

THE EFFECTS OF DUAL ENROLLMENT CREDIT AND
HUSKINS PROGRAM CREDIT ON COLLEGE READINESS

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by
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ABSTRACT

THE EFFECTS OF DUAL ENROLLMENT CREDIT AND HUSKINS PROGRAM CREDIT ON COLLEGE READINESS (August 2010)

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This causal-comparative study researched the effects of dual enrollment and Huskins Bill course experience on traditional-age North Carolina community college students. The study examined dual enrollment and Huskins Bill course effects on academic success, retention and graduation rate using quantitative statistical measures including parametric and non-parametric means comparisons. The study found that dual enrollment and Huskins Bill courses showed a positive effect on GPA and graduation rate and that this effect is evident in technical, medical and college transfer programs. Dual enrollment and Huskins Bill courses also showed positive effects on GPA and graduation rates for non-white students and female students enrolled in all programs.

Findings in this study support continuing and expanding dual enrollment offerings as one aid for college readiness. They also support promoting dual enrollment programs to help underserved student populations. Recommendations for further research include more examination of the effect dual enrollment has on four-year students and the significance of site as a factor in dual enrollment course success.

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CHAPTER 1

INTRODUCTION

Dual enrollment programs, known in various forms as concurrent enrollment, dual credit, or, in North Carolina, Huskins Bill programs, have grown rapidly over the past 10 years. In 2003, the National Alliance of Concurrent Enrollment Partnerships reported that over 650,000 students nationally were dual enrolled. Many of these programs enrolled both secondary and postsecondary students in the same courses (Krueger, 2006). Today, 70% of all public schools offer some type of dual enrollment program. Dual enrollment courses are prominently advertised by school systems and community colleges who tout their rigor, their cost, their accessibility and even their growing popularity as a means to prepare students for success in their continuing postsecondary education. Factors such as the increasing cost of education and studies that link dual enrollment programs to college success have helped grow state programs, which saw large leaps in enrollment in the 1990s and through the first half decade of the twenty-first century (Boswell, 2001; Catron, 1998; Krueger, 2006).

The growth of these programs has also been fueled by the looming economic need for a college bound or college-ready workforce to compete in increasingly complex workplaces in the twenty-first century. This increased demand for employees with greater competencies in problem solving ability and intellectual capabilities presses the need for more students to complete postsecondary educational programs. However, the high number of students who fail to undertake or complete postsecondary degrees (61% nationwide) indicates a need to better prepare and assimilate secondary students to succeed at the postsecondary level (North Carolina Budget and Tax Center, 2006). The

problem can be stated in a simple equation: Less access to advanced educational degrees and skills training will result in less productivity by workers, which will disrupt the economy.

Statement of the Problem

Many states, including North Carolina, have turned to dual enrollment programs as an aid to college readiness and success. Some of the key advantages these programs have shown are an increase in academic rigor for high school students (Boswell, 2001; Greenberg, 1989; Herzog, 2004; Kim, 2006; Klein, 2007; O'Brien & Nelson, 2004), an increase in high school retention rates (Catron, 1998; Peterson, 2003) and help with the rising cost of tuition for a four-year degree (Greenberg, 1989; Karp, Bailey, Hughes, & Fermin, 2004; Kim, 2006). Conversely, researchers have questioned dual enrollment standards, specifically with regard to faculty selection, student competency, and the legitimacy of courses not offered on a college campus as part of a postsecondary curriculum (Fontenot, 2004; Krueger, 2006). Many researchers agree that dual enrollment programs will only increase as the need for more college-ready students grows (Hoffman, 2005; Karp & Hughes, 2008). Furthermore, as these programs are advertised as tuition savers and promoted to a larger segment of the secondary school population (Eimers & Mullen, 2003; Karp & Hughes, 2008; Kirst & Venezia, 2007; Klein, 2007), they will likely see increases in the number and in the diversity of the students who take them. In order for dual enrollment to serve its mission of increasing college success, it is more necessary than ever to investigate how these programs affect learners and what goals they meet for these students.

Much of the research done to date on dual enrollment students has been qualitative in nature, though there have been some large scale quantitative studies undertaken recently on the topic (Karp & Hughes, 2008; Kim, 2006). However, there is not a wide enough selection of quantitative research to call the category comprehensive, and findings from existing qualitative and quantitative studies on the topic would benefit from additional research. Two such areas of research are the effectiveness of dual enrollment courses and to whom these courses are best addressed.

Purpose of the Study

The purposes of this study were to investigate whether dual enrollment programs at community colleges offer an academic advantage to college-bound students, and whether a dual enrollment or a Huskins-Bill-type course offers a positive effect in student success. The study sought to find a link between exposure to actual college courses and later success in postsecondary education.

The model used for this study is causal-comparative in which the relationship between dual enrollment and Huskins Bill course experience on first-year college GPA was examined. Data for the groups were taken from the North Carolina Community College System database. The database yielded a large population of all North Carolina community college students to work from. This is an improvement over earlier quantitative studies (Eimers & Mullen, 2003; Kim, 2006; Spurling & Gabriner, 2002) which used data drawn from small or local datasets.

Research Questions

The specific research questions addressed were:

- Is there a relationship between student success as measured by first-year GPA and persistence to graduation for students matriculating to community college programs who participated in dual enrollment and Huskins Bill courses and those who did not?
- Is there a difference in first-year GPA and persistence to graduation from a community college program for students in technical or medical programs who participated in a dual enrollment program and those who did not?
- Is there a difference in first-year GPA and persistence to graduation that relates to race or gender?
- Is there a difference in students taking dual enrollment and Huskins Bill courses in maintaining better persistence rates and better first-year GPAs in community college?
- What is the relationship between the number of dual enrollment or Huskins Bill courses a student takes and first-year GPA and persistence to graduation in community college programs?

Introduction of Study Design

This causal-comparative study was performed for the purpose of determining if dual enrollment or Huskins Bill courses show an effect on student postsecondary success. The study looked at North Carolina community college students who enrolled in a college in the summer or fall term following their high school graduation in 2003. It compared the first-year GPA and graduation rates of three groups of students within the cohort, students who had experience with at least one dual enrollment course, students

who had experience with at least one Huskins Bill course, and students who had experience in neither of these programs. Groups were broken down to compare several subsets of students, which included gender, race, program and region. Statistical measures such as one-way ANOVAs, chi-square tests and Tukey's tests of multiple comparisons were used in the analysis of data.

Significance of the Study

In order to use dual enrollment programs at their best potential, a clear understanding of their effects is necessary. Though some studies have taken a quantitative approach to this program's effectiveness (Eimers & Mullen, 2003; Karp, Calcagno, Hughes, Jeong & Bailey, 2007; Kim, 2006; Spurling & Gabriner, 2002), there is still a very limited body of quantitative research in this area. Furthermore, studies that look at dual enrollment effectiveness at North Carolina schools are less plentiful. This study adds to the body of research on dual enrollment and offers a specific look at dual enrollment within the context of North Carolina community colleges. In addition, part of this study looks for any difference of effects if they exist between dual enrollment and Huskins courses in North Carolina, an important feature that can help those deciding how to position these types of courses within the North Carolina K-12 curriculum.

This study may benefit researchers and educators looking at the effectiveness of dual enrollment courses and how to best position these courses within a curriculum for the best outcome for the student population. It provides strong quantitative information on the effectiveness and the area of best effectiveness for these courses.

Definitions of Key Terms

Dual Enrollment

Dual enrollment (also called concurrent enrollment, joint enrollment or dual credit) programs are collaborative efforts between high schools and postsecondary institutions where students (typically high school juniors and seniors) are allowed to take college courses (Greenberg, 1989; Karp & Hughes, 2008; Peterson, 2003). However, multiple authors specify that the exact definition of the term varies by state and location.

Hoffman (2005) defines dual enrollment as above but specifies that the courses are taken in a student's junior and senior year.

Krueger (2006) notes that dual enrollment is sometimes used to describe dual enrollment programs as defined by Greenberg (1989), but is often applied to middle college programs and early college high school programs. However, he differentiates the three as follows:

- Dual enrollment programs can be administered in high school classrooms, on a college campus or through a distance-learning provider.
- Middle college high schools are essentially high schools located on college campuses, and enrollment is usually limited. Some middle college programs target low-income or at-risk students.
- Early college high schools integrate high school and college resources to create an accelerated curriculum and allow students to graduate with a high school diploma and an associate's degree in four or five years, instead of six. Reaching out to underserved students is also a feature of early college programs (Krueger, 2006, para. 3).

Klein (2007) also defines dual enrollment broadly, adding that the term could include any course that allows high school students to receive both high school and college credit simultaneously. This could include Tech-prep courses, which serve students in career and technical education, early college courses or middle college courses.

Fontenot (2004) defines dual credit as the delivery of a college course, normally on a high school campus, to high school students that resulted in both high school and college credit. He defines dual enrollment as a college-level class taken by a high school student on a college campus. He specifies, however, that dual enrollment itself is not to be confused with early or middle college arrangements which also enroll high school level students in college courses.

Dual enrollment students are typically rising high school juniors or seniors, between 16 and 18 years old. Most are college-bound students seeking college-level credits through state articulation agreements that allow equal transfer of community college credits in “Core” courses to state universities. Dual enrollment students typically take basic “Core” courses such as English, math and science, but are not limited to these courses.

Huskins Bill Program

The North Carolina legislature established the Huskins Bill program with legislation in 1983 to provide college courses for high school students. The program is operated by the North Carolina Community College System (NCCCS). In 1988, the NCCCS defined the program’s mission with the following statement, which it still maintains in its current catalog: “The purpose of Huskins Bill cooperative programs is to

make available for the enrichment of high school students, college level academic, technical and advanced vocational courses not otherwise available to them” (North Carolina Community College System, 2008, p. 2). The Huskins Bill program is a partnership between local secondary and community college institutions. The partnership allows the community college to oversee administration of college-level classes with a secondary institution. Huskins Bill courses, as opposed to dual enrollment courses, are administered to a specific secondary school or secondary system. Instruction takes place at a secondary facility, and, typically, it is administered to a cohort of high school students. The instructor can be a high school teacher qualified to teach a college-level course, or an adjunct of the administering postsecondary institution (North Carolina Community College System, 2009).

Stipulative Definitions

For this study, dual enrollment and Huskins Bill program courses are defined in accordance with how they are administered in the NCCCS. A dual enrollment course is defined as a college course offered to high school students, taught by a community college faculty member and delivered on a community college campus. A Huskins Bill course is defined as a college course offered to high school students in a cohort on a high school campus and taught by a secondary school teacher with college teaching qualifications.

Organization of the Study

This study is presented in five chapters. Chapter one contains introductory components of the study along with a discussion of the climate that necessitates postsecondary readiness and the importance of programs that contribute to it. The central research questions are established and a general description of the study is given.

Chapter two looks in depth at literature relevant to the central questions of the study. First, it attempts to establish the growing need for a college-ready student segment to meet the workplace demands of the twenty-first century. Second, it focuses on dual enrollment programs as a means for promoting postsecondary success

Chapter three presents the specific research methods used for the study, including how the data will be gathered, sampling procedures and statistical methods employed on the data.

Chapter four presents the results of the quantitative analysis. It includes test tables and details from statistical findings.

A discussion of the results is presented in chapter five, which includes analysis of the outcomes, inferences based on the data, implications for several audiences, and suggestions for further research.

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter looks in depth at literature relevant to dual enrollment, its place in educational systems in preparing students for postsecondary work, and the necessity of a student population that is able to achieve postsecondary education in order to meet the demands of a workforce that continues to advance in technological complexity. This literature review first provides evidence for the growing need for a college-ready student population. It then focuses on dual enrollment programs specifically as a means for promoting student postsecondary success.

The Case for More Access to Postsecondary Education and the Link to Dual Enrollment

As workforce jobs adopt more complicated technology and more sophisticated processes, the basic skills required for even the most basic jobs will become more demanding, and continuing education will be needed to fulfill the skills needed to do these jobs well (Bailey & Mingle, 2003; Gordon, 2005; Ingle, 2007; Ip, 2008; Kirst & Venezia, 2007; McCabe, 2000). In order to sustain a competitive workforce in this country, America must invest in human capital development by providing educational development for its citizens beyond the secondary level and facilitating continuing education throughout a worker's adult life.

In a 2009 speech to a joint session of Congress, U.S. President Barack Obama pledged help for students seeking higher education, citing the demands of the twenty-first century workforce and the necessity of the nation to have access to and to be able to

attain education throughout life. He acknowledged America's perilous place in the world economy as its intellectual capital falls behind other developing nations and encouraged Americans to commit to not only complete a high school degree but attempt at least one year or more of higher education. He stated:

In a global economy where the most valuable skill you can sell is your knowledge, a good education is no longer just a pathway to opportunity—it is a pre-requisite.

Right now, three-quarters of the fastest-growing occupations require more than a high school diploma. And yet, just over half of our citizens have that level of education. We have one of the highest high school dropout rates of any industrialized nation. And half of the students who begin college never finish.

This is a prescription for economic decline, because we know the countries that out-teach us today will out-compete us tomorrow. That is why it will be the goal of this administration to ensure that every child has access to a complete and competitive education – from the day they are born to the day they begin a career. (Higher Education for Everyone, 2009, p. 10)

Although the speech provides a refreshing commitment to the educational needs of the country, it is not saying anything that hasn't been said or suggested by studies in the past (Bailey & Mingle, 2003; DeLong, Goldin, & Katz, 2003; Educational Testing Services, 2007; Gordon, 2005; McCabe, 2000). Crook (2008) notes that countries including South Korea, Japan and China already have higher proportions of workers aged 25 to 34 with college degrees. And Brooks (2008) notes that as other countries are

gaining in educational attainment, United States educational attainment has stagnated. Beverly Ingle (2007), president of the Colorado Education Association, cites another study by the U.S. Department of Labor corroborating many of the President's points. It estimates that by age 38, today's worker will have had anywhere from 10 to 14 jobs, creating the problem of identifying what job skills a school is preparing a worker for. The answer, she says, is that students must have a broader array of skills today than in the past. She says: "The demands of the twenty-first century require us to examine our schools and our expectations for students, and revamp both to meet the challenges of a global economy" (Ingle, 2007, para. 10).

A principal driver of the need to bolster education levels has been the continuing advancement of technology in the workplace (Bailey & Mingle, 2003; Gordon, 2005; Kirkegaard, 2007; McCabe, 2000). Before the last quarter of the nineteenth century, jobs that required more than an elementary education employed about 10% of the workforce (Goldin & Katz, 2008). In the first part of the twentieth century, technological advancements in the workplace—which included electrically powered machines and factories, precision instrumentation and new models of production (assembly lines)—created a demand for more highly trained workers. The new technologies accelerated production at a rate that outstripped the supply of workers that could be produced "the old-fashioned way," through on-the-job-training alone. To answer the call, the U.S. government engineered high school programs that prepared the emerging workforce for the kind of jobs they would face. The result was a high school diploma that produced adequate skills to get a high wage job. By 1920, more than 25% of the workforce had a job where at least a high school education was expected (Goldin & Katz, 2008). Goldin

and Katz suggest this technological transition period (late nineteenth through early twentieth century) has parallels to the current period in the U.S. Both periods had an acceleration of growth in new technologies that created a supply deficit (Goldin & Katz, 2008). However, in the early twentieth century it was the emergence of the high school that restored equilibrium in the economic balance by supplying the necessary work skills to make a worker compatible with the technology of the time. These skills, say the authors, have not been sufficient to keep the present workforce compatible with current workplace skills demand (Goldin & Katz, 2008).

The demand that the mass production era created in industry for vast numbers of skilled workers and its reward of high-wage jobs gradually began to fade as early as the 1950s. In 1950, 60% of all new jobs created fell in this category. However, by the early 1990s that percentage had dropped to 35%, and by 2000 it shrank to 20% (Gordon, 2005). What replaced these jobs were ones requiring more analytically inclined technicians with a higher degree of skill to operate more complicated machinery and use more specialized software. The result was a drop in demand for laborers with limited skills, and a shortage of laborers with the skill to operate at the new standard. Add to this change the growing losses of highly skilled workers in such technical fields as welding, plumbing and electrical systems to retirement, and predicted shortages by 2012 run between 5% and 16% (Troianovski, 2008).

Technological advancements eliminated the need for workers with limited skills, and technology continues to advance more rapidly now than at any time thus far in history. This rapid advance has created a demand for more highly skilled workers to fill the requirements for even basic jobs. In general, proficiency in today's workforce

requires more intense skills, as Goldin and Katz (2008) write: “We see great demand today for the highly analytical individual who can think abstractly and who understands such disciplines as finance, nanotechnology, and cellular biology in a deep, not routine, manner” (p. 353).

Based on observations of trends in secondary curricula across the country, Conley believes, as do others in the field (Conley, 2003; Gordon, 2005; Ingle, 2007), that most of the traditional skills taught in secondary schools are outmoded in today’s workplace. He says, “Traditional vocational education programs cannot match the current complexity of the economy or of the skills required for most technical occupations” (Conley, 2003, p. 11). Gordon (2005) cites math and literacy skills along with the ability to adapt, learn, and master new skills as changes warrant as the kind of skills needed in the future workplace. “The United States needs a new breed of workers ... in every field,” he states. “[These workers have] discrimination, analysis and interpretation skills. They can solve problems and coordinate projects” (Gordon, 2005, p. 43). Ingle (2007) adds an understanding of economics and business and entrepreneurial literacy to the list. These specific prescriptions of higher-level knowledge and analytical skills go beyond the parameters of the twentieth century high school. They call for the higher order learning of college-level institutions. In short, the twenty-first century workplace demands postsecondary-level skills.

Over the past few decades, college graduates have held a growing wage advantage on non-college graduates. The wage difference has increased from 40% in 1979 to 75% in 2008 (Ip, 2008). On average college completers earn a 12% to 14% return on investment for their education based on lifetime earnings, according to studies by the

United States Department of Education and the Federal Reserve Board (Surette, 1997; United States Department of Education, 1999). In addition, studies have shown that the benefits of education go beyond simple wages earned. These other advantages include greater fringe benefits and superior working conditions due to job conditions, better ability to save for retirement, better health and longer life. In general, a college education produces a better quality of life (Kane & Rouse, 1995; Leslie, 1990). This point runs counter to critics who argue that the cost of higher education (specifically four-year colleges) can erase added earning potential by saddling graduates with extra debt (Gray & Herr, 1996; Stanfield, 1997). However, a more educated workforce benefits more than the individual with the advanced education. It goes beyond the workforce and affects the commonweal of society. In setting forth its plan to increase participation and success in its higher education institutions, the state of Texas summed up the importance of its initiative with the following statement:

An educated workforce contributes more to the state's prosperity, providing added fuel for a growing economy. Education at its best also allows individuals to do what they want to do, rather than what they have to do and it opens their minds to better understand the world around them. (The Texas Higher Education Coordinating Board, 2005, p. 4)

The Rise in Social Inequality in the Workforce

As educational progress lags behind technological advancement, inequality widens as fewer skilled workers command high paychecks while unskilled workers have no bargaining power (Brooks, 2008). The lag in education is evident in America's poor showing internationally in literacy and math scores (Darling-Hammond, 2007; Gordon,

2005). A big contributor to the scores deficit is the gap between the best students and the worst students, a gap that is greater than any other leading industrial country (Educational Testing Services, 2007; Sum, Kirsch, & Taggart, 2002). This widening gap in education is presently translating to inequality in the workplace as a greater number of Americans are finding themselves unemployable or employed in jobs that offer lower wages than previous ones. Though more Americans are graduating from college, more Americans are also dropping out of high school and dooming themselves to low-skill and low-wage jobs (Bailey & Mingle, 2003; Heckman, 2008; Heckman & LaFontaine, 2007). The decrease in educational attainment has caused a terrific decrease in the average wage of U.S. workers. Lifetime earnings for a non-high school graduate in 1979 were about \$1.5 million in 2005 dollars. In 2004 that earning average dropped to \$960,000, a drop of 39% (Educational Testing Services, 2007). Similarly, earnings for high school graduates dropped 24%. But as the real wages of high school dropouts have declined since the early 1970s, those of more skilled workers have risen sharply. Although earnings for college graduates have remained nearly unchanged since 1979, earnings for master's and professional degree holders have risen 15%, reflecting the changing demands for job success within the economy. "The fruits of [economic] growth are flowing largely to a relatively small group of people who have a particular set of skills and assets that lots of people don't" (Ip, 2008, para. 12).

Meanwhile, instead of providing greater skills for the workplace, American education is sliding backward. The rise in American drop-out rates, a trend that has been on the increase since a low of about 23% in 1970, adds to the problem, and with it the gap in the educated and the undereducated continues to widen (Educational Testing

Services, 2007; Goldin & Katz, 2008; Heckman & LaFontaine, 2007). The economic inequality that this gap affects becomes more alarming in that it is not equally distributed across racial and ethnic boundaries. Deficits in literacy and math are higher in Hispanics and Blacks (Educational Testing Services, 2007), and males run a greater risk than females of dropping out of the higher education population.

The decline in high school graduation is of interest in its own right as a measure of the performance of American schools. It has important implications for interpreting a wide variety of educational statistics. For example, part of the slowdown in male college attendance rates documented by Card and Lemieux (2001) is due to declining rates of high school graduation among males. In addition, half of the growing gap in female versus male college enrollments documented by Goldin, Katz and Kuziemko (2006) can be attributed to higher levels of high school graduation among females and larger declines in male graduation rates. (Heckman & LaFontaine, 2007, p. 5)

The widening skills gap and the diminishing pipeline of human capital from America's schools are the main reason why commentators such as David Brooks (2008) and Clive Crook (2008) have rallied to education as the key to sustaining America's economic advantages. They acknowledge that fixing the problem goes beyond any single program or array of new classes. It calls for a total reassessment of the type of skills schools need to be teaching but are not. Milner (2007) finds that though discussion of developing more rigorous standards in high school curricula abound, little is often done to implement them effectively, even though competition worldwide for human capital development makes accomplishing better workforce skills more critical.

“America’s schools must become more serious about teaching advanced knowledge to all or most students; otherwise, nations that are pressing their students to reach higher academic standards will take the new jobs, and our students will fall behind” (Milner, 2007, p. 52).

The Importance of College Readiness in the Changing Economy

With the evidence of the nation’s shrinking skills pipeline, the personal financial benefits of postsecondary education and the role that a postsecondary education holds in leveling marketplace equality, 38 states have undertaken initiatives since the 1990s to prepare students with skills needed for college success (Conley, 2003). Programs involved in these initiatives range from early college, charter schools, to partnerships with organizations such as the Achieving the Dream initiative and the Gates Foundation. One such initiative, The Standards for Success by the Association of American Universities and the Pew Charitable Trusts identifies six areas of skills needed for college success: English, mathematics, natural sciences, social sciences, second languages and the arts, and provides examples of work that exemplify the skills in each area as an aid for students (Center for Education Policy Research, 2008). A goal of the initiative is to create a database where secondary educators can compare standards with higher education institutions and align teaching goals with them. The American Council on Education similarly has proposed an extensive system that stresses multiple sources of data to align postsecondary standards with secondary schools (“Diplomas Count 2008”, 2008). Other groups such as the American Diploma Project offer more general math, science and critical thinking skills as guidelines for developing secondary learning goals.

Scholars (Darling-Hammond, 2007; Gordon, 2005; Milner, 2007) suggest that skills needed for college success are either not being taught at the secondary level, or are being marginalized to promote end-of-grade testing skills, which are not helpful at the postsecondary level. The skills necessary for postsecondary success typically include the ability to analyze information, reading comprehension, knowledge of the scientific process and math proficiency. Gordon (2005) stresses skills such as these that will translate to the technologically advancing workplace. They include a formal education, which will, as Conley (2007) suggests, give them “a firm general education foundation,” continuing education and training throughout their career to keep them up-to-date (p.43). Conley (2007) also stresses more concrete differences in college and secondary environments and points to core skills in writing, critical reasoning, analytic thinking and investigative inquiry as critical to postsecondary success. “College courses require students to be independent, self-reliant learners who recognize when they are having problems and know how to seek help from professors, fellow students, or other sources” (Conley, 2007, p. 2). The analytical aspect of college learning and the independent learning of the student are common college skill requirements. Hazard and Nadeau (2006) stress the need for interaction with professors and peers, accepting learning as a partnership to enhance student learning experiences.

Attacking the problem has its complications, however. The national high school graduation rate at this time hovers around 70% and has been in decline since around 1970 (Heckman & LaFontaine, 2007). Bettering this graduation rate is the first step in preparing students for a postsecondary education, but as students graduate and enter postsecondary institutions many find they need remedial skills work in order to

successfully complete a degree. According to one study, entering freshmen at postsecondary institutions filled remedial classes in reading, writing and math at rates as high as 98% at some two-year colleges to 78% at four-year colleges (Pulley, 2008). But remediation of some basic skills for students only represents part of the scale of this problem. According to the authors of the *College for All* study (United States Department of Education, 1999), over one third of 1993 high school graduates lacked sufficient skills to function in college academics (United States Department of Education, 1999). A cause for the lack of college-ready skills from many high school graduates is the philosophical divide between high school and postsecondary institutions (Conley, 2003; Venezia, 2006). That is, policies and standards for each system are created in isolation from each other, not giving students a clear idea of what to expect when they move from one system to the other.

Another problem hinges on assessment and agreement. With no centralized system to agree on a specific set of standards and to create a single valid assessment tool to measure these skills, it becomes difficult to track and measure success. The first step in achieving something of this nature would be to organize a single central system to administer these standards and to promote more partnerships between secondary and higher education institutions to achieve ongoing efficiency. Few states have an active system like this at this time as indicated by Conley in a 2003 survey he conducted of nationwide school systems.

Creating a system to centralize and track postsecondary standards and the assessment of those standards for high school students will go far to guarantee the consistency of the effort. Whereas there are numerous examples of standards presently

being employed by school systems, many are incomplete, concentrated on math or language skills (Conley, 2007) or too general to meet the specific expectations of national universities (Milner, 2007).

Given these circumstances, it is necessary for the country to adapt policies and programs that will facilitate better K-12 performance and completion and more efficient transition to postsecondary learning. The path to better economic prosperity and better access for all to better wages and a better life will not be navigable unless measures are taken to facilitate free movement from secondary to postsecondary opportunities. The first step to this is to prepare learners for their inevitable move to postsecondary opportunities. One such program is dual enrollment.

The Link to Dual Enrollment

As college enrollment increases, more scrutiny has come to the type of education the average twenty-first-century student gets in secondary school. Enrollment at postsecondary institutions in the United States grew at a rate of 17% from 1984-94 and 21% between 1994 and 2004 (National Center for Education Statistics, 2007). The percentage of high school students who have completed at least one year of college rose from 34% to 57% between 1971 and 2005. This increase in student matriculation has also generated questions as to the way students are prepared for postsecondary work. *The Boston Globe* (Plummer, 2007) reported that about 60% of incoming community college students require remedial coursework and U.S. Department of Education statistics show that between 1992 and 2000, 61% of students who first attended a public two-year, and 25% who first attended a four-year institution completed at least one remedial course at the postsecondary level. Some studies have put these figures as high as 80% (McCabe,

2000). The increased need for remedial education has put additional pressures on students competing in the heightened academic environment of the university. The result has been an increase in the number of students unable to complete degree programs. In fact, according to the U.S. Department of Education, students who enroll in remedial coursework are less likely to complete a degree than students who don't require remediation (National Center for Education Statistics, 2007).

Based on figures such as these, educators have developed various programs to prepare students for the accelerated learning environment of postsecondary education (Karp et al., 2004). But how are high school students *best* prepared for the rigors of college education? One way, say some, is by sending them to college (Bailey & Karp, 2003; Klein, 2007). Or at least by exposing them to college-style courses, such as those in International Baccalaureate (IB), Advanced Placement (AP) and dual enrollment programs. Citing these hopes, AP and IB programs have been expanded nationally, and initiatives that partner schools with local universities and community colleges to offer programs such as dual enrollment and Tech-Prep or, in North Carolina, Huskins Bill courses have also proliferated in hopes of improving college performance. Dual enrollment programs in particular have recently become favorable as a way of exposing middle and even low-performing students and underserved student populations to college coursework as a means of preparing them to successfully complete a degree (Eimers & Mullen, 2003; O'Brien & Nelson, 2004). In fact, 57% of all colleges now have dual-enrolled high school students (Jaschik, 2005).

One driving factor in these expansions of college-oriented programs is recent research on college readiness that suggests it is the methods of learning in secondary

schools that are inadequate for preparing students for the rigors of college-level work. Conley (2003) and Bailey and Karp (2003) suggest the problem lies in a failure of coordination between K-12 and postsecondary education. This problem is furthered by changing educational needs spurred by the globalized economy and the elimination of manufacturing-based jobs in many American communities, say scholars such as Howard-Vital (2006). Furthermore, Reindl (2006) emphasizes a dire need for students to succeed at the college level in order for the United States to be able to compete economically with a globally competitive marketplace. These concerns have pressed educators to look at better ways to link secondary and postsecondary programs and institutions. A readily convenient link between the two has been the two-year or community college.

Current Dual Enrollment Programs and Their Origins

From its outset the two-year college had been a natural partner of the secondary school system. In their beginnings at the start of the twentieth century, two-year colleges worked in local partnerships to establish technical programs and to facilitate transitions of secondary students to postsecondary studies (Cohen & Brawer, 2003). The connection between the two was often as literal as the sharing of a common building and administration where students easily sifted between secondary and postsecondary programs of study (Bogue, 1950). According to the earliest literature (Koos, 1970), dual enrollment as an intentional program that allows enrolled high school students the opportunity to take college courses offered by a postsecondary institution began early in the twentieth century. The earliest dual enrollment program models were outgrowths of secondary school and junior college partnerships in states such as Minnesota, Texas and California, when local high school students were permitted to enroll in courses in the first

quarter of the twentieth century (Koos, 1970). The Texas and California programs came on the heels of a push by George Zook at the U.S. Department of Education and other supporters of the junior college movement to weld partnerships between the relatively young college model and secondary schools (Kisker, 2006). Zook explained his rationale in an address to the American Council on Education in 1922:

Our higher institutions are spending a wholly unwarranted amount of time assimilating freshmen and sophomores who are doing a grade of work which each year is becoming more clearly recognized as secondary rather than higher in character. It must be apparent that this situation will one day become intolerable and that a solution should be sought. The junior college is offered as that solution. In order that we may be better able to understand this proposal, it may be well to recall that the junior college is here understood to be two years of work superimposed on a four-year secondary-school course of study. (Zook, 1922, p. 576)

The idea was not a far-fetched one at the time. Junior colleges, begun only about 30 years earlier, were essentially outgrowths of high schools developed to fill the needs of a growing population looking for education beyond the secondary level. They were intended to fill the void that existed for the increasing numbers of high school graduates who saw limited opportunities at the end of the nineteenth century to attend one of perhaps 311 four-year traditional institutes nationwide. These new two-year colleges had been established under the premise that they were filling the needs of the “non-academically minded high-school graduate” (Rudolph, 1990, p. 463). They originated within high schools, were operated as departments within local school systems, and in

some states operated as such as late as 1960 (Pederson, 2000). It was actually in the 1920s when the idea of the junior college institution as an emerging companion to the four-year college began to ferment. This development may have initiated the separation between secondary institutes and two-year colleges seen increasingly afterward (Bogue, 1950; Pederson, 1996).

Another great proponent of the high school-junior college partnership was University of Chicago secondary education professor, Leonard Koos. He outlined a plan to facilitate partnering of higher and secondary education which he called the 6-4-4 plan, which he spent much of the 1930s and 1940s promoting at conferences and educator meetings across the nation (Kisker, 2006). The plan's rationale was also based on the "large amount of repetition" he saw in the transition from secondary to postsecondary education. It called for a total realignment of public schools where grades one through six would be offered in elementary school, grades seven through 10 in junior high school, and grades 11 through 14 in the junior college (Pederson, 2000). Koos says he first heard the plan proposed in 1915 by the North Central Association of Colleges and Secondary Schools. However, he claims the concept was developed by George Merrill, a California vocational education administrator, who proposed the idea to the president of the University of California in a 1908 report (Koos, 1946). The plan was implemented first in Minnesota in 1916 (Koos, 1970). Koos felt this system would ultimately "raise the bar" for secondary education expectations and free universities to focus on research and professional training as well as to offer opportunities for a terminal education with a degree for those who did not have the chance to go on to a four-year school (Koos, 1970). One important foundational belief of the Koos model as well as other dual enrollment

programs at the time was that they allowed for either the potential to seek a terminal degree or as Walter Eells, a professor at Stanford University, said, take an end to their higher education work “naturally and honorably at the end of the sophomore year” (Cohen & Brawer, 2003, p. 13). In other words the focus of these higher education programs did not necessarily assume the goal of a four-year degree or beyond for the student.

As the expansion of the junior college continued through the 1940s, a few examples of Koos’ dual enrollment programs were put into place, numbering as many as 38 by 1950. This was a small amount compared to the overall number of two-year colleges (Bogue, 1950). Koos’ model faced two concerns that ultimately led to its disregard. First, though some systems had successfully implemented the Koos “four-year” junior college format, many secondary systems did not have the structure, or even a local junior college, to be able to implement the model and many secondary system administrators voiced dismay at the premise of reorganizing existing systems to accommodate it. Second, the rush of students following World War II spurred by the G. I. Bill and eager for a four-year degree quickly became the dominant driver in higher education planning (Bogue, 1950).

By the late 1950s, the dual enrollment plan in general seems to have completely disappeared from the radar of educational planners. Like the Koos plan, this is perhaps due to changes in the education market with the proliferation of four-year colleges through the twentieth century and with a booming economic market where workers demanded higher degrees from competing four-year colleges for increasing opportunities in the workplace (Cohen & Brawer, 2003). But by the end of World War II, the junior

college was seeing a change in identity, from the two-year college outgrowth of the secondary movement to a stand-alone educational institution that met community work and educational needs: the community college. The change from junior college to community college would have a bearing on the diminished interest in dual enrollment programs after the war as leaders interested in establishing the community college identity would push for separate administrations, separate educational departments and a separation of the community college institution from its secondary peer (Bogue, 1950; Cohen & Brawer, 2003; Kisker, 2006).

Following World War II, two-year colleges began discussions to change the constitution of the American Association of Junior Colleges to meet the new set of demands they saw before them. The result was a sharp change in mission for the two-year college as the focus of secondary education moved to four-year transfer credit (Bogue, 1950). This new direction would mean a difference in the way colleges administered dual enrollment programs. Over the next 50 years several new forms of the program would appear, and for each the goal would include four-year college readiness. These programs were: Advanced Placement (AP), International Baccalaureate (IB), Middle College High School, Early College and general dual enrollment college transfer (Cohen & Brawer, 2003; Kisker, 2006).

From their start in the mid-1950s, Advanced Placement (AP) and International Baccalaureate (IB) programs gradually took precedence as a four-year college transfer qualifier to the secondary and postsecondary partnerships that had come before. These programs worked outside of postsecondary institutions by being delivered through secondary institutions and assessed through external exams. The 1970s saw declining

graduation rates and the need to find alternative programs for at-risk students in the high school. Community colleges responded with the middle college high school, opening the first at LaGuardia Community College in New York in 1974 (Kisker, 2006). This initial program focused on at-risk and near dropout students by offering them an alternative college preparatory curriculum that provided close faculty and peer support as well as strong academic counseling (Kim, Kirby & Bragg, 2004). The middle college movement continued a primary focus on at-risk students but remained limited in number through the 1970s and 1980s. By 2000, only 30 were in operation (Kisker, 2006). By the 1980s, though, another system began to take favor with secondary and postsecondary administrations. It was the simple dual enrollment program which emphasized access to college transfer credit over the more intertwined partnerships of the middle college and for a different target population. These programs include the Huskins Bill program, Early College High School and Middle College.

Beginning in 1990 with the authorization of the Carl Perkins Vocational and Technical Education Act, Tech Prep programs became an option for secondary students looking for exposure to postsecondary instruction in vocational areas. These programs combine high school requirements with postsecondary courses needed for specific technical fields. Though these programs are working partnerships between secondary and postsecondary institutions, their primary concern is not with college transfer credit, although some institutions allow transferable credits if the program is completed successfully (Bailey & Karp, 2003).

Though the term dual enrollment can generally be applied to any program where students receive credit from both secondary and postsecondary institutions, simple “dual

enrollment” programs typically refers to the option for secondary students to take one or more college level classes with their high school curriculum for postsecondary credit. These classes may be offered at the secondary institution or at the postsecondary institution granting the credit. Instructors may be full-time college instructors or employed by a secondary institution and meet college teaching requirements (Karp et al., 2004). Though students have been allowed to take college courses in ad hoc fashion under special conditions for many years, dual enrollment involves a systematic program with credit agreement between the secondary and postsecondary institution. In this respect, dual enrollment programs began as early as the 1970s, mostly as local ventures and probably as outgrowths of the middle college movement. The earliest example of this is likely Syracuse University’s Project Advance (SUPA) in 1972 (Kim et al., 2004). The program was initially aimed at high achievers who wanted a rigorous academic curriculum for college preparation. Several other programs began in the 1970s and early 1980s, including Florida International’s Partners in Progress (PIP) in 1982, which was aimed at minority students, and College Now at Kingsborough Community College in New York City in 1984, which focused on average and middle achievers. As these maturing programs began to show promise, other states weighed in with legislation to open the doorway for secondary students to enter college courses. The first such state, Minnesota, adopted the Postsecondary Enrollment Options Act in 1985 (Kim et al., 2004). In the program, any 11th and 12th grade students who met the regular admission standards of the postsecondary institution to which they applied were allowed to take regular college courses on the college campus at state expense. Michigan, Indiana, Iowa and Ohio soon followed suit. Through the 1990s the number of states with dual

enrollment programs similar to these multiplied. Boswell (2001) reported that by the turn of the twenty-first century 38 states had implemented a formal dual enrollment program. The Education Commission of the States reported 47 a year later (Bailey, Hughes & Karp, 2002). Numbers in these programs have continued to grow through the first decade of the twenty-first century. Despite the exploding numbers, policies for them can vary widely between state to state or even county to county (Bailey et al., 2002). And accountability for the classes has been questioned as at this time there is little structure for assessing student performance (Klein, 2007).

In the early years of the twenty-first century a new hybrid of the dual enrollment program came on the scene. Funded by the Bill and Melinda Gates Foundation and the Carnegie and Ford Foundations, these new academies would, in the fashion of the middle college, eliminate the physical transition between high school and supply on-staff counselors and instructors to facilitate the maturation of student learning. They would, like the 6-4-4 plan, enact a hybrid high school where the secondary requirements of each student were met and the first two years of postsecondary study were also facilitated; and, like simple dual enrollment programs, these academies would provide a rigorous academic environment for the purpose of preparing students for further postsecondary study. This new hybrid was the early college, and the first examples of the model were established in 2002 (Kisker, 2006).

Early college has gained momentum as a serviceable program that encourages low-income students to gain postsecondary credit and eventually gain postsecondary degrees. Department of Education data show that students from upper and middle income families are five times more likely to attend postsecondary institutions than are lower

income students. The early college is intended to promote accessibility for these students. This central premise of the early college mission is specified on its web site:

Such data call for radical interventions to increase the number of low-income young people gaining postsecondary credentials. Clearly, bold education policies and practices are needed to ensure that more young people earn the postsecondary credentials that are crucial to their individual economic security and to the viability of our nation's economy. (The Early College High School Initiative, n.d.)

In the 2007-08 school year early colleges were in operation in 124 schools across 24 states. Two thirds of current early college enrollments are African American and Latino students and eight sites are directed towards Native American students (The Early College High School Initiative, n.d.). Early colleges are, at this time, at an early stage in their production; however, the educational climate has been receptive so far, and expansion of the program is on track to double in the next few years.

Increasing College Readiness

Some researchers feel the key to college success begins with the style of course that a student takes. At least that's the premise of several studies that suggest end-of-course tests and an emphasis on rote knowledge don't contribute to skills necessary to succeed at the college level (Adelman, 1999; Conley, 2003; Karp, 2006; Reindl, 2006). However, several studies have presented evidence that college-style courses do contribute to success in higher education. Cliff Adelman (1999), a senior researcher with the U.S. Department of Education, attributes 41% of college success ability to the type of high school curriculum to which a student is exposed. One program with this type of academic

rigor is the AP program. AP has been the focus of several studies (Adelman, 1999; Hargrove, Goldin, & Dodd, 2007; Swanson, 2007) that show a relationship between taking the course and performing well in upper level college courses. A study by the University of Texas shows an AP regimen benefiting students at the college level (Klopfenstein & Thomas, 2005). This regimen qualifies students by high school grade, socio-economic level, race and gender. AP courses, as with the later International Baccalaureate courses, have been the accepted indicator of college success for college admissions counselors, if simply because they have a final test that serves as a national standard (Mathews, 2007).

Dual enrollment courses have shown success similar to AP programs and expose students to variables that some researchers suggest may contribute greatly to college readiness and success (Karp et al, 2007; O'Brien & Nelson, 2004). An early study of junior college transfer students found that graduates who transferred to four-year institutions showed a "marked superiority" to similar groups of students who entered four-year institutions as freshmen (Hillway, 1958). Though the study compared students who had completed full two-year programs as opposed to having limited exposure to college-style courses, it provides a solid rationale for investigating the positive effect of two-year courses on continuing postsecondary students. A more recent study (Karp et al., 2007) looking at dual enrollment in two locations, Florida and New York City, shows favorable returns for students enrolled in these courses. The study finds that dual enrollment is positively associated with the likelihood that students will earn a high school diploma, initially enroll in a four-year institution, enroll full-time and persist in college to a second semester. Participating students had significantly higher college

GPA's three years after high school graduation than did peers who did not participate in dual enrollment programs. In addition, the study finds that the exposure to the college atmosphere and consequent experience is an important factor for later success (Karp et al., 2007). Furthermore, the New York side of the study, which tracked students in a vocational dual enrollment program, found them more likely than their peers to pursue a bachelor's degree, earn higher first-semester GPA's and progress toward a degree (Karp et al., 2007). A 2004 Florida study found dual enrollment successful in promoting retention and graduation. It compared high achieving dual enrollment students with high achieving non-dual enrollment students and found significantly higher community college graduation rates with the dual enrollment students (Florida Department of Education, 2004).

A local study in San Francisco (Spurling & Gabriner, 2002) found that students transferring dual enrollment credit to City College in San Francisco were statistically more likely to pass courses at the college than students without dual enrollment credits. Other studies, Karp et al. (2007) and O'Brien and Nelson (2004) in particular, show a positive effect for dual enrollment programs on middle achieving students, specifically males from low income demographics. These findings have raised interest in dual enrollment as not only a program effective for college readiness, but also as a means of creating more equity among the college bound. This response to equity is shared by the authors of a U.S. Department of Education study who suggest that if anything, dual enrollment credit can at least mitigate the cost of a college education with transferable credit, a foundation in the platforms of many early college programs.

We conclude that since at least the turn of the century, the nation has responded to the growing demand for skills by raising the mean education level of the work force, that is, by adding years of education. This process continues, but as time goes on, the cost of each additional year of education will become less and less affordable, and it will become ever more important to increase the learning and skills yielded by a year of education at earlier stages. (United States Department of Education, 1999, para. 14)

Though these studies show strong evidence in favor of these programs' effectiveness, other research suggests mixed results in student returns, and there is generally not a large body of quantitative research that addresses effectiveness (Bailey & Karp, 2003). Variations in state policies make gauging the overall effectiveness of dual enrollment difficult. That these courses are sometimes offered in secondary schools with secondary school instructors and resources has some educators concerned about the consistency of these programs' delivery (Bailey & Karp, 2003; Boswell, 2001; Klein, 2007). Some researchers have reported dual enrollment credit being granted in classes that mixed students taking high school versions of the same course. Other programs used high school texts for the college version of the course (Klein, 2007). In response to this problem, the National Alliance of Concurrent Enrollment Partnerships developed a set of standards for dual enrollment courses. Four states have adopted these standards for their programs (Arkansas, Indiana, Minnesota and Iowa). States, such as Florida and Washington, have developed their own set of standards to monitor the courses. Critics of the Tech Prep, or programs stemming from the Perkins Act, contend that the legislation

so loosely defines courses that can be taken in these programs that often courses are not “rigorous” or “challenging” at all (Meeder, 2008).

As the quality of dual enrollment courses comes under more scrutiny, states are enacting further policy measures not only to establish accountability, but to implement better procedures for teaching effectiveness. Nine states (Florida, Maine, Minnesota, North Carolina, Tennessee, Texas, Rhode Island, Utah and Virginia) are in the process of implementing policies to take into account recommendations from key researchers on program effectiveness (Klein, 2007). Among recommendations that researchers have proposed are to enhance existing programs by making them more individualistic and that course outcomes be more specifically aligned to postsecondary standards, and at least two studies (Howard-Vital, 2006; Reindl, 2006) suggest expanding access and offerings to these programs. Both Bailey and Karp (2003) and Smith (2007) conclude that dual enrollment programs may offer an effective advantage for less prepared students by improving student motivation, as these programs offer students a diversion to the high school routine. Adelman (1999) cites the power of simply giving students the opportunity to take college courses early as a method for improving the odds that students will complete a postsecondary degree. He says that any amount of early credit is some help for matriculating students.

Less than 20 credits by the end of the first calendar year of enrollment [in college] ... is a serious drag on degree completion....It is all the more reason to begin the transition process in high school with expanded dual enrollment programs offering true postsecondary course work so that students enter higher education

with a minimum of 6 additive credits to help them cross that 20-credit line. Six is good, 9 is better, and 12 is a guarantee of momentum. (Adelman, 1999, p. 71)

Other Variables Affecting Dual Enrollment

The wave of interest in studies that focus on specific types of courses as indicators of college success has some worried that schools, parents and students may accept courses on face value as a panacea for declining college readiness. Though both quantitative and qualitative studies indicate that AP and dual enrollment do show a strong link to college success, other research points out that separate factors may contribute to a student's academic welfare. California-Riverside researchers (Wagerman & Funder, 2006) argue that student "conscientiousness" is an undervalued predictor of success. The Wagerman and Funder construct, which they define as "high motivation, organization and a determination to succeed," was measured by a personality survey given to both students and to acquaintances of those students. Perceptions of student personalities (from the students and from their acquaintances) were then compared to grades and SAT scores. Other concerns range from the quality control issues of the individual courses discussed earlier, to the readiness of the individual high school student (Redden, 2007).

The location of the program, also called "power of site," has been investigated as a possible variable in student readiness. Smith (2007) shows a qualitative correlation in students having a higher educational aspiration when taking these courses on a college campus as opposed to a high school campus. Her study adjusts for individual student achievement and parent educational level. However, she relied on a small regional sample for her data. Jordan, Cavalluzzo and Corallo (2006) note the advantages of programs that use the college campus, seeing benefits for students in the array of

available classes, technological resources and the promotion of more positive, learning oriented interaction between college and high school students. Melinda Karp, a researcher at Columbia University, contends that course authenticity, the feeling of attempting a high level and challenging course, is very important in developing student identity and plays a strong role in the success of a student (personal communication, November 16, 2007). A study she did in 2006 found that dual enrollment participation can help students understand the college student role and can integrate that role into their self-concepts resulting in greater postsecondary persistence (Karp, 2006).

The challenge of adapting from the role of a secondary student to a postsecondary student has raised concerns among some researchers. Klein (2007) reports that in order to ease these transitions experts have suggested incorporating foundation courses as a part of the program requirements. These courses would give middle and low achieving students in these programs a chance to grasp material with which they have little experience. Researcher Katherine Hughes, an assistant director at the Community College Research Center at Columbia University, points to comprehensive dual enrollment programs, such as the College Now program at City University of New York, as an example of a postsecondary transitional program that offers extensive counseling and support services to students (Redden, 2007). Others (Kirst & Venezia, 2001) warn that ultimately the lack of any incentive for secondary and postsecondary institutions to collaborate presents one of the greatest barriers to programs connecting the two institutions. Nonetheless, as students continue to enroll in programs such as dual enrollment, scrutiny over how well these programs are serving students and how postsecondary institutions accept them will only be looked at more intensely.

Summary

This chapter discussed the importance of increasing postsecondary participation and readiness to benefit both the economic state of the country and the individual welfare of its citizens. It reviewed literature that showed an increase in workforce demand for higher technical and critical thinking skills and literature that called for more attention to developing postsecondary pathways for developing these skills. The chapter then discussed dual enrollment programs as one pathway that met the demand for developing these skills and reviewed literature which showed some mixed evidence of effectiveness from these programs.

Due to the mixed nature of the evidence available, it stands to reason that the case for more study on this issue is warranted. The remaining chapters of this paper are dedicated to pursuing a study that will investigate what effects dual enrollment courses may have on students taking these courses and matriculating to a postsecondary institution.

CHAPTER 3

RESEARCH METHODOLOGY

Dual enrollment programs in secondary schools are one way of preparing students for the rigors and expectations of a higher education degree. As discussed in the previous chapter, multiple studies show a positive relationship between students enrolled in dual enrollment courses and their success at the postsecondary level. But the body of literature that looks at dual enrollment effectiveness is limited in size and scope. Much of existing literature is qualitative, leaving the opportunity for more quantitative inquiry on the subject. In addition, there is a need for more studies that can be generalized to the national population of dual enrollment students. Two particular study features that could accomplish this are to incorporate data from samples larger than a few colleges and to break down the potential effect of dual enrollment programs on gender and race or within specific types of postsecondary programs. These features would allow researchers to compare the effects of dual enrollment programs on more than one area of study.

To address this gap in the literature, this study uses a causal-comparative research design to look at two types of North Carolina dual enrollment programs: courses simply termed, dual enrollment, and Huskins Bill dual enrollment. The study is designed to investigate if there is a causal link between each program and the academic success of students who took courses in these programs and later enrolled in a North Carolina community college. Academic success in this study is measured by first-year student grade point average (GPA) and persistence to graduation. Based on findings in earlier studies that show a positive effect in college readiness by taking a higher education class in high school (Bailey & Karp, 2003; Conley, 2003; Kim, 2006; Spurling & Gabriner,

2002), dual enrollment courses and Huskins Bill classes should show a positive effect in student success.

In this study an existing dataset of students was analyzed using inferential statistical methods including comparisons of sample means and analysis of descriptive statistics. Where statistical significance was found using ANOVA, a Tukey test was used for post hoc testing to determine which mean samples were significant. For comparisons of nonparametric statistics, the chi-square test was used. All calculations were performed with SPSS 17.0 statistical software.

The causal-comparative model works well for this study because it takes a specific group affected by a common independent variable and compares the group with one not affected by the variable (Gall, Gall, & Borg, 2005). The effect that the independent variable has is measured by a change in a dependent variable. In this study the independent variables are student exposure to dual enrollment courses and student exposure to Huskins Bill courses. The effects of these independent variables are measured on two dependent variables, first-year GPA and graduation.

For a causal-comparative study it is necessary to compare groups that are generally homogenous with the exception of a treatment, or independent, variable (Gall, Gall, & Borg, 2005). To keep the make-up of the groups for this study as alike as possible, the sample for the study contained only students who matriculated to a community college after high school. By choosing only community college students the study provides a control for students that have similar backgrounds and career aspirations as opposed to a sample that contains students who matriculate to both community

colleges and four-year institutions. More specifically, the sample used in this study was limited to students who:

- Matriculated straight into community college from high school, which indicates a sense of academic purpose and direction for these students.
- By enrolling in the community college made a purposeful decision to pursue the offerings of a two-year college over those of a four-year institution.
- Were traditional-age college students with no time off between high school and beginning college.

To further control for differences within these groups, the study breaks each student group into three additional subsets, students enrolled in technical programs, students enrolled in medical programs, and students enrolled in remaining programs which include college transfer degree and unclassified students. (The specific breakdown of programs into these groups is shown in Appendix A.) These subsets offer a further control in the study, as grouping students by program maintains student similarity by homogenizing academic goals and career aspirations. For instance, students enrolling in technical programs, which include degrees and certifications in industrial, construction, engineering, computer and business technologies, sought to attain degrees that could be used for more immediate career employment. These degrees, as opposed to college transfer degrees, are terminal and apply to specific career paths. Using medical programs as a subset offers the same control for students as the technical subset, but offers an additional control for previous academic success in that these programs are highly

selective for admission and students must maintain a minimum GPA to graduate. These programs include nursing degree programs and professional medical certifications.

Research Questions

The study addresses the following research questions:

- Is there a relationship between student success as measured by first-year GPA and persistence to graduation for students matriculating to community college programs who participated in dual enrollment and Huskins Bill courses and those who did not?
- Is there a difference in first-year GPA and persistence to graduation from a community college program for students in technical or medical programs who participated in a dual enrollment program and those who did not?
- Is there a difference in first-year GPA and persistence to graduation in community college that relates to race or gender?
- Is there a difference in students taking dual enrollment and Huskins Bill courses in maintaining better persistence rates and better first-year GPAs in community college?
- What is the relationship between the number of dual enrollment or Huskins Bill courses a student takes and first-year GPA and persistence to graduation in community college programs?

The hypotheses tested in the study are as follows:

- Hypothesis 1: Community college students who took Huskins Bill or dual enrollment courses will show statistically significant higher first-year GPAs and graduation rates than non-dual or Huskins Bill students.
- Hypothesis 2: Students in community college technical programs and students in community college medical programs will show statistically higher first-year GPAs and graduation rates for dual enrollment and Huskins Bill students than for non-dual and Huskins Bill students.
- Hypothesis 3: Dual enrolled and Huskins Bill male community college students will show statistically significant higher first-year GPAs and graduation rates than female dual enrolled and Huskins Bill students.
- Hypothesis 4: Non-white dual enrolled and Huskins Bill community college students will show statistically higher first-year GPAs and graduation rates than non- dual enrolled and non-Huskins Bill non-white students
- Hypothesis 5: Community college students who have taken dual enrollment courses will show statistically significant higher first-year GPAs and graduation rates than community college students who have taken Huskins Bill courses.
- Hypothesis 6: Community college students will show an increase in first-year GPAs and graduation rates with each dual enrollment or Huskins Bill course taken.

The Dataset

Data were drawn from the North Carolina Community College system Curriculum Student Information II Universe located in Raleigh, North Carolina. This database contains information on students in the community college system enrolled since the summer session of 2002. Information in this database includes student program information, course grades, college enrollment, student hours and grades, and student descriptive statistics. The database is updated each year with information on incoming students. The broad range of student information and the large number of students from all of the 58 community college programs in the state makes this database a strong resource for this study.

The data were retrieved from the database using an instrument designed by the database administrator. The instrument is a software program that retrieves requested data and then reads the data into a data file that can be accessed by computer statistical programs (SAS, SPSS, Microsoft Excel). In order to meet Internal Review Board (IRB) and Family Educational Rights and Privacy Act (FERPA) compliance, identifiers (names, Social Security and student numbers) were stripped from the individual student records on retrieval. IRB approval for this study was granted in June 2009 and all data used in this study comply with FERPA privacy regulations and IRB guidelines.

The data consist of a cohort of 15,527 individuals who graduated from high school in the spring or summer of 2003 and subsequently enrolled in a North Carolina community college in the fall of 2003. The year 2003 is used because this is the most recent year that could be studied while tracking students for graduation and success rates. Students within this cohort were tracked backwards to determine which of them had

Huskins Bill or dual enrollment experience while in high school and how many courses they had taken. The students were tracked through 2008 to determine graduation and success rates.

For each student, descriptive statistics were collected. These statistics included: gender, age, ethnicity, program of study, whether the student graduated from a community college program and number of years to graduate where applicable. In addition to this, the sample includes number of dual enrollment or Huskins Bill courses in which a student enrolled.

The GPA of each student at the end of the first year of college was also calculated from information in the database. The standard community college method of determining GPA was used. This method multiplies grade value on a four-point scale with course quality points and divides the factor by total quality points. Student GPA was chosen as an indicator of overall student success because it is a primary indicator of academic success, and higher student GPA typically shows that a student is well adapted to the college environment and will most likely continue and complete the program in which he or she is enrolled. Also, in the community college where successful students in some programs such as college transfer tend to transfer with high frequency, GPA offers an indication of success where graduation rate alone may not offer a complete picture.

Subsets

To perform the causal-comparative analysis, the dataset was broken down into three comparison groups. Two of these groups, students who took at least one dual enrollment course while in high school, and students who took at least one Huskins Bill course while in high school, represented the treatment groups in the study. The remaining

group was students who have taken neither a Huskins Bill nor dual enrollment course while in high school.

Within each of the comparison groups students were separated into three subgroups by program of study. This makes it possible to compare only students within certain programs. The first subgroup was identified as Technical Program Students and contained community college students enrolled in diploma, certification and degree programs associated with technical professions. The second subgroup was identified as Medical Program Students and contained students enrolled in diploma, certification and degree programs associated with medical professions. (A specific listing of the programs within each of these categories is in Appendix A). The remaining students were classified as Transfer Students, which included students enrolled in college transfer programs or the general credit curriculum.

Methods of Analysis

To answer the research questions discussed earlier in this chapter, the study employed inferential and descriptive statistics using SPSS 17.0 software on the three comparative groups within the dataset. For hypotheses 1 through 4 an analysis of variance (ANOVA) was calculated to determine the statistical significance for the relationship of the non-categorical variable (first-year GPA) and each group. Statistical significance for the ANOVA was recognized at the 0.05 level of probability. Where the ANOVA found a statistically significant value, a Tukey test was performed to determine which of the group means were statistically significant. A chi-square test was used to test for significance in the categorical dependent variable (graduation) and the group.

Delimitations

There are several delimitations to this study design. Primarily, it provided a look at a large group of dual enrollment and Huskins students in the North Carolina community college system and the possible effect of these programs on students matriculating into the system. It allowed comparison of Huskins program outcomes (specifically GPA and graduation rate) with the outcomes of the dual enrollment program and it allowed comparison of the effects of both of these programs with non-Huskins and non-dual students. It also allowed for separation of regions when investigating the relationship between these programs, and it allowed a comparison between the relationship of the total number of courses in either program on student success. Furthermore, the design allowed for breakdown of important descriptive elements such as race and gender and the effect of these programs on both.

The study employed three filters in the selection of the samples. First, the study used only students who enrolled in community college. By this being done, the sample reflected students who had the initiative and intent to enroll in postsecondary studies, who fall into similar demographics, and who have a similar range of educational goals. Second, the groups were compared by filtering students enrolled in community college technical programs. This ensures that students with similar career goals and motivation towards those goals are compared. Finally, the groups were compared after filtering students enrolled in medical programs. Using medical programs ensured that students with similar academic backgrounds were compared, as the medical programs are highly competitive and have a minimum GPA requirement.

Summary

This was a causal-comparative study investigating the effects of dual enrollment and Huskins Bill classes on higher education performance as measured by first-year GPA and graduation rate. The study looked at the possible effects of these programs using a large sample of students across all 58 North Carolina community colleges. The study compared traditional-age community college students who did not take a dual enrollment or Huskins Bill course while in high school with students who took one or the other. The study analyzed first-year GPA and graduation rates to see if they showed any differences in these programs. Outcomes were observed according to race and gender and by program type (Technical, Medical and Transfer). The outcomes were calculated using appropriate parametric and nonparametric inferential statistics depending on the variables.

CHAPTER 4

STUDY FINDINGS

This was a causal-comparative study performed for the purpose of determining if dual enrollment or Huskins Bill courses show an effect on student postsecondary success. The study examined a cohort of community college students who enrolled in a North Carolina community college in the summer or fall term following their high school graduation and compared the first-year student GPA and student graduation rates of these students among students who had experience with at least one dual enrollment course, students who had experience with at least one Huskins Bill course and students who had experience in neither of these programs. This chapter presents the statistical analysis of the dataset using SPSS 17.0 software. The chapter is divided into two sections. The first section presents descriptive data related to the dataset. The second section presents findings related to the six hypotheses derived from the study questions and presented in the previous chapter.

Descriptive Statistics from the Dataset

The dataset consisted of 15,527 students who entered a North Carolina community college in the Fall semester of 2003 after having graduated from high school in the Spring or Summer term of 2003. The dataset identified students who had dual enrollment or Huskins Bill courses while attending high school. Approximately 79% of the students had no dual enrollment or Huskins Bill experience, 7% had one or more dual enrollment courses and 14% had one or more Huskins courses (see Table 1).

Table 1
Number and Percent by Group

Group	Number	Percent
Dual	1013	6.5%
Huskins	2181	14.0%
Non	12333	79.5%
Total	15527	100%

Tables 2 and 3 show the distribution of dual enrollment and Huskins Bill students in technical and medical programs. These frequencies apply to the second tested hypothesis. The frequencies of the groups for technical programs are close to the overall frequencies of groups in the dataset, with dual enrollment showing 5.7% of technical program students compared to the overall rate of 6.5%, and Huskins Bill students showing 15.8% of technical students compared to 14% overall. The medical program students showed a higher frequency of dual enrollment students (9.9%) with Huskins Bill students showing at 14.4%.

Table 2
Dual Enrollment and Huskins Bill Distribution in Technical Programs

Group	Number	Percent
Dual	339	5.7%
Huskins	934	15.8%
Non	4636	78.5%
Total	5909	100.0%

Table 3
Dual Enrollment and Huskins Bill Distribution in Medical Programs

Group	Number	Percent
Dual	149	9.9%
Huskins	216	14.4%
Non	1133	75.6%
Total	1498	100.0%

The following tables show the frequencies of the remaining variables used in the statistical analysis of the dataset (see Tables 4-8). These include gender, race, region, curriculum code, graduation rates and number of dual enrollment or Huskins Bill courses for each student.

Table 4
Gender Number in Dual Enrollment and Huskins Bill Courses

Gender	Number	Percent
Female	1871	58.6%
Male	1323	41.4%
Total	3194	100.0%

Table 5
Non-White and White Student Number in Dual Enrollment and Huskins Bill Courses

Ethnicity	Group			Total
	Dual	Huskins	Non	
Non-White	122 (3%)	378 (10%)	3343 (87%)	3843 (24.8%)
White	891 (8%)	1803 (15%)	8990 (77%)	11684 (75.2%)
Total	1013 (7%)	2181 (14%)	12333 (79%)	15527 (100.0%)

Female students make up 58.6% of the dataset with male students representing 41.4%. Non-white students make up 24.8% of the dataset with non-whites representing 3% of the dual enrollment sample and 10% of the Huskins Bill sample.

Tables 6 and 7 show the distribution in the dataset of dual enrollment and Huskins Bill students in the three regions of the state, East, Central and West. East and West regions show 22% and 33% respectively as dual enrollment or Huskins Bill students. The Central region shows 15% of the sample as dual enrollment or Huskins Bill students.

Table 6
Distribution of Students by Region and Curriculum

Region	Curriculum			Total
	Transfer	Technical	Medical	
East	2737 (54.0%)	1835 (36.2%)	497 (9.8%)	5069
Central	4096 (51.9%)	3041 (38.6%)	746 (9.5%)	7883
West	1287 (50.0%)	1033 (40.1%)	255 (9.9%)	2575
Total	8120	5909	1498	15527

Table 7
Distribution of Dual Enrollment and Huskins Bill Students by Region

Region	Group			Total
	Dual	Huskins	Non	
East	324 (6%)	799 (16%)	3946 (78%)	5069
Central	349 (4%)	882 (11%)	6652 (85%)	7883
West	340 (13%)	500 (20%)	1735 (67%)	2575
Total	1013	2181	12333	15527

The final three tables show the frequencies for program of study and graduation rate among students in the sample. Students in the cohort were enrolled in a North

Carolina community college in the summer or fall of 2003. The majority of the students in the dataset were enrolled in college transfer programs or were undeclared. About 38% of the students were enrolled in technical programs and 9.6% were enrolled in medical programs. The overall graduation rate in the dataset after five years was 24%.

Table 8
Last Curriculum for Students

Curriculum	Number	Percent
College Transfer/ Undeclared	8120	52.3%
Technical	5909	38.1%
Medical	1498	9.6%
Total	15527	100.0%

Table 9
Graduation Rates for Students in the Dataset

Graduation Status	Number	Percent
No	11793	76.0%
Yes	3734	24.0%
Total	15527	100.0%

Note. Y= Graduated; N= Did not Graduate

Table 10 shows the distribution of students taking a dual enrollment or Huskins Bill course. The majority of students (79.4%) did not take any courses of this type. About 5% of the students in the database took one dual enrollment or Huskins Bill course and about 16% of the dataset took between 1 and 4 of this type of class.

Table 10
Number of Dual Enrollment or Huskins Courses for Students

Number of Courses	Number of Students	Percent of Students
0	12333	79.4%
1	741	4.8%
2	900	5.8%
3	461	3.0%
4	414	2.7%
5 or more	678	4.4%
Total	15527	100.0%

Testing the Hypotheses

This section lists the hypotheses derived from the study questions in the previous chapter and tests each of them with the appropriate statistical process. The results of the statistical tests are given for each hypothesis.

- Hypothesis 1: Community college students who took Huskins Bill or dual enrollment courses will show statistically significant higher first-year GPAs and graduation rates than non-dual or Huskins Bill students.

Statistical Analysis of GPA

To test this hypothesis an ANOVA was performed between the three student groups (dual enrollment, Huskins Bill, and those with neither experience). The mean first-year GPA of each group is 2.178 for dual enrolled students, 1.934 for Huskins Bill students and 1.632 for students with experience in neither program (see Table 11). The ANOVA showed a significant difference between the mean GPAs of the groups (see Table 12). It reported an *F*-value of 143.533 which is significant at the .001 level.

Table 11
First-Year GPA by Group

Group	Mean	Number	Std. Deviation
Dual	2.178	1013	1.165
Huskins	1.934	2181	1.191
Non	1.632	12333	1.192
Total	1.710	15527	1.201

Table 12
ANOVA for First-Year GPA by Group

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	406.452	2	203.226	143.533	.001
Within Groups	21980.141	15524	1.416		
Total	22386.593	15526			

The ANOVA revealed a significant difference among the means of the groups. To determine which groups showed a significant difference in first-year GPA means, a post hoc test was performed. The test used for this procedure was a Tukey test of multiple comparisons. The test showed that the greater mean of dual enrollment students (2.18) was statistically significant over the Huskins Bill mean (1.93) and the non-dual enrollment and non-Huskins Bill mean (1.63). The difference is also significant between Huskins Bill students and non-dual enrollment and non-Huskins Bill students. The means were significant at the .001 level (see Table 13A).

Table 13A
Multiple Comparisons for First-Year GPA by Group

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Dual	Huskins	.244*	.045	.001	.138	.350
	Non	.546*	.039	.001	.455	.637
Huskins	Dual	-.244	.045	.001	-.350	-.138
	Non	.302*	.028	.001	.237	.367
Non	Dual	-.546	.039	.001	-.637	-.455
	Huskins	-.302	.028	.001	-.367	-.237

Note. *The mean difference is significant at the 0.05 level.

The number of students within each group was varied. To prevent statistical error, SPSS used harmonic means to calculate significant differences among the means. Table 13B shows the harmonic sample size and the calculated means used in the multiple comparisons test.

Table 13B
Homogenous Subsets for Dataset

Tukey HSD ^{a,b}				
Group	Number	Subset for alpha = 0.05		
		1	2	3
Non	12333	1.632		
Huskins	2181		1.934	
Dual	1013			2.178
Sig.		1.000	1.000	1.000

Note. Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 1964.951.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Statistical Analysis of Graduation Rate

To determine the significance of graduation rate by group, the graduation rates of dual enrollment, Huskins Bill and students with experience in neither were crosstabulated (see Table 14). The results show that dual enrollment students graduated at a higher rate (33.7%) than both Huskins Bill students (28.3%) and students with experience in neither (22.5%). Students with either dual enrollment or Huskins Bill experience graduated at a rate of 30.0%.

Table 14
Graduation Rate by Group

Group		Graduate Status		Total
		No	Yes	
Dual	Count	672	341	1013
	% within Group	66.3%	33.7%	100.0%
Huskins	Count	1564	617	2181
	% within Group	71.7%	28.3%	100.0%
Non	Count	9557	2776	12333
	% within Group	77.5%	22.5%	100.0%
Total	Count	11793	3734	15527
	% within Group	76.0%	24.0%	100.0%

Three chi-square tests were performed to test the significance of the distribution of the graduation rates between each group. The tests revealed a significant difference between the expected distribution and the actual distribution in the sample (see Tables

15A-C). The chi-square test in Table 15A shows a significant difference in the distribution of graduation rates between dual enrollment students and non-dual enrollment and non-Huskins Bill students at the .001 level of significance.

Table 15A

Chi-Square Analysis for Graduation Rate for Dual Enrollment and Non-Dual and Non-Huskins

Type of Analysis (N=13,346)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	65.057	1	.001		
Continuity Correction	64.436	1	.001		
Likelihood Ratio	60.185	1	.001		
Fisher's Exact Test				.001	.001

The chi-square test in Table 15B shows a statistically significant distribution in the graduation rates for Huskins Bill students and non-dual enrollment and non-Huskins Bill students. The significance is at the .001 level.

Table 15B

Chi-Square Analysis for Graduation Rate for Huskins Bill and Non-Dual and Non-Huskins

Type of Analysis (N=14,514)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	34.578	1	.001		
Continuity Correction	34.256	1	.001		
Likelihood Ratio	33.346	1	.001		
Fisher's Exact Test				.001	.001

The chi-square test in Table 15C shows a statistical significance between the graduation rates for dual enrollment students and Huskins Bill students at the .002 level of significance.

Table 15C

Chi-Square Analysis for Graduation Rate for Huskins Bill and Dual Enrollment

Type of Analysis (N=3,194)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	9.509	1	.002		
Continuity Correction ^b	9.255	1	.002		
Likelihood Ratio	9.403	1	.002		
Fisher's Exact Test				.002	.001

The graduation rate differences between each of the groups were statistically significant. Dual enrollment students graduated at a rate 5.4% higher than Huskins Bill students, and 11.2% higher than student not exposed to either program. Huskins Bill students, in turn, graduated at a rate 5.8% higher than students not exposed to either program.

- Hypothesis 2: Students in community college technical programs and students in community college medical programs will show statistically higher first-year GPAs and graduation rates for dual enrollment and Huskins Bill students than for non-dual and non-Huskins Bill students.

Statistical Analysis of GPA (Medical and Technical)

For this hypothesis the first-year GPAs and graduation rates of dual enrollment and Huskins Bill students were compared to those of students with experience in neither type of course within technical and medical programs (see Tables 16 and 17). First-year dual enrollment students averaged a GPA of 2.0 in technical programs and 2.41 in medical programs. Huskins students averaged 1.91 in technical programs and 2.29 in medical programs. Students with neither Huskins nor dual experience averaged 1.62 in technical programs and 1.92 in medical programs.

Table 16
First-Year GPA for Technical Program by Group

Group	Mean	Number	Std. Deviation
Dual	2.005	339	1.204
Huskins	1.906	934	1.196
Non	1.618	4636	1.203
Total	1.686	5909	1.209

Table 17
First-Year GPA for Medical Program by Group

Group	Mean	Number	Std. Deviation
Dual	2.408	149	.969
Huskins	2.290	216	1.071
Non	1.922	1133	1.173
Total	2.024	1498	1.154

To test the significance of the difference in the means within the programs, an ANOVA was performed for student GPA average for each program (see Tables 18 and 19), and as each yielded a significant *F*-value (34.914 for technical students and 18.832 for medical students). Tukey's test of multiple comparisons was performed for each ANOVA calculation to determine which of the means had statistically significant differences (see Tables 20A and 21A).

Table 18
ANOVA for 1st-year GPA and Technical Program

	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Between Groups	100.855	2	50.427	34.914	.001
Within Groups	8530.162	5906	1.444		
Total	8631.017	5908			

Table 19
ANOVA for 1st-year GPA and Medical Program

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48.956	2	24.478	18.832	.001
Within Groups	1943.243	1495	1.300		
Total	1992.198	1497			

The test of multiple comparisons for both technical and medical programs (see Tables 20A and 21A) revealed a significant difference at the .001 level between the first-year GPA means of dual enrollment students and students who did not have dual enrollment experience. It also showed a significant difference for each program between students with Huskins Bill experience and those who had no Huskins Bill experience. Though dual enrollment students had a higher first-year GPA than Huskins Bill students, Tukey's honestly significant difference in means did not show a statistically significant difference between the two for each of the programs.

Table 20A
Multiple Comparisons for Technical Program

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Dual	Huskins	.099	.076	.397	-.080	.277
	Non	.386*	.068	.001	.228	.545
Huskins	Dual	-.099	.076	.397	-.277	.080
	Non	.288*	.043	.001	.187	.389
Non	Dual	-.386	.068	.001	-.545	-.228
	Huskins	-.288	.043	.001	-.389	-.187

Note. * The mean difference is significant at the 0.05 level.

Table 20B
Homogenous Subsets for Technical

Tukey HSD^{a,b}

Group	Number	Subset for alpha = 0.05	
		1	2
Non	4636	1.618	
Huskins	934		1.906
Dual	339		2.005
Sig.		1.000	.269

Note. Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 708.179.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 21A
Multiple Comparisons for Medical Program

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Dual	Huskins	.117	.121	.597	-.167	.402
	Non	.485*	.099	.001	.252	.718
Huskins	Dual	-.117	.121	.597	-.402	.167
	Non	.368*	.085	.001	.169	.566
Non	Dual	-.485	.099	.001	-.718	-.252
	Huskins	-.368	.085	.001	-.566	-.169

Note. * The mean difference is significant at the 0.05 level.

Table 21B
Homogenous Subsets for Medical Program

Tukey HSD ^{a,b}			
Group	Number	Subset for alpha = 0.05	
		1	2
Non	1133	1.922	
Huskins	216		2.290
Dual	149		2.407
Sig.		1.000	.489

Note. Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 245.426.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

There was no real difference in the mean first-year GPAs of dual enrollment students and Huskins Bill students within technical programs or within medical programs. Because the group samples contained varied amounts of students SPSS used a harmonic mean to calculate the honestly significant differences. The means and sample sizes used for these calculations is shown in Tables 20B and 21B.

Statistical Analysis of Graduation Rate (Medical and Technical)

A chi-square test was used to test if dual enrollment and Huskins Bill students graduated a statistically significant higher rate than non-dual and non-Huskins Bill students. Huskins Bill students graduated from Technical programs at a 29.3% rate with dual enrollment students graduating at 27.2% and non-dual and non-Huskins Bill students graduating at a rate of 24.2% (see Table 22).

Table 22
Graduate Status by Group for Technical Students

Graduate Status	Group			Total
	Dual	Huskins	Non	
No	247 (72.8%)	660 (70.7%)	3516 (75.8%)	4423
Yes	92 (27.2%)	274(29.3%)	1120(24.2%)	1486
Total	339	934	4636	5909

The chi-square test between groups showed the distribution of graduates between dual enrollment and Huskins Bill students to not be statistically significant (see Table 23A). The test showed the distribution was 22% likely to occur by chance alone.

Table 23A
Chi-Square Test for Dual Enrollment and Non-Dual and Non-Huskins Students, Technical Programs

Type of Analysis (N=4,975)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	1.522c	1	.217		
Continuity Correction	1.365	1	.243		
Likelihood Ratio	1.488	1	.222		
Fisher's Exact Test				.214	.122

The chi-square test of graduation rate distribution between dual enrollment students and Huskins Bill students showed the difference to not be statistically significant. The test showed that the distribution could occur 44% of the time by chance alone (see Table 23B).

Table 23B

Chi-Square Test for Dual Enrollment and Huskins Bill Students, Technical Programs

Type of Analysis (N=1,273)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.586c	1	.444		
Continuity Correction	.484	1	.487		
Likelihood Ratio	.591	1	.442		
Fisher's Exact Test				.484	.244

The chi-square test of graduation rate distribution between Huskins Bill and non-dual and non Huskins Bill students showed a statistical significance at .001 level. Based on these tests, the hypothesis that Huskins Bill students will show higher graduation rates in technical programs is accepted. For dual enrollment students, the hypothesis that dual enrollment students will show higher graduation rates is rejected.

Table 23C

Chi-Square Test for Huskins Bill and Non-Dual and Non-Huskins Students, Technical Programs

Type of Analysis (N=5,570)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	11.106c	1	.001		
Continuity Correctionb	10.832	1	.001		
Likelihood Ratio	10.799	1	.001		
Fisher's Exact Test				.001	.001

Within the medical programs, students graduated at higher rates than within the technical programs, with dual enrollment students leading the groups with a rate of 67.8% and Huskins Bill students graduating at a rate of 59.8%. Non-dual and non-Huskins Bill students graduated at a rate of 51.9% (see Table 24).

Table 24
Graduation Rates by Group for Medical Students

Graduate Status	Group			Total
	Dual	Huskins	Non	
No	48 (32.2%)	87 (40.2%)	545 (48.1%)	680
Yes	101 (67.8%)	129 (59.8%)	588 (51.9%)	818
Total	149	216	1133	1498

The chi-square test for graduation rate distribution for dual enrollment and non-dual enrollment and non-Huskins Bill students showed the difference in groups to be statistically significant at the .001 level (see Table 25A).

Table 25A
Chi-Square Test for Dual Enrollment and Non-Dual and Non-Huskins Students, Medical Programs

Type of Analysis (N=1,282)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	13.371d	1	.001		
Continuity Correction	12.739	1	.001		
Likelihood Ratio	13.708	1	.001		
Fisher's Exact Test				.001	.001

The chi-square test for distribution of graduation rates between dual enrollment and Huskins Bill students was not significant at the .05 level. The test showed that the distribution could occur by chance alone 12% of the time (see Table 25B).

Table 25B

Chi-Square Test for Dual Enrollment and Huskins Bill Students, Medical Programs

Type of Analysis (N=365)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	2.460d	1	.117		
Continuity Correction	2.126	1	.145		
Likelihood Ratio	2.477	1	.115		
Fisher's Exact Test				.124	.072

The chi-square test for distribution of graduation rates between Huskins Bill students and non-dual and non-Huskins Bill students showed statistical significance at the .04 level (see Table 25C).

Table 25C

Chi-Square Test for Huskins Bill and Non-Dual and Non-Huskins Students, Medical Programs

Type of Analysis (N=1,349)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	4.461d	1	.035		
Continuity Correction	4.152	1	.042		
Likelihood Ratio	4.492	1	.034		
Fisher's Exact Test				.037	.021

Based on these tests the hypothesis that in medical programs dual enrollment students will show higher graduation rates than non-dual and non-Huskins Bill students is accepted, and the hypothesis that Huskins Bill students will show higher graduation rates than non-dual and non-Huskins Bill students is accepted.

- Hypothesis 3: Dual enrolled and Huskins Bill male community college students will show statistically significant higher first-year GPAs and graduation rates than female dual enrolled and Huskins Bill students.

Dual enrolled and Huskins Bill male students showed lower first-year GPAs than female dual enrolled and Huskins Bill students (see Table 26). Male dual enrolled and Huskins Bill students showed a 1.96 mean first-year GPA while female dual enrolled and Huskins Bill students showed a 2.05 mean first-year GPA. An Independent Samples *t*-test was performed on the sample average (see Table 27). The test revealed a *t*-value of 2.06 for the comparison. The comparison was statistically significant at the .05 value, with a *p*-value of .039 (see Table 27). Since the mean first-year GPA for females was higher than that of males, the hypothesis that male students will show significantly higher first-year GPAs was rejected.

Table 26
Dual Enrollment and Huskins Bill First-Year GPA by Gender

Gender	Number	Mean	Std. Deviation	Std. Error Mean
Female	1871	2.048	1.191	.0275
Male	1323	1.960	1.181	.032

Table 27

Independent Samples Test for Dual Enrollment and Huskins Bill Students by Gender

Levene's Test for Equality of Variances					<i>t</i> -test for Equality of Means				
	<i>F</i>	Sig.	<i>t</i>	<i>df</i>	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
*	.064	.801	2.060	3192	.039	.088	.043	.004	.171
**			2.063	2861.183	.039	.088	.043	.004	.171

Note. * Equal variances assumed. ** Equal variances not assumed

The chi-square test was used to test the statistical significance of the distribution of graduates and non-graduates for male and female dual enrollment and Huskins Bill students. Female dual enrollment and Huskins Bill students graduated at a rate of 33.1%, while male dual enrollment and Huskins Bill students graduated at a rate of 25.5% (see Table 28). The chi-square test revealed a significant difference between the expected distribution and the actual distribution in the sample (see Table 29). There is a significant difference in graduation rate between these groups at the .001 level of significance.

Table 28

Dual Enrollment and Huskins Bill Graduation Rate by Gender

Graduation Status	Gender		Total
	Female	Male	
No	1251 (66.9%)	985 (74.5%)	2236 (70.0%)
Yes	620 (33.1%)	338 (25.5%)	958 (30.0%)
Total	1871	1323	3194

Table 29
Chi-Square Tests for Graduation Rates by Gender

Type of Analysis (N=3,194)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	21.259 ^a	1	.001		
Continuity Correction ^b	20.899	1	.001		
Likelihood Ratio	21.484	1	.001		
Fisher's Exact Test				.001	.001

Based on these findings the hypothesis that male dual enrolled and Huskins Bill students will show higher first-year GPA and graduation rates is not accepted.

- Hypothesis 4: Non-white dual enrolled and Huskins Bill community college students will show statistically higher first-year GPAs and graduation rates than non- dual enrolled and non-Huskins Bill non-white students

For this hypothesis a one-way ANOVA was performed using only non-white students from the sample (see Table 30). The mean first-year GPA for non-dual enrolled and non-Huskins Bill non-white students was 1.15, while dual enrolled non-white students showed a mean first-year GPA of 1.54 and Huskins Bill non-white students showed a mean of 1.35. The ANOVA showed a statistically significant difference between the Dual, Huskins Bill and non-dual and non-Huskins Bill group means at the .001 level. To determine which group means were significantly different, a Tukey post hoc test was performed (see Table 31A). The test revealed that both dual and Huskins Bill non-white students showed a significant difference in mean first-year GPA from non-

dual and non-Huskins Bill non-white students. The hypothesis that dual and Huskins Bill non-white students will show a statistically significant higher first-year GPA is accepted.

Table 30
ANOVA Non-White By Group

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	30.086	2	15.043	12.357	.001
Within Groups	4674.477	3840	1.217		
Total	4704.563	3842			

Table 31A
Multiple Comparisons Non-White by Group

Tukey HSD						
(I)	(J)	95% Confidence Interval				
Group	Group	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
Dual	Huskins	.195	.115	.205	-.074	.465
	Non	.395*	.102	.001	.156	.633
Huskins	Dual	-.195	.115	.205	-.465	.074
	Non	.200*	.060	.003	.059	.340
Non	Dual	-.395	.102	.001	-.633	-.156
	Huskins	-.200	.060	.003	-.340	-.059

Note. * The mean difference is significant at the 0.05 level.

The number of students within each group was varied. To prevent statistical error, SPSS used harmonic means to calculate significant differences among the means. Table 31B shows the harmonic sample size and the calculated means used in the multiple comparisons test.

Table 31B

Homogenous Subsets for Non-White Multiple Comparisons

Tukey HSD ^{a,b}			
Group	Number	Subset for alpha = 0.05	
		1	2
Non	3343	1.146	
Huskins	378	1.345	1.345
Dual	122		1.541
Sig.		.090	.100

Note. Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 269.267.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Non-white students showed lower graduation rates than the mean graduation rates from the dataset. Dual enrollment and Huskins Bill students graduated at a rate of 17.2%, while non dual and non-Huskins Bill students graduated at a rate of 13.8% (see Table 32).

Table 32

Graduation Rates for Dual-Huskins and Non-Dual and Non Huskins Non-White Students

Graduation Status			Total
	Dual-Huskins	Non	
No	414 (82.8%)	2881 (86.2%)	3295 (85.7%)
Yes	86 (17.2%)	462 (13.8%)	548 (14.3%)
Total	500	3343	3843

To determine whether the difference in graduation rates for non-whites in dual enrollment and Huskins Bill programs and the rates of students in neither program is

statistically significant, a chi-square test was performed (see Table 33). The test showed a statistically significant distribution of the graduation rates at the .04 level. The hypothesis that dual and Huskins Bill programs will have statistically higher graduation rates than non-dual and non-Huskins Bill students is accepted.

Table 33
Chi-Square Tests for Dual Enrollment and Huskins Bill Students

Type of Analysis (N=3,843)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	4.064 ^a	1	.044		
Continuity Correction	3.793	1	.051		
Likelihood Ratio	3.886	1	.049		
Fisher's Exact Test				.047	.028

- Hypothesis 5: Community college students who have taken dual enrollment courses will show statistically significant higher first-year GPAs and graduation rates than community college students who have taken Huskins Bill courses.

As computed for hypothesis 1, the mean first-year GPA of dual enrollment students is 2.18, the mean first-year GPA of Huskins Bill students is 1.93 and the mean first-year GPA of students with experience in neither program is 1.63 (see Table 11). The test for multiple comparisons using Tukey's honestly significant mean shows that there is a statistically significant difference in means between dual enrollment students and Huskins Bill students (see Table 13A).

For the second part of the hypothesis, a chi-square test was used to test the statistical significance of the rate of graduation for each group of students. Dual enrollment students graduated from community college at a rate of 33.7% and Huskins

Bill students graduated at a rate of 28.3% (see Table 34). The chi-square test showed that the difference was statistically significant at the .002 level (see Table 35). The hypothesis that dual enrollment students will show statistically significant better graduation rates than Huskins Bill students is accepted.

Table 34
Graduate Status Dual Enrollment and Huskins Bill Students

Graduation Status	Group		Total
	Dual	Huskins	
No	672 (66.3%)	1564 (71.7%)	2236
Yes	341 (33.7%)	617 (28.3%)	958
Total	1013	2181	3194

Table 35
Chi-Square Tests For Dual Enrollment and Huskins Bill Graduation Rates

Type of Analysis (N=3,194)	Value	df	Asymp. Sig. (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	9.509 ^a	1	.002		
Continuity Correction ^b	9.255	1	.002		
Likelihood Ratio	9.403	1	.002		
Fisher's Exact Test				.002	.001

- Hypothesis 6: Community college students will show an increase in first-year GPAs and graduation rates with each dual enrollment or Huskins Bill course taken.

The number of dual enrollment and Huskins Bill courses students took was broken down into four categories: students who did not take any dual enrollment or Huskins Bill courses, students who took one or two of the courses, students who took from 3-5 courses, and students who took six or more courses. The mean first-year GPA

of students who took no dual enrollment or Huskins Bill courses was 1.63. The mean first-year GPA of students who took one or two courses was 1.92. The mean first-year GPA of students who took three to five courses was 2.08, and the mean first-year GPA of students who took six or more courses was 2.19 (see Table 36).

Table 36

First-Year GPA by Number of Dual Enrollment or Huskins Bill Courses

Number of Courses	Mean	Number	Std. Deviation
0 Courses	1.63	12333	1.192
1-2 Courses	1.92	1641	1.181
3-5 Courses	2.08	1065	1.180
6+ Courses	2.19	488	1.200
Total	1.71	15527	1.201

A one-way ANOVA was performed on the categories to compare the means (see Table 37). The ANOVA showed a statistically significant value at the .001 level between the categories. A post hoc test was conducted to determine which groups showed a significant difference.

Table 37

ANOVA for Number of Dual Enrollment or Huskins Bill Courses and First-Year GPA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	400.736	3	133.579	94.312	.001
Within Groups	21985.857	15523	1.416		
Total	22386.593	15526			

Tukey's test of multiple comparisons was used to determine which groups showed a significant difference in first-year GPA (see Table 38A). The test showed that all categories of students who had at least one dual enrollment or Huskins Bill course had statistically significant higher first-year GPAs than students who had no dual enrollment or Huskins Bill courses. The test also showed that students with three to five dual

enrollment or Huskins Bill courses had statistically significant higher first-year GPAs than students who had one or two dual enrollment courses, and it showed that students who had six or more dual enrollment or Huskins Bill courses had statistically significant higher first-year GPAs than students who had one or two courses. These results were significant at the .001 level. The test did not show a statistical significance in first-year GPA between students who had six or more dual enrollment or Huskins Bill courses and students who had three to five courses.

Table 38A
Multiple Comparisons Test for Number of Dual Enrollment or Huskins Bill Courses and First-Year GPA

(I) Number of Courses	(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
0	1-2	-.284*	.031	.001	-.36	-.20
	3-5	-.444*	.038	.001	-.54	-.35
	6+	-.560*	.055	.001	-.70	-.42
1-2	0	.284*	.031	.001	.20	.36
	3-5	-.161*	.047	.003	-.28	-.04
	6+	-.276*	.061	.001	-.43	-.12
3-5	0	.444*	.038	.001	.35	.54
	1-2	.161*	.047	.003	.04	.28
	6+	-.115	.065	.286	-.28	.05
6+	0	.560*	.055	.001	.42	.70
	1-2	.276*	.061	.001	.12	.43
	3-5	.115	.065	.286	-.05	.28

Note. * The mean difference is significant at the 0.05 level.

The number of students within each group was varied. To prevent statistical error, SPSS used harmonic means to calculate significant differences among the means. Table 38B shows the harmonic sample size and the calculated means used in the multiple comparisons test.

Table 38B
Homogenous Subsets for Number of Dual and Huskins Courses

Tukey HSDa,,b				
DE/Huskins	Number	Subset for alpha = 0.05		
		1	2	3
0	12333	1.63		
1	1641		1.92	
2	1065			2.08
3	488			2.19
Sig.		1.000	1.000	.107

Note. Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 1087.366.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

For the second half of the hypothesis a chi-square test was performed on student graduation rate and number of dual or Huskins Bill courses. Students with no dual enrollment or Huskins Bill courses graduated at a rate of 22.5%. Students with one or two dual enrollment or Huskins Bill courses graduated at a rate of 27.7%. Students with three to five dual enrollment or Huskins Bill courses graduated at a rate of 31.3%, and students with six or more courses graduated at a rate of 34.8% (see Table 39).

Table 39
Graduation Rate for Number of Dual Enrollment or Huskins Bill Courses

Graduation Status	Number of DE/Huskins Courses				Total
	0	1-2	3-5	6+	
No	9557 (77.5%)	1186 (72.3%)	732 (68.7%)	318 (65.2%)	11793
Yes	2776 (22.5%)	455 (27.7%)	333 (31.3%)	170 (34.8%)	3734
Total	12333	1641	1065	488	15527

The chi-square test showed a statistically significant difference in the distribution between number of dual enrollment and Huskins Bill courses and graduation rate among

students in the sample. The test showed a significant difference in distribution at the .001 level (see Table 40).

Table 40
Chi-Square Tests for Graduation Rate by Number of Dual Enrollment or Huskins Bill Courses

Type of Analysis (N=15,527)	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	89.645a	3	.001
Likelihood Ratio	85.204	3	.001

Summary

This chapter presented the findings from the analysis of the dataset. It presented frequencies of subsets from the dataset that pertain to the individual hypotheses and statistical analyses appropriate for determining the validity of each hypothesis. The following chapter discusses the findings and the conclusions they offer for the study.

CHAPTER 5

DISCUSSION

The study found positive effects for dual enrollment and Huskins Bill course experience on postsecondary students' first-year GPAs and graduation rates. This effect was evident in the general dataset and also when the sample was broken down into the more specific technical and medical program subsets. Student experience in these courses also showed a positive effect on non-white first-year postsecondary GPA and graduation rate, and it showed a positive effect on female first-year GPA and graduation rate. Evidence from the study also suggests that enrollment in multiple dual enrollment and Huskins Bill courses has a positive correlation to higher first-year GPA and graduation rates for students.

This chapter will discuss the findings of this study and their implications in the effectiveness of dual enrollment and Huskins Bill courses. The chapter is divided into two parts. The first will discuss the specific findings for each of the seven study hypotheses from the previous chapter. Hypothesis 1 and hypothesis 2 are discussed together because the findings for each are interrelated. The second part includes study limitations and further implications for these programs and will discuss the broader implications these study findings have for dual enrollment and Huskins Bill courses.

Discussion of Findings

- Hypothesis 1: Community college students who took Huskins Bill or dual enrollment courses will show statistically significant higher first-year GPAs and graduation rates than non-dual or Huskins Bill students.

And

- Hypothesis 2: Students in community college technical programs and students in community college medical programs will show statistically higher first-year GPAs and graduation rates for dual enrollment and Huskins Bill students than for non-dual and Huskins Bill students.

The findings indicate that dual enrollment and Huskins Bill programs show a positive relationship to college success. The study yielded some valuable information that supports this positive relationship between dual enrollment and Huskins Bill courses and college success. A strong positive statistical significance was found between first-year GPA and exposure to a dual enrollment or Huskins Bill courses when the entire dataset was examined. Dual enrollment students maintained a higher first-year GPA (2.18) than the either of the comparative groups. Huskins Bill students averaged a 1.93 first-year GPA, and students without experience in either type of course averaged a 1.63 GPA.

The statistically significant difference for dual enrollment and Huskins Bill students was evident in the general population of students as well as with students in specialized programs of study (the technical and medical groups). Dual enrollment and Huskins Bill students achieved higher first-year average GPAs than non-dual enrollment and non-Huskins Bill students in each of these groups. However, a statistically significant difference in average first-year GPA was not found between dual enrollment and Huskins Bill first-year GPA. Statistically, this could be due to the limited number of dual enrollment and Huskins Bill students within these subsets. The difference could also be due to the further homogenization of the student population from the general dataset. Both of these groups are selective. The technical group attracts students with a specific

interest in a particular program. The medical group attracts students with a specialized interest, but also maintains rigorous GPA requirements for continuation. The comparison of students within these groups offers controls for student motivation and individual ability which could account for lesser differences between dual enrollment and Huskins Bill student performance.

Despite this, both dual enrollment and Huskins Bill students statistically outperformed non-dual and non-Huskins Bill students. Because the result persists within specialized groups, this finding suggests that exposure to dual enrollment and Huskins Bill courses played a significant role in preparing these community college students for success. This finding aligns with other studies that showed a positive effect of dual enrollment courses on GPA (Karp et al., 2007; Kentucky Council on Postsecondary Education, 2006; Spurling & Gabriner, 2002). It also provides additional support for the contention that dual enrollment courses are an effective pathway to college success (Hoffman, Vargas & Santos, 2009; Karp et al., 2007; Morrison, 2008; O'Brien & Nelson, 2004).

The study finds similar evidence with student graduation rates. Dual enrollment and Huskins Bill students in the dataset graduated at a statistically higher rate than students who were not exposed to these courses (33.7% for dual enrollment and 28.3% for Huskins Bill). Though these graduation rates are relatively low, they are significantly higher than the graduation rate of students in the dataset who were not exposed to dual enrollment or Huskins Bill programs (22.5%).

Students in technical and medical programs who took dual enrollment and Huskins Bill courses also showed significant graduation results when compared to non-

dual enrollment and non-Huskins Bill students. In technical programs dual enrolled students graduated at a rate of 27.1%. This was slightly lower than Huskins Bill students (29.1%). However, each group outperformed the non-dual enrollment and non-Huskins Bill students (24.1%). It is interesting to note that in this category, the Huskins Bill students outperformed the dual-enrollment students. It is the only category in this study where Huskins Bill students numerically outperformed, though slightly, the dual enrollment students. The higher rate by Huskins Bill students could be due partly to the nature of the Huskins program, which are primarily designed for technical programs and high school students can develop working relationships with technical programs before matriculating to the community college. These relationships may aid in student continuation through college. On the other hand, dual enrollment programs are focused on general transfer degree programs. Dual enrollment students entering technical fields in college may be more likely to find other interests as they progress, leading to a lesser degree of continuation.

In medical programs dual enrollment students graduated at a significantly higher rate (67.8%) than Huskins Bill students (59.7%) or the 51.9% rate posted by students who did not experience Huskins Bill or dual enrollment courses. The higher graduation rates across the board in medical programs are partly explained by the 2.0 minimum GPA in medical programs. The higher rate for dual enrollment students over Huskins Bill students could be due to the nature of dual enrollment courses, which tend to be college transfer classes. These classes have rigorous academic goals which could provide a stronger basis for students entering medical programs when they enter the college.

The significantly higher graduation rates and first-year GPA of dual enrollment and Huskins Bill students in these programs is an important finding because student experience with these courses seems to be a contributing factor in academic success, and in student persistence and graduation rate. Student retention and academic success are important issues facing the community college and dual enrollment and Huskins Bill programs show evidence here of influencing the issue positively. This finding agrees with the findings of other studies that show a positive effect for dual enrollment courses on graduation rate (Eimers & Mullen, 2003; Florida Department of Education, 2004; Hoffman et. al., 2009; Karp et. al., 2007; Kim, 2006).

- Hypothesis 3: Dual enrolled and Huskins Bill male community college students will show statistically significant higher first-year GPAs and graduation rates than female dual enrolled and Huskins Bill students.

Female students had higher first-year GPAs than male students in each of the groups, which included dual enrollment (2.21 over 2.1), Huskins Bill (1.95 over 1.9), and students with experience in neither Huskins Bill nor dual enrollment (1.68 over 1.57). In the comparison between male and female first-year GPA means among both dual enrollment and Huskins Bill students, females maintained a 2.05 average versus a 1.96 average for male students. This statistically significant difference and the fact that female students maintained a higher first-year GPA within each group suggests that dual enrollment and Huskins Bill courses show a more positive effect on female college readiness than for male college readiness.

This is a significant finding as earlier studies (Karp & Hughes, 2008; Kirst & Venezia, 2007; Klein, 2007) have found that dual enrollment and Huskins Bill courses

have shown a greater effect for male students. This study finds that female students receive benefits from the program as well, maintaining a higher GPA as both dual enrollment and as Huskins Bill students.

In graduation rate females surpassed males among dual enrollment and Huskins Bill students as well. Female dual enrollment and Huskins Bill students graduated at a rate of 33.1% and males graduated at a rate of 25.5%. This finding is also significant because it contradicts previous studies (Karp et al., 2007) that indicate a greater effect for male students, and it shows success in college continuation for female students in this group. Continuation to graduation is significant here because it suggests that dual enrollment and Huskins Bill courses offer female students performance advantages in college programs that extend beyond first-year success.

- Hypothesis 4: Non-white dual enrolled and Huskins Bill community college students will show statistically higher first-year GPAs and graduation rates than non- dual enrolled and non-Huskins Bill non-white students

Dual enrollment and Huskins Bill non-white students showed higher first-year GPA means and higher graduation rates than non-dual enrollment and non-Huskins Bill students. This finding duplicates findings in other studies (Karp & Hughes, 2008; Karp et. al., 2007; O'Brien & Nelson, 2004) that suggest dual enrollment and Huskins Bill courses benefit non-white student college readiness.

Non-white students in the dataset averaged a first-year GPA of 1.14 for non-dual enrollment and non-Huskins students, while non-white dual enrollment students averaged a 1.54 first-year GPA and non-white Huskins Bill students averaged a 1.35 first-year

GPA. Graduation rates showed a similar pattern with non-dual enrollment and non-Huskins Bill non-white students graduating at a rate of 13.8% and dual enrollment and Huskins Bill students graduating at a rate of 17.2%. The higher GPA and graduation rates for dual enrollment and Huskins Bill non-white students demonstrate a statistically significant advantage to the programs.

These study findings are important because they identify a positive effect on academic success and continuation to graduation in a postsecondary setting for a demographic that made up 24.8% of the dataset. Students with experience in either the dual enrollment or Huskins Bill courses showed a 5% higher rate of graduation and higher first-year GPAs, a significant boost for this large at-risk demographic. This finding agrees with findings in other studies that show dual enrollment experience shows a heightened benefit for minority student populations (Hoffman, 2005; Karp et.al., 2007).

- Hypothesis 5: Community college students who have taken dual enrollment courses will show statistically significant higher first-year GPAs and graduation rates than community college students who have taken Huskins Bill courses.

The study shows that dual enrollment students maintained statistically significant higher GPAs (2.18 compared to 1.93) and higher graduation rates (33.7% compared to 28.3%) than Huskins Bill students when all groups were compared. However, despite the significant difference between dual enrollment and Huskins Bill first-year mean GPA in the general dataset, when the dataset is examined in technical and medical programs, the difference disappears. This difference could be explained in technical programs by the greater focus of Huskins Bill courses on the technical areas (North Carolina Community

College System, 2008). This greater focus could result in an added benefit for technical students who took Huskins Bill courses, thereby leveling the field between these students and those taking dual enrollment courses. It is possible the smaller numbers in these subsets could skew the data. However, there is not ample evidence to conclude that there is any difference between the two programs in effect on first-year GPA.

Graduation rates for dual enrollment students are greater than rates of Huskins Bill students in the general dataset and in the Medical program subset. However, Technical program Huskins Bill students showed a slightly higher graduation rate (29% compared to 27%) than dual enrollment students. This is the only area in which Huskins Bill students outperformed dual enrollment students. The difference here may also be due to the specific nature of Huskins Bill programs and their ties to the technical programs at community colleges.

- Hypothesis 6: Community college students will show an increase in first-year GPAs and graduation rates with each dual enrollment or Huskins Bill course taken.

Students showed statistically significant increases in first-year GPA and in rate of graduation with greater numbers of dual enrollment and Huskins Bill courses. Students who took one or two dual enrollment or Huskins Bill courses averaged a 1.92 first-year GPA, while students with no dual enrollment or Huskins Bill experience averaged a 1.63 first-year GPA. Students with three to five dual enrollment or Huskins Bill courses averaged a 2.08 first-year GPA while students with six or more courses averaged a 2.19 first-year GPA. The increase in first-year GPA between students with three to five courses and those with six or more courses, however, was not statistically significant,

perhaps due to the smaller number in sample of students taking six or more courses. Despite this, the difference in means seems to show evidence of a plateau effect on first-year GPA after three to five dual enrollment or Huskins Bill courses. The increase in GPA is affected most dramatically by the experience of two or three courses, but after that, GPA increases in smaller increments. Due to the smaller numbers in the dataset of students taking more than three dual enrollment or Huskins Bill courses, this leveling of GPA could not be pin pointed to a specific number of courses. Further research into this question could be helpful in determining if there is a number of greatest effect with these courses, or if incremental gains truly continue with every course.

Graduation rates show an increase with each group of dual enrollment and Huskins Bill course experience. Students with six or more courses graduated at a rate of 34.8% as opposed to the 22.5% rate for students with no experience in these courses. Students with one or two courses graduated at a rate of 27.7% and students with three to five courses graduated at a rate of 31.3%. The increase in graduation rate with additional dual enrollment or Huskins Bill courses suggests that experience in these courses is beneficial to student college success. Multiple courses can expose a student to more academic rigor, thereby increasing potential for successfully completing a degree. The additional courses can also lighten an academic load when the student transfers to a postsecondary institution and lessen the amount of time the student needs to complete a degree making it more likely the student will finish.

Summary of Findings

The findings of this study indicate that participation in dual enrollment programs offer students a positive effect in transitioning to postsecondary studies. Specifically,

experience in a dual enrollment program benefitted first-year student GPA and increased graduation rates over students who did not participate in a dual enrollment program. These findings were consistent within medical, technical and transfer programs. The study also showed that female students benefitted more from dual enrollment programs than their male counterparts and that non-white students gained advantages from these programs in first-year GPA and graduation rate. Additionally, the study found that students showed significant improvement in GPA and graduation rate with each dual enrollment course taken. The study did not show evidence that simple dual enrollment courses offered any advantage in GPA or graduation rate to students over Huskins Bill courses.

Limitations

The study design was limited in several ways. Primarily, it did not allow an accounting for variables such as previous student academic success (In North Carolina, dual enrollment and Huskins Bill students are required to have a set high school GPA before they can take a college course.) or for individual student motivation, which could account for the self-selection of students into the dual enrollment or Huskins Bill group. Also, the type of course a student takes as a dual enrollment or Huskins Bill student was not available in the dataset, which does not make it possible to trace the effects of specific courses on student performance.

The study compensated for this limitation in two ways. The first way was by comparing outcomes in the two groups, Huskins Bill and standard dual enrollment, as the selection of students in these two groups used the same grade cut-off. The second way was by comparing students when the sample was filtered by technical and medical

programs. These actions ensured that the comparison involved more homogenous groups because these programs have GPA requirements that limit them to higher achieving students. These compensatory strategies level the quality of the students being compared. However, in light of the absence of data that could individually identify student quality, it still presents some limitation to the study and is important to note while interpreting the findings. Further research into student motivation and isolating contributing variables will be helpful in understanding this issue.

Another limitation is that the study looked only at North Carolina community college students. The study does not take into consideration students with Huskins Bill or dual enrollment experience who matriculated to four-year colleges and universities. This is an important student segment and warrants specific attention if the effects of these programs are to be completely understood. More study in this area is necessary.

Implications

The effectiveness of dual enrollment and Huskins Bill programs has implications in a number of important areas of education. Based on the findings of this study there are several recommendations that can be made. These recommendations are discussed under the following headings in this section: Implications for Addressing the Job Skills Shortage; Implications for Addressing College Readiness; Implications for Promoting Diverse Populations in Dual Enrollment Programs; and Implications for Dual Enrollment Program Funding.

Implication for Addressing the Job Skills Shortage

- Recommendation 1: Dual enrollment and Huskins Bill courses should be promoted in states as one solution to job skills deficits and workforce readiness.

As discussed earlier in this study, one major implication of this study involves the continuing changes in the labor market of the 21st century driven by technological innovation and globalization (Educational Testing Service, 2007). These changes make it necessary for coming generations of the labor force to not only be more technologically savvy but to be prepared for continuous learning and retraining of work skills (Gordon, 2005). Dual enrollment and Huskins Bill programs are one important pathway necessary in generating more students ready to undertake these challenges. A workforce prepared to take on complicated technological skills and prepared to meet the requirements of the educational and training programs that will administer them is more necessary now than in past decades. Maintaining the adequate education levels for the coming generation to meet these advanced needs and changing workforce requirements should be priority of all who value the importance of individual welfare and the integrity of the future economy (Hoffman, 2005; Morrison, 2008). Dual enrollment and Huskins Bill programs serve this purpose by accelerating learning at secondary education levels so that students are at least prepared to take on the skills of the modern workforce. Dual enrollment and Huskins Bill programs offer students an opportunity to gain program credits or an accelerated regimen to prepare them for further educational attainment after leaving high school, and as evidenced by this study, these programs show effectiveness in doing so. To this end,

these programs should be maintained as a vital link in promoting student success in their ongoing learning.

Implication for Addressing College Readiness

- Recommendation 2: Dual enrollment and Huskins Bill programs should be promoted in states as an effective means in improving college readiness.

A principal step in being able to compete in the modern workforce is the ability of a large part of the workforce to succeed in postsecondary education (McCabe, 2000; Morrison, 2008). However, a major impediment to this step is the gap between secondary and postsecondary skill requirements which, according to one author, has created a “dead zone” between high school and college (Reindl, 2006). As more students matriculate to postsecondary institutions (Conley, 2007), programs such as dual enrollment and Huskins Bill which show effectiveness in the creation of a college-ready student are in greater need for maintaining a job pipeline for students into the 21st century, and, thus, are important in maintaining the economic welfare of the country and its population.

This particular study offers good evidence for dual enrollment and Huskins Bill course effectiveness for students matriculating to community colleges. Community colleges, in particular, face the challenge educating students with a diverse array of abilities. Dual enrollment programs are a vital resource for creating a successful bridge from secondary to postsecondary work for students. Put simply, if a particular program shows effectiveness in promoting higher student GPA and graduation rate, then it follows that the program should be instituted, supported and promoted as a pathway to student success in all community college systems.

Implication for Promoting Diverse Populations in Dual Enrollment Programs

- Recommendation 3: Dual enrollment and Huskins Bill programs should be utilized to promote success in underserved student populations.

This study shows promising outcomes in first-year college success and in graduation rate for non-white students taking dual enrollment and Huskins Bill courses. Positive outcomes for non-white students taking dual enrollment and Huskins Bill type programs have also been duplicated in other studies (Karp et. al., 2007; O'Brien & Nelson, 2004). This pattern of success warrants more attention by state education leaders to promote dual enrollment and Huskins Bill programs specifically for these students and thereby help launch them into a successful and productive adulthood. Presently, dual enrollment programs are underutilized by this type of student (Hoffman, 2005; O'Brien & Nelson, 2004). Some ways this program can benefit these students are to put dual enrollment programs in schools with high populations of non-white students. State policymakers can work to establish more diverse partnerships with K-12 and community college administrations which will allow for creative programs involving dual enrollment and Huskins Bill type courses. These programs could focus on at risk demographics within regions of the state or could target areas of workforce development that show promise for creating future employment or economic opportunity. Offering a mandate and the funding for these programs could provide a jumpstart for the creativity and initiative that is needed to create and successfully establish these ventures.

- Recommendation 4: Target female students to utilize dual enrollment and Huskins Bill courses as an aid to education attainment.

This study shows a positive effect for dual enrollment and Huskins Bill courses on female students. Though several studies have touted the positive effects of dual enrollment on male students and have recommended targeting this group (Karp et. al., 2007; Kirst & Venezia, 2007; Klein, 2007), female students should not be left out of targeted groups who benefit from this program.

Dual enrollment and Huskins Bill programs could be used enhance female student success in courses of study where females typically score lower, such as in math and science. Vocational and technical programs using dual enrollment courses can also be developed to attract female students to programs in career fields that are typically underrepresented by female students.

Implications for Dual Enrollment Program Funding

Dual enrollment programs are an effective means of college readiness and postsecondary degree attainment for a diverse group of students, not only high achievers. It is important that access to these programs is open to all segments of the student population who can benefit from them. This would involve funding for increasing not only the size of these programs but also the scope of these programs. It also includes providing complete funding for student to use complete college resources such as counseling and advising as well as campus resources in their education. Recent shortfalls in state funding have brought many education programs under scrutiny, and dual enrollment and Huskins Bill programs have certainly been among them. However, if the end reward to funding a program is its effectiveness, this study adds yet another link in the studies that verify the positive results of these programs (Karp et. al., 2007; Kim, 2006; Spurling & Gabriner, 2002).

Suggestions for Further Research

Several areas of research could further the understanding of dual enrollment effectiveness. Based on the limitations of this study, more research should be conducted in determining the effectiveness of dual enrollment programs on students matriculating to four-year colleges. Also, attention should be given to the effects of student motivation and how it works within the dynamic of success for dual enrollment students.

Particular issues that arise from the findings of this study that warrant additional inquiry include further research into how location of dual enrollment courses affects the quality of course delivery, that is, whether courses delivered on a college campus show any better success than those delivered on a high school campus. Further research into the size of the effect of dual enrollment and Huskins Bill courses on male and female students and on non-white students would also provide good information for understanding the best way to position these programs within a curriculum.

Conclusion

As high schools continue to grow programs that focus on college readiness, knowledge of the best methods of college preparation will be necessary to guide educators in implementing the best programs for students. Dual enrollment and Huskins Bill courses are two such programs that provide high school students with rigorous courses and that show success in preparing these students for postsecondary work. Administrators in secondary and in postsecondary institutions should look at evidence of the effectiveness of these programs to best gauge their place in improving student readiness. The task of the future will be to find the most effective ways these courses can be administered to students in order to reap the greatest gain from them, and to ensure

that these courses are administered in consistent ways in order to preserve the reliability of the programs. In order to best do this, more studies should be undertaken to find how well these programs work with individual student variances, such as environment and individual learning styles and to gauge the best methods of effectiveness from course experience. Until then, administrators should continue to look to a large array of these types of programs in order to benefit the diverse student body to which they must cater.

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APPENDIX A

List of Specific Degrees Within Program Area

Transfer Programs

All Associate of Arts, Associate of Fine Arts and Associate of Science degrees including:

Anthropology

Art Education

Business Administration, Accounting, Economics, Finance
and Marketing

Business Education and Marketing Education

Communication/Communication Studies

Computer Science

Criminal Justice

Elementary Education

English

English Education

Geography

Health Education

History

Information Systems

Liberal Studies

Mass Communication/Journalism

Middle Grades Education

Nursing

Physical Education

Political Science

Psychology

Social Science Secondary Education

Social Work

Sociology

Special Education

Art

Drama

Music and Music Education

Biology and Biology Education
Chemistry and Chemistry Education
Engineering
Mathematics
Mathematics Education
Special Coded students

Technical Programs

Include associate degrees, diplomas and certifications in the following areas:

Agricultural and Natural Resources Technologies
Biological and Chemical Technologies
Business Technologies
Commercial and Artistic Production Technologies
Construction Technologies
Engineering Technologies
Industrial Technologies
Public Service Technologies
Transportation Systems Technologies

Medical Programs

Include associate degrees, diplomas and certifications in the following areas:

Cancer Information Management
Cardiovascular / Vascular Interventional Technology (Diploma)
Cardiovascular Sonography
Cardiovascular Technology (Invasive and Non-Invasive)
Central Sterile Processing (Certificate)
Clinical Trials Research Associate
Computed Tomography & Magnetic Resonance Imaging Technology
(Diploma)
Cytotechnology (Certificate)

Dental Assisting (Diploma)
Dental Hygiene
Dental Laboratory Technology
Dialysis Technology (Diploma)
Dietetic Technician
Electroneurodiagnostic Technology
Emergency Medical Science
Health and Fitness Science
Health Care Technology (Certificate)
Health Information Technology
Histotechnology
Human Services Technology
Human Services Technology/ Developmental Disabilities
Human Services Technology/ Gerontology
Human Services Technology/ Mental Health
Human Services Technology/ Social Services
Human Services Technology/ Substance Abuse
Interventional Cardiac and Vascular Technology
Licensed Practical Nurse Refresher (Certificate)
Magnetic Resonance Imaging
Medical Assisting
Medical Dosimetry (Diploma)
Medical Laboratory Technology
Medical Sonography
Nuclear Medicine Technology
Nursing Assistant (Certificate)
Occupational Therapy Assistant
Ophthalmic Medical Assistant (Diploma)
Optical Apprentice (Certificate)
Optical Laboratory Mechanics (Certificate)
Opticianry
Pharmacy Technology
Phlebotomy (Certificate)
Physical Fitness Technology
Physical Therapist Assistant (2-year program)

Physical Therapist Assistant (1 + 1)
Polysomnography
Polysomnography (Certificate)
Positron Emission Tomography (Diploma)
Practical Nursing (Diploma)
Radiation Therapy Technology
Radiography
Rehabilitation Assistant (Diploma)
Respiratory Therapy
Speech-Language Pathology Assistant
Surgical Technology
Therapeutic Massage
Therapeutic Recreation Assistant
Veterinary Medical Technology
Magnetic Resonance Imaging

BIOGRAPHICAL SKETCH

Bartlett Yancey Ganzert was born in Virginia in 1967. He studied English at Wake Forest University and received his Bachelor of Arts degree in 1989. He taught secondary English for eight years before returning to Wake Forest University to complete his Master of Arts degree.

Mr. Ganzert assumed a community college faculty position in 2002. He received his Educational Specialist degree from Appalachian State University in 2005 and his Doctor of Education degree from Appalachian State University in 2010. He is currently a faculty member at Forsyth Technical Community College.