studies in the literature review that found ACT score and gender to be significant variables for academic achievement of community college transfer students at the four-year college (Arnold, 2001; Carlan & Byxbe, 2000; James Madison University, 1998).

In addition, a study conducted by Cejada, Kaylor and Rewey (1998), that math achievement declined among community college transfer students at the four-year college. Also, Cejada's (1997) study found that science achievement among community college transfer students diminished as well. These studies confirm that there appears to

be a pattern with academic achievement and progress toward degree with students in the STEM category.

Finally, the graduation rates show lower graduation rates for minorities than non-minorities in community college transfers and native students. However, ethnicity was not significantly related to the probability of graduation. This suggests that it is other factors, particularly number of lower-level credit hours and lower-level GPA are related to graduation rates.

CHAPTER V  
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The researcher focused this chapter on presenting the summary, conclusions, and recommendations of the study. Community college transfer students make up a significant portion of the enrollment at four-year colleges, as the literature review provided a confirmation of this phenomenon. In addition, the studies conducted in the area of academic success at four-year colleges by community college transfers have yielded a mixture of results. A portion of the studies support the contention that community college transfer students perform as well as native students at the four-year college. Other research examined for the literature review revealed that the community college transfer students did not perform as well academically as native students at the four-year college. In addition, some studies supported the thesis that community college transfer students perform at a lower-level academically and graduate at lower rates than do native students.

This study attempted to answer the question regarding the rate at which community college transfer students graduate from the four-year college and what variables can be used to explain the corresponding graduation rates. In addition, the study attempted to answer the identical question regarding the rate at which native

students graduate from the four-year college and the variables that can be used to explain the native student graduate rates. Finally, the study made comparisons between the community college transfer variables that explained the corresponding graduation rates and the native student variables that explained their corresponding graduation rates to determine if differences existed between the two groups.

The data for the study was taken from the population of community college transfer students who entered Mississippi State University in the fall of 2002 with a minimum of 48 credit hours. The native student data was taken from those native students who had entered Mississippi State as a first-time freshman in the fall of 2000 and had earned 48 credit hours by the fall of 2002. The graduation rates were measured in 2006-2007 academic year, giving both groups of students four additional years to graduate for a total of six years to graduate from the beginning of their college career.

The data was compiled and statistically analyzed using Microsoft's Excel, SPSS and Stata. The data collected on the community college transfer and native students at Mississippi State University was analyzed in a two-group logistical regression. For each group, a logistical regression was built that included the independent variables of the student demographic characteristics (age, gender, race and academic discipline) and the ability measures/lower-level academic success measures (ACT/SAT test score, high school grade point average and lower level college grade point average).

The results from the logistical regression for the transfer and native students were compared. Delta-ps, the change in predicted probability were calculated for each independent variable and then compared for transfer and native students. For

dichotomous variables(graduated and not graduated), the delta-p provided a measure of the extent to which the outcome was likely to change if the community college transfer students or native students graduated from Mississippi State University. Once the data was obtained, the researcher developed an effect scale for the delta-p statistic.

### Conclusions

The findings generated by the analysis of the data in this study resulted in the following conclusions.

1. The native students appeared to be better prepared to graduate or have less difficulty graduating, as they did graduate at a higher rate than did the community college transfer student population. In addition, the differences in percentages of graduation among the community college transfer and native students were consistent when the demographic, lower-level academic measures, and academic discipline categories were compared.
2. The lower-level grade point average and number of lower-level credit hours earned appear to consistently explain the rates of graduation for both groups, as these two variables were significant for both groups. The data appears to suggest that once students get to the 48 hour credit level, these two variables give the researcher the best indication of the students who will graduate.
3. The students in the Science, Technology, Engineering and Mathematics (STEM) category appear to be less prepared to graduate or encounter more

obstacles to graduate than students in the other academic discipline categories, as community college transfer students and the natives students in the STEM category were less likely to graduate than those in the other academic discipline categories.

4. Running separate logistic models for each academic discipline category was effective in assessing the particular variables that impact graduation for the community college transfer and native students. This assessment allowed the researcher to discover the different patterns across the academic discipline categories, thus providing direction for additional study or intervention strategies.

### Recommendations

This section will provide insight into current practices and future research with the following recommendations:

1. This study was limited to those community college transfer students and native students who enrolled at one institution, Mississippi State University. While Mississippi State enrolls students from all 15 public community colleges in Mississippi, the researcher recommends that a statewide study involving all of the four-year colleges would help validate the results of this study.
2. The population for this study was taken from one group of community college transfer students and one group of native students over the

established time period. The researcher suggests that a multiple year study be conducted to determine if the results are consistent over time.

3. The portion of the study which focused on analysis of the academic discipline categories revealed some variables that helped explain the graduation rates of the students in the different categories. Additional studies should be conducted that focus on student performance by academic discipline category, as well as the other significant variables for this study. Consideration should be given to additional quantitative studies, as well as qualitative studies. The qualitative studies may be able to gather information outside of the academic data that could provide some specific information on what is taking place with students in that specific academic discipline category.
4. The establishment of a center and/or programs on the campus of the four-year college that provides academic support for community college transfer students exclusively. This recommendation concurs with St. Clair's (1993) study that suggested that transfer student success was influenced by specific guidance and counseling opportunities, academic support programs, and orientation programs. The University of Arkansas has a specific office that is charged with addressing the needs of transfer students, while the University of Illinois at Urbana-Champaign has developed a specific program within the Office of Admissions that



provides academic, personal, and financial support to transfer students (Eggleston & Laanan, 2001).

5. Follow-up studies should be conducted on students who progress to the level of earning 48 semester hours of credit either as a community college transfer student or a native student and who do not graduate. These students should be contacted and assessed to determine if intervention strategies could be implemented to assist those students with completing their degree. These follow-up studies should be focused toward targeting the students by their respective academic discipline category. For example, the departments whose majors were categorized as STEMs, should plan and implement intervention strategies for students in their category.
6. Four-year colleges should consider the development of an admissions policy that uses a sliding scale of the lower-level GPA and the number of lower-level credit hours as part of the admission decision.

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APPENDIX A  
ACADEMIC DISCIPLINE CATEGORIES

## Academic Discipline Categories

### Agriculture

Agribusiness  
Agricultural Engineering Technology and Business  
Agricultural Information Science  
Agricultural Science  
Agricultural, Food and Resource Economics  
Agronomy  
Animal and Dairy Science  
Food Science, Nutrition and Health Promotion  
Forestry  
Horticulture  
Human Sciences  
Integrated Pest Management  
Poultry Science  
Wildlife and Fisheries

### Humanities

English  
Foreign Languages  
General Liberal Arts  
History  
Music (with College of Arts and Sciences)  
Philosophy  
Art

### Professional

Accounting  
Architecture  
Banking and Finance  
Business Information Systems  
Economics (Business and Industry)  
Educational Psychology  
Elementary Education  
General Business Administration  
Interdisciplinary Studies  
Landscape Architecture  
Landscape Contracting and Management  
Management



Management of Construction and Land Development  
Marketing  
Music Education  
Music (with College of Education)  
Physical Education  
Real Estate and Mortgage Appraisal Financing  
Risk Management, Insurance, and Financial Planning  
Secondary Education  
Special Education

### Social Sciences

Anthropology  
Communication  
Economics (Arts and Sciences)  
Political Science  
Psychology  
Social Work  
Sociology

### Science, Technology, Engineering, Mathematics

Aerospace Engineering  
Biochemistry  
Biological Engineering  
Biological Sciences  
Chemical Engineering  
Chemistry  
Civil Engineering  
Computer Engineering  
Computer Science  
Electrical Engineering  
General Science  
Geosciences  
Industrial Engineering  
Industrial Technology  
Information Technology Services  
Mathematics  
Mechanical Engineering  
Medical Technology  
Microbiology  
Physics  
Software Engineering  
Technology Teacher Education



APPENDIX B

OFFICE OF INSTITUTIONAL RESEARCH PERMISSION LETTER



Office of Institutional Research

John R. Dickerson  
144 Sunset Hills Drive  
Florence, MS 39073

July 28, 2008

The Office of Institutional Research is providing data to John Dickerson in order for him to comply with doctoral degree requirements at Mississippi State University. Student enrollment data is not available publicly, but the dataset is being provided to Mr. Dickerson for his research efforts in conjunction with his doctoral dissertation.

Any and all identifying data elements have been removed from the data set provided to John Dickerson from the Office of Institutional Research.

Respectfully,

Julie Fulgham,  
Interim Director  
Office of Institutional Research  
Mississippi State University

P.O. Box EY • Mississippi State, MS 39762-5708 • (662)-325-3920 • Fax: (662)-325-3514

APPENDIX C  
IRB CERTIFICATION LETTER



September 10, 2008

John Dickerson  
144 Sunset Hills Drive  
Florence, MS 39073

RE: IRB Study #08-205: The Factors That Influence The Graduation Rates of Community College Transfer Students and Native Students at a Four-Year Public State University

Dear Mr. Dickerson:

The above referenced project was reviewed and approved via administrative review on 9/10/2008 in accordance with 45 CFR 46.101(b)(4). Continuing review is not necessary for this project. However, any modification to the project must be reviewed and approved by the IRB prior to implementation. Any failure to adhere to the approved protocol could result in suspension or termination of your project. The IRB reserves the right, at anytime during the project period, to observe you and the additional researchers on this project.

**Please note that the MSU IRB is in the process of seeking accreditation for our human subjects protection program. As a result of these efforts, you will likely notice many changes in the IRB's policies and procedures in the coming months. These changes will be posted online at <http://www.orc.msstate.edu/human/aahrpp.php>.**

Please refer to your IRB number (#08-205) when contacting our office regarding this application.

Thank you for your cooperation and good luck to you in conducting this research project. If you have questions or concerns, please contact Christine Williams at [cwilliams@research.msstate.edu](mailto:cwilliams@research.msstate.edu) or call 662-325-5220.

Sincerely,

A handwritten signature in black ink that reads "Christine Williams".

Christine Williams  
IRB Compliance Administrator

cc: James "Ed" Davis

**Office for Regulatory Compliance**

P. O. Box 6223 • 70 Morgan Avenue • Mailstop 9563 • Mississippi State, MS 39762 • (662) 325-3294 • FAX (662) 325-8776