

DUAL ENROLLMENT PROGRAMS: A COMPARATIVE STUDY  
OF HIGH SCHOOL STUDENTS' COLLEGE  
ACADEMIC ACHIEVEMENT AT DIFFERENT SETTINGS

A Dissertation  
By  
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This dissertation meets the standards for scope and quality of  
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## ABSTRACT

### DUAL ENROLLMENT PROGRAMS: A COMPARATIVE STUDY OF HIGH SCHOOL STUDENTS' COLLEGE ACADEMIC ACHIEVEMENT AT DIFFERENT SETTINGS

(December 2012)

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The *ex post facto* causal-comparative study examined the academic achievement of high school students who took their dual credit English or mathematics college credit-bearing course in two different environments, namely, the college setting and the high school setting. Due to non-experimental nature of the study, no causal inferences were drawn. The non-probability sample consisted of 428 students who had taken the English dual credit course of which 342 were off-campus and 86 had taken the course on campus. There were 82 students who had taken the mathematics dual credit course of which 25 were off-campus students and 57 had taken the course on campus. The English and mathematics achievement grades were treated as ordinal data and Mann-Whitney U test showed that group differences on the basis of outcome measures were not statistically significant. The results suggest that when each setting adheres to the rigor of dual credit program standards, academic quality is maintained, academic achievement is comparable between students in the two settings, and college level learning is achieved.

## **DEDICATION**

This study is dedicated to all the dual enrollment instructors at the high school, college, and university campuses who teach college-level courses to students who have not yet completed their high school education. These teachers and faculty members are to be commended for the quality education they provide to the dual enrollment students. This study would not have taken place if I did not believe in the dual enrollment programs offered on- and off-college and university campuses.

I would like to thank the many individuals that who made it possible for me to complete this journey: my husband, Pete Flores, who encouraged and never complained about my time away to be a student; my children, David, Bridget, and Sidney, who gave up their mom many weekends to allow me to continue my education; my parents, David and Mary Acker, who supported me and gave me my desire to continue life-long learning; my classmates who studied with me and supported me; and my special friend, Cheryl Flint who listened to me, encouraged me, and helped with edits.

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## **CHAPTER ONE: INTRODUCTION**

### **Background and Setting**

Dual enrollment programs—to include dual credit and concurrent enrollment—have been around since the early 1970s and have allowed high school students the opportunity to take postsecondary courses at two- or four-year institutions (Andrews, 2004; Kleiner & Lewis, 2005; Robertson, Chapman, & Gasken, 2001). Some of the earliest programs were located at Syracuse University in 1973 and LaGuardia Community College in New York City in 1974. The Syracuse University's Project Advance (SUPA) program targeted high academic achievers, whereas the Middle College High School program at LaGuardia Community College in New York City targeted students thought to be high risk of dropping out of high school (Kim, 2008). These dual credit programs have expanded nation-wide, and foundations such as the Bill and Melinda Gates Foundation are contributing heavily to the concept of a seamless education from secondary into postsecondary education.

Today's dual credit programs continue to provide high school students an opportunity to earn college credit while they work toward a high school diploma. This opportunity applies to degrees as well as technical and/or vocational certifications offered at community technical colleges. Depending upon the program, high school students can earn as much as one year's worth of college credit toward an associate's degree while still earning credit toward a high school diploma. Due to the increase in demand for dual enrollment programs in the 1980s, many states began developing policies for dual enrollment programs (Andrews, 2000; Girardi & Stein, 2001).

Johnson's and Brophy's (2006) research indicated that dual enrollment programs provided motivated and interested students an opportunity to earn college credit in high school, while these programs provided tremendous savings to parents: moreover, these programs allowed high schools to offer colleges access to their brightest students (p. 25). Ever-increasingly, school districts are paying for college tuition and fees for students. In Texas, many of the colleges and universities pay for a portion of the fees associated with dual credit courses and some even absorb the cost completely (Texas Education Agency, 2010). Surveys conducted by the Texas Higher Education Coordinating Board (THECB) indicated that community colleges waived all or part of the tuition and fees costs while very few universities offer fee waivers.

Dual credit programs are proliferating as the number of high school students enrolled in dual credit and dual enrollment programs continues to increase (Westcott, 2009). The State of Texas passed House Bill 2808 in 2005, which was implemented by fall 2008, and included a provision that required school districts to offer a minimum of 12 semester college credit hours to high school students. In light of the passing of HB 2808, the Bill and Melinda Gates Foundation offered grant funds for collaborative agreements between independent school districts and higher education institutions to start early college high schools. These models mandated that higher education institutions offer associate degrees and/or certificate programs by bringing students on campus and create an on- campus early college high school.

Dual credit programs are immensely popular, and the number of high school students taking advantage of these programs continues to increase. According to a study by the Texas P-16 Council (2007), dual credit offerings allow for a smooth transition

from secondary to postsecondary education creating a greater range of learning experiences as well as opportunities for students. In addition to a seamless transition into postsecondary education, college courses encourage at-risk students and first generation college students to continue their educations. However, despite the growth of dual credit programs nationwide, very little is known about their effectiveness.

### **Statement of the Problem**

The delivery of dual credit programs creates a problem when more than one campus setting is present. Research indicates that a campus setting affects academic achievement (Astin, 1993; Baily, Hughs & Karp, 2002; Mace, 2009; Pascarella & Terenzini, 2005; Tagg, 2003). Results of Astin (1993) longitudinal effects of college on students study concluded that smaller institutions were more effective than larger ones, residential colleges more effective than commuter colleges, and full-time programs more effective than part-time programs. Learning environments that place an emphasis on close relationships and frequent interaction between faculty and students has implications for students' general intellectual-cognitive development. Thus, school campus size can affect student performance.

Additionally, research suggests that students with similar characteristics could have vastly different learning outcomes, depending on their different campus experiences (Renn & Patton, 2011). However, dual credit programs delivered at different campuses expect students to have similar outcomes. The college or university that transcripts the end-of-course grade for a dual enrollment course expect the student to meet the same academic criteria as a student who has graduated high school and who is enrolled in the same course at the college or university. Dual enrollment programs are based on the

premise that high school students must meet college prerequisites requirements designated for the course through college placement tests to ensure that the student will be successful (The Higher Education Coordinating Board, 2010).

Campus environments and dual credit expectations suggest different levels of achievement. On the one hand, dual credit programs expect students to perform, similarly, regardless of campus setting. On the other hand, research about campus setting relates that different settings produce different outcomes. These two issues raise a problem: How do different campus settings affect student achievement when an academic program expects similar results?

The problem is further complicated based on background characteristics. College-aged Hispanics account for 15% of the overall enrollment of young adults in two- or four-year colleges in 2010. This is a small percentage since high levels of immigration and high birth rates have made Hispanics the nation's largest minority group. Of those Hispanics attending college, some 46% were at a two-year college and 54% were at a four-year college (National Center for Education Statistics, 2011). According to Texas Education Agency (2011), a research study on dual credit programs found that male students were underrepresented among students who were enrolled in dual credit courses. Further analysis of school characteristics revealed that schools located in rural areas had higher percentages of limited English proficient (LEP) students and African-American students. The study also concluded that because students must meet academic eligibility requirements to enroll in dual credit course, student subgroups that have lower average achievement scores are more apt to be underrepresented among students who enroll in courses for dual credit. An analysis of dual credit by subject area

revealed that 70% of courses taken by high school students were in core academic subjects and that English comprised 26% and mathematics comprised 8% of all dual credit enrollments (American Institutes for Research, 2011). This data also suggests that ethnicity and type of core courses can affect how well students perform in dual credit programs.

The study took place at a community college in South Texas hereafter referred to as The College. The College's fall 2010 data stated that 708 students were enrolled in dual credit courses. The College has a collegiate high school on its campus with 159 students enrolled in college-level courses (Office of Institutional Research and Effectiveness, 2009). A collegiate high school is a unique program that is located on a college campus and offers high school students the opportunity to earn their associates degree at the same time as their high school diploma.

According to requirements as noted by The Higher Education Coordinating Board (2010), two of the core curriculum courses for any major consist of English and mathematics. Dual credit students at The College were prepared in first year English, referred to as English, and Algebra, referred to as mathematics, at two venues: the high school and The College campus settings. College faculty and dual credit high school instructors followed college curriculum requirements for both subjects regardless of location. Differences in college readiness between these two groups were studied. The issue of college versus high school preparedness has not been investigated. Therefore, the study examined students' achievement in English and mathematics dual credit courses relative to their on- or off-college campus dual credit learning experience. It also examined how school campus size, ethnicity, and gender affected achievement.

## **Theoretical Framework**

Instructional settings are different for students, who are prepared in a college classroom with faculty and classmates whom they do not know, than for students receiving college preparation in a high school setting with students and teachers they know. Common dual enrollment programs include English and Algebra I or, as referred to in this paper, mathematics. During the rise of student development theories, Chickering's (1969) earlier work created six vectors for adolescence developmental theories. In 1993, along with his colleague, Reisser, Chickering revised and updated his developmental theories to vectors which address both the developmental phases of the high school-aged student and the progression he or she goes through as he or she matures in his or her college years.

The seven vectors as laid out by Chickering and Reisser (1993) are as follows:

(a) developing competence to include intellectual competence, physical and manual skills, and interpersonal competence; (b) managing emotions; (c) moving through autonomy toward interdependence which includes emotional independence, instrumental independence and developing autonomy; (d) developing mature interpersonal relationships which involves tolerance and appreciation of differences and capacity for intimacy; (e) establishing identity which includes a number of subsets; (f) developing purpose made up of vocational plans and aspirations, personal interests and interpersonal and family commitments; and finally (g) developing integrity.

A school setting, whether a high school or college campus environment, has an impact on how a student views himself or herself within the learning environment. The learner who is enrolled in dual credit programs has a unique position in which the



classroom experiences must also prepare the student for college credit. The success of dual credit programs must rely on the construction of knowledge the student has acquired prior to enrolling in a college credit course that also meets his or her high school requirements. The learning then becomes a collaborative process where the student interacts with both a high school environment and a college environment for successful completion.

### **Purpose of the Study**

The purpose of the study was to examine students' achievement in English and mathematics dual credit courses relative to their on- or off-college campus dual credit learning experience. It also looked at how ethnicity, high school campus size, and gender affected academic achievement in English and mathematics. English and mathematics are two of the most common core curriculum courses offered at high school campuses as dual enrollment courses. The students in this study were enrolled in high school English and mathematics courses that simultaneously met high school graduation requirements and college credit. The researcher investigated only the achievement scores for the earned college credit of the dual enrollment students. Achievement scores were determined by final course grades from A to F. Grades were used for academic achievement because grades are used to document successful completion of dual credit English and mathematics course and appear on a student's transcript.

### **Research Questions**

1. What is the difference in English achievement between dual credit students who completed the English component of the core curriculum requirement for a

college degree in a high school setting versus students completing the requirement in a college campus?

2. What is the difference in mathematics achievement between dual credit students who completed the mathematics component of the core curriculum requirement for a college degree in a high school setting versus students completing the requirement in a college campus?

### **Operational Definitions**

For the purpose of the study, the following operational definitions were used:

1. English achievement is defined by course grade earned toward college credit.
2. English is referred to as English language, composition, and literature as offered as a course of study in school. The College's ENGL1301 or Composition I was used for the study.
3. Mathematics achievement is defined by course grade earned toward college Algebra credit. The College's MATH1314 or college algebra was used for the study.
4. Algebra known in this study as mathematics is the branch of mathematics that deals with general statements of relations, utilizing letters and other symbols to represent specific sets of numbers, values, vectors, etc., in the description of such relations.
5. Dual credit course is defined by the student earning college credit while concurrently earning high school credit.
6. Academic achievement is defined as grades in English and mathematics: A, B, C, D, F on a 4-point grading scale.

## Glossary of Terms

The following are generally accepted definitions of terms used in this study:

*Dual Credit* is defined by The Higher Education Coordinating Board as a process by which a high school junior or senior enrolls in a college course and receives simultaneous academic credit for the course from both the college and the high school. (Texas P-16 Council, 2007).

*Dual enrollment* and *concurrent enrollment* are terms used for programs that allow students to enroll in college-level courses prior to graduation and to earn credit toward their high school diplomas and simultaneously earn college credit. These courses can be administered in high school classrooms, on a college campus, or through a distance-learning provider (Cech & Wendt, 2009).

*Early college high school* is an integrated high school with college resources to create an accelerated curriculum which allows students to graduate with a high school diploma and an associate's degree in four or five years, instead of six (Office of Institutional Research and Effectiveness, 2009).

*Collegiate high school / middle college high schools* are interchangeable terms referring to high schools that are located on The College campuses where enrollment is usually limited. Students enroll to earn a high school diploma and an associate's degree or transferable college credit (Kim, 2008).

*College readiness* as defined by Bill and Melinda Gates Foundation means that students will be able to succeed in credit-bearing courses in two- or four-year colleges or postsecondary certificate programs (College-Ready, 2009).

*Credentialed faculty* is the term assigned to the faculty or adjunct faculty member teaching a dual credit course. They are responsible for evaluating a student's education and experience in accordance with system-established minimum qualifications for faculty teaching credit-based courses (The Higher Education Coordinating Board, 2010).

### **Limitations and Delimitations**

Due to non-probability nature of the sampling, external validity was limited to study participants. The study was delimited to outcome measures of English and mathematics achievement scores. The researcher had no control of areas such as different teachers at each of the instructional settings, teaching styles, student selection for participation at each institution, testing criteria and curriculum.

### **Assumptions**

The researcher assumed data collected on dual credit students enrolled in The College were accurate. This study assumed that assessments for final achievement scores in The College credit English and mathematics courses met The College's testing criteria. The research assumed that the data collected documented students who took their dual enrollment courses at a high school campuses were separate from those students who took their dual enrollment courses at The College campus. It also assumed that the faculty possesses the appropriate credentials and training to teach in the dual credit program regardless of campus environment.

### **Significance of the Study**

Dual credit programs have been in existence since the early 1970s. The researcher was able to find anecdotal references to dual credit curriculum that was less than rigorous in the high schools. Data that compared on-campus college achievement to

college credit awarded to students taught in a high school setting was not available. The significance of this study was to determine if there is a difference in student achievement in dual credit mathematic and English courses completed at high school campuses versus the equivalent mathematic and English courses completed on a community college campus in South Texas. Limited studies have documented students' achievement their first year of enrollment in an institution of higher education after having successfully completed dual credit courses in high school. Little research is available documenting the setting in which dual credit courses are offered.

Recent Texas legislation requires high schools to offer a minimum of 12 college-credit hours to students prior to high school graduation. Data were used to examine the difference in academic achievement between dual credit students who completed English and mathematic requirements in a high school setting versus students completing dual credit courses on a college campus. The result of data collected and analyzed provides insight into how the high school student's environment effects academic achievement.

### **Summary**

With the increased pressure to ensure high school graduates enter college with 12 or more college credits, it is important to learn if there is a difference in academic achievement of high school students who received college credit for a course taught at the high school setting as compared to high school students who took college credit courses on The College campus. Administrators at the high school campuses and at The College campus can use this information in preparing instructors who teach dual enrollment courses. Furthermore, the college awarding credit must credential the high school teachers and must approve the syllabus, therefore, the onus of checking for rigor.

Students can make better-informed decisions about their futures as they select to enroll in a college credit course while still high school.

## **CHAPTER TWO: LITERATURE REVIEW**

### **Introduction**

Dual credit programs provide high school students an opportunity to earn college credit for coursework they complete while in high school. The intent of the study was to investigate students' achievement scores of dual credit English and mathematics at The College relative to their on or off college campus dual credit learning experience. The literature reviewed in this chapter will explore dual credit programs and provide the foundation for this study.

### **History of Dual Credit Programs**

The first dual credit programs can be traced to Syracuse University in 1973 and LaGuardia Community College in New York City in 1974. Dual credit or dual enrollment programs allow students to enroll simultaneously in a course in high school while earning college credit at the same time. Through collaborative agreements with colleges and universities, students are allowed to earn college credit while still in high school. The Syracuse University's Project Advance (SUPA) program targeted high academic achievers, whereas the Middle College High School program at LaGuardia Community College in New York City targeted students thought to be high risk of dropping out of school (Kim, 2008). Dual credit programs have expanded nation-wide catching the attention of foundations such as the Bill and Melinda Gates Foundation. This Foundation began start-up initiatives to create collegiate high schools throughout the nation to bridge the notion of a seamless education from secondary into postsecondary education.

Dual credit programs provide high school students an opportunity to enroll in college-level courses while they earn their high school diplomas. This opportunity applies to academic as well as technical and/or vocational certifications offered at community technical colleges. Depending upon the program, high school students earn anywhere from one semester of college credit to an associate's degree while still earning their high school diploma.

The College Board's Advanced Placement (AP) program, founded in 1955, enables high school students to earn college credit. Upon finishing an AP class, students are encouraged to take a nationally administered test. Those students meeting the scoring requirement may receive college credit. The College Board reports that roughly 5,400 schools, colleges, and universities nationwide accept college credit earned by this program (Cech & Wendt, 2009).

The rigor and challenge of an AP course is intended to be comparable with that of an introductory level college course. Many students choose not to take advantage of AP classes because there is a fee for the exam that determines whether or not a college will award credit for the course. The cost to a student to take one AP course exam was approximately \$86. This fee quickly adds up if students are taking multiple AP exams. By offering an AP class, high schools must pay for teacher resources and textbooks adding to the cost of offering AP courses. In addition, AP programs have been underutilized because students are not sure if the college of their choice will accept the AP credits (Vedder et al., 2010).

The traditionally underserved student now has a number of emerging models of dual enrollment programs from which to choose. Some of these models include drop-out



recovery programs such as Gateway to College in which students earn a high school diploma and college credits at the same time. Other program models offer students academic and social support services while they take multiple dual enrollment courses. In Maine, Early College serves as a transition program where high school seniors can take a range of college courses at their local and regional community colleges (Barnett & Stamm, 2010).

Hoffman, Vargas, and Santos, (2008) identified a number of principles by which states can increase successful dual enrollment programs. Some of these principles include creating a clear purpose, providing equal access and eligibility, offering high-quality course options and student support systems, ensuring adequate funding and systems to track data on quality and outcomes, and building governance and alignment to ensure coordination between high schools and higher education institutions.

In 2002, The Bill and Melinda Gates Foundation became an example of a philanthropic organization becoming involved with state and local agencies to support underrepresented high school students in higher education through an early college concept. The foundation has placed more than 200 early college high schools in 24 states across the country (Bill & Melinda Gates Foundation, 1999-2010). The College has one of the Gates Foundation grants and started a collegiate high school in fall of 2006. It graduated its first senior class in May 2010 with 61 students receiving both their high school credits and an associate degree simultaneously. Dual credit programs offer several benefits to students according to many colleges and universities across the state. These benefits include increased enthusiasm and motivation among students; and these programs allow students to gain confidence for college success while they hone their

academic abilities and skills, which decreases the amount of time required to complete a college degree by developing a college transcript while in high school.

A study by Andrews (2004) suggested that dual credit and dual enrollment programs have grown rapidly because these programs offer testaments to two national concerns. The first of these concerns is deciding what to do with students their senior year of high school, and the second concern is how to shorten time to a baccalaureate degree that averages five years for most students. The senior year of high school has been considered as lost time for students who have fulfilled college entrance requirements by the end of their junior year according to The National Commission on the High School Senior Year (Mills, 2001).

The Center for College Affordability and Productivity supported by the Lumina Foundation for Education provides some insight on the cost savings of dual enrollment programs. The average student paid about \$1,063 per three-hour credit course or \$4,253 per semester. Public universities subsidized students at a rate of about \$881 per three hour credit course or \$3,522 per semester. The study continued to report that a college education could potentially be reduced by approximately 12.5% through dual enrollment programs, which would reduce the financial burden on students and taxpayers (Vedder et al., 2010).

A number of studies have been conducted to support the growing number of institutions of higher education who accept college credit for dual enrollment courses. Swanson (2008) conducted a study that compared high school and college transcripts of students who participated in dual enrollment courses. Her research showed that:

- Dual enrollment students were 11% more likely to persist through the second year of college than non-participating students;

- Dual enrollment students were 12% more likely to enter college within seven months of high school graduation than non-participating students; and
- Dual enrollment students who completed 20 or more credits in the first year of college were 28% more likely to persist through the second year in college than were students who did not complete dual enrollment courses (p. 3).

There are dual enrollment program models that have been created to address students who would not ordinarily qualify for college credit-bearing courses while still in high school. One such dual enrollment program model is provided by the City University of New York's "Pathways to College Network" initiative designed to improve college access for underserved populations. Dual enrollment students participate in preselected college activities, introductory zero-credit courses, and credit-bearing courses through CUNY's Pathways Now program (Allen, 2010).

The issue is that there is skepticism about the quality of dual enrollment programs. Community college faculty members are divided on how they view dual credit programs. Faculty are concerned that when the high school culture takes priority over the college's protocols, academic quality suffers. College faculty also think high school students not enrolled in college should not be mixed with students who are enrolled in college courses earning college credit. The thought is that dual credit enrollment programs should resemble the college classroom so that the student not only learns the content, but also picks up the norms and behaviors associated with success in college (Hughes, Karp, Fermin, & Bailey, 2006). This study helps to address some of the skepticisms about dual enrollment programs by looking at academic achievement at a college and at area high schools in Nueces County where dual enrollment programs are offered.

### **Dual Enrollment Programs in Texas**

With the rising cost of college tuitions across the state, dual credit programs cut thousands of dollars from student tuition costs for the high school student earning 12 or more college credits while in high school. A student's ability to accumulate a full year's worth of college credit while in high school shortens the time it takes to earn a college degree and allows the student to save significantly on the overall cost of college (Bailey, Hughes, & Karp, 2002). College tuition for high school students ranges from free to greatly reduced costs, depending on the institution awarding the college credit.

In an article appearing in *The Dallas Morning News*, Holloway (2010) offered that although Texas law requires public universities to accept credit for core classes identified by the state, some students are discovering that some of their classes do not count toward their majors. The article continued to state that the number of students taking dual credit courses has more than doubled in the past five years because of the state law requiring high schools to offer students the opportunity to earn a minimum of 12 college credit hours. Private schools and out-of-state colleges and universities may not accept dual credit courses. Holloway's (2010) article cited that Rice University, a private university in Houston, Texas, will not give credit for any class that the student also used to fulfill a high school graduation credit. In the article, the dean for undergraduate enrollment at Rice University stated that college credit is not the same for everyone and the pace for each student is different. Because of this, selective schools such as Rice University do not readily accept courses used for high school graduation credit. Thus, dual credit programs tend to benefit public education and they are designed for public institutions. Therefore, if a student wants to transfer to a private institution, the

credit may not transfer. Administrators at Rice expressed the heart of the issue. They believe that different campus settings produce different outcomes. This is in contrast to the philosophy of dual credit programs in that the structure of the program, regardless of the setting, will produce similar results.

Although state supported colleges and universities accept core courses such as English, government, or economics, these same institutions may not use other courses to fill elective requirements toward a student's degree requirements (Holloway, 2010). A suggestion for today's high school students is to decide what college or university he or she wants to attend and check that institution's website for a list of dual credit courses that will transfer. Many private colleges and universities do not always accept core courses toward a student's degree requirement.

Students and their families enjoy the tremendous savings afforded by dual credit programs as more and more school districts are paying for tuition and fees for students. Many of the colleges and universities are allowed all, part, or none of the mandatory tuition and fees for dual credit courses (Texas Education Agency, 2010). Surveys conducted by the Texas Higher Education Coordinating Board indicate that community colleges waived all or part of the tuition and fees costs while very few universities offered fee waivers (Texas Education Agency, 2010).

Dual Credit programs are increasing due to continued support from state and local policymakers. The State of Texas passed House Bill 2808 in 2005, which included a provision that required school districts to offer a minimum of twelve semester college credit hours to high school students taking effect in fall 2008. Since the state first started tracking enrollment in 1999, the number of dual-credit students across Texas ballooned

from just fewer than 12,000 to more than 91,000 in 2010. When the program first started, white and gifted students seeking accelerated curriculum were the major participants. In recent years, schools have started looking at dual credit programs for students who might not have seen themselves as college material (Texas Education Agency, 2010).

Most states developed dual enrollment programs to give advanced students a head start on college. Very few programs were designed to serve as a bridge to college for those students not already college-bound. However, the situation is changing as dual enrollment programs have become more common, as well as serve a wider variety of students who participate (Hoffman, Vargas, & Santos, 2008). According to a study by the Texas P-16 Council (2007), dual credit offerings allowed for a smooth transition from secondary to postsecondary education by creating a greater range of learning experiences as well as opportunities for students. In addition to a seamless transition into postsecondary education, taking college courses encourage at-risk students and first generation college students to continue with their education.

### **Dual Enrollment Programs at The College**

Early records for dual credit courses taught at The College began in fall 1998 with 14 area schools teaching English, mathematics and chemistry at the local high schools and with a total of 268 students participating. Two school districts taught English, mathematics and chemistry on The College campus with a total of six students participating. By spring 2008, 2,729 students participated in dual credit courses with 1350 students taking courses on site at the local high schools, 636 students enrolled in courses taught through distance education, and another 636 students took courses at The College campus (Office of Institutional Research and Effectiveness, (2009).

The College is a two-year comprehensive community college founded in 1935, and is one of 75 state and locally supported colleges in the 50 public community college districts in Texas. The College serves approximately 12,000 students per semester with a record fall 2010 enrollment of 12,249. The average student age is 25 years old with females making up 59% of the student population. Full-time students make up only 30% of the total population with 79% of all incoming freshman testing into one or more developmental education courses (Office of Institutional Research and Effectiveness, 2009).

The College has a collegiate high school (CHS) located on campus. The partnership is with a local independent school district and serves approximately 400 high school students. The CHS works collaboratively with The College to align and to integrate subject matter to build college readiness for its students. The student body is approximately 86% Hispanic, 70% economically disadvantaged, 64% first generation college students and 42% documented at-risk students. The first graduating class for CHS occurred in May 2010 with 64% of the seniors graduating with an associate's degree. Those not earning an associate's degree were allowed to return to The College for one year at no charge to complete their degree (Office for Strategic Planning and Institutional Research, 2011-2012).

### **Learning Environments**

Many studies cited that students are largely unprepared for college (Blum, 2007; Mace, 2009; Pensky, 2001; Tagg, 2003; Tinto, 1993). Colleges and universities attributed student capacities and limitations to their secondary learning environments. Many students do not make a successful transition into the college environment.

Students have their own theories about what college is like—based on their previous experiences with formal schooling. High school does not always prepare the average high school student for the rigors of study as they often lack good study habits, listening skills, and the ability to identify academic support resources (Tagg, 2003).

### **High School Learning Environment**

The structure of the high school is set up around a calendar year where students are provided instruction based on bells that signal a class change and calendar years that signal class progression. Class is often interrupted by announcements, assemblies, club outings, fire drills, and class events. Morning announcements can cut into significant class time. Flexibility is key to managing a high school educational system. Students are in the high school setting daily for a four year time period which allows a more intimate relationship between the high school student and the teacher (Mace, 2009).

The concept of the high school environment is to provide a safe environment so that students can focus on learning. According to Blum's (2007) study, the way high schools create safe and structured environments is through a planned physical environment that includes maintained buildings and grounds and access to opportunities and learning materials. Physical safety is provided through the implementation of rules and regulations that address such areas as truancy, aggressive behavior, codes of conduct, conflict resolution and zero-tolerance for weapons on campus. Academic safety is achieved when students feel their ideas are valued and when teachers and students can take intellectual risks.

The learning environment in a high school setting has an impact on student achievement. Blum (2007) projected the school environment to be the social, academic,



and emotional contexts of the school. Optimal teaching and learning is achieved through a positive school environment. “When students believe that adults in the school care about them, have high expectations for their education and will provide the support essential to their success, they thrive” (p. 2). According to Tagg (2003), high school students are not motivated by the subjects they are learning, but by the desire to make good grades to get into college so that they can earn good money when they graduate.

Blum (2007) maintained that “learning requires a personal touch and teaching fundamentally depends on interpersonal communication” (p. 7). He claimed that the high school environments are positive when there are good student-to-teacher relationships and student-to-student relationships. Additionally, Blum stated that positive relationships are based on teacher, staff, and administrative relationships that provide a sense of interpersonal respect and set high standards for the school personnel and their students. Parents and community members should also feel that the school provides a welcoming environment which then enhances the community’s support for education. Mace (2009) related that instructors in a high school setting often take a more pastoral role over the students providing a more nurturing classroom environment.

Technology has played an important role for high school students and how they learn and perceive their learning environment. Prensky (2001) noted that today’s students have changed radically and that they are not the students for whom education systems are designed to teach. The current generation of students has grown up with new technology surrounding themselves with computers, video games, cell phones, digital music players, digital tablets, and other tools of the digital age. The schools are struggling to figure out how to provide instruction when the education structure has not

kept up. Pensky (2001) stated that “the debate must no longer be about whether to use calculators and computers... but rather how to use them to instill the things that are useful” (para. 30).

The high school setting is often seen as the primary social structure for friendship and social relationships with peers. A positive school environment encourages communication and interaction among students. Social norms form and pivot around the popular students and what they favor will influence the rest of the school population. This influence can counter the balance of education if the popular crowd favors fun over preparing for the future or sports as opposed to academics. School loyalty and attachments make it difficult for new students to transfer in. New students fear fitting in, making new friends or being included in extracurricular activities (Blum, 2007).

### **College Learning Environment**

The successful transition into a college environment is critical to students’ successful degree completion. Tinto (1993) believes that precollege education influences a student’s initial commitment to an institution of higher learning and its academic goals. The student’s level of interaction with the learning environment will affect his or her decision to stay or go. Tagg (2003) cited several studies indicating that students who enter college right out of high school are not as likely to make a smooth transition into college. Students who have spent a year or two in the world of work tend to make better students than recent high school graduates. Tagg cited Steinberg’s 1996 study that claimed high school students spent approximately four hours a week on homework and are largely unprepared for the college environment (2003).

The ACT Policy Report (Lotkowski, Robbins, & Noeth, 2004) findings indicated that the non-academic factors of academic-related skills, academic self-confidence, academic goals, institutional commitment, social support, certain contextual influences, and social involvement all had a positive relationship to retention. Orientation programs and first year courses assist students with the transition from high school into college. The ACT Policy report cited Tinto and Fidler (2004), who address students' "preparedness, their identification, and connections to academic and social cultures of the institution, and their academic goals and aspirations" (p. 14).

Tagg (2003) asserted the assumption of the college learning unit is that the period will be constructed of three-unit semester classes captured by clocks and calendars that terminate into letter grades. According to the Commission on Education report as cited by Tagg (2003), boundaries for establishing a student's growth are defined by schedules instead of standards for learning. Little consideration is given to the learning as the assumption is that all students will be able to learn the material at the end of each semester and they learn at the same rate. The mission of the college is to produce student learning and will result in how well the student achieved by providing a letter grade.

American colleges and universities have a more varied mix of students than any high school system in the world. The high schools do not have the same level of mixed student populations and the transition into the various cultures can have an effect on how well students transition into the college environment. Tagg (2003) further stated that college staff and administrators need to make an effort to realize that the students' coming into the college institution for the first time are new and are different than the students whom they already know. Although school is not new to the students coming

onto the college campus, the cultures and the environment are new and can affect whether or not a student stays or quits.

College is a major transition for high school students to make prior to their actual high school graduation. As mentioned in the high school environment section, this transition is difficult for students who transfer into new high schools. According to Blum (2007), friendship connections and networks are broken, and both student relationships and school attachment suffer. High school students are fearful when they take courses on a college campus and do not have the security of their friends or of teachers whom they have seen daily for a number of years in the familiar high school environment. These insecurities may have a negative impact on their course achievement. However, college credit-bearing courses taken for dual credit purposes in the high school environment may result in more positive achievement than for the same college credit-bearing course offered on the college campus. The college environment and culture are not the same for the high school student as a first-year college student. High school students do not have the opportunity to take part in typical first year programs and therefore, cannot become immersed in college support services and social activities.

This study compared the achievement for high school students who took college English and college Algebra credit-bearing courses offered at each the high school setting and The College setting. The researcher wanted to know if there was a difference in the academic achievement given for a college credit-bearing course for the high school students when the student elected to study in an unfamiliar setting: The College campus. The importance of the study, and others like it, can have an impact on how dual enrollment and other early college programs for students influence educators and

legislators. Colleges and universities will be more confident offering more and expanded dual enrollment programs if there are no significant differences in academic credit received no matter where the college credit-bearing course is offered.

### **Student Background**

Students' background has some bearing on their potential success in dual credit programs. A report by Fry and Lopez (2012) appearing in the Pew Hispanic Center publication stated that Hispanic students are the largest minority population in the country. However, socio-economic factors limit their access to college, and their high school and college graduation rates lag behind other sub-groups (Fry & Lopez, 2012). It is important to look at the Hispanic population because they make up the majority of the population in the region in which the study took place.

According to the American Institutes for Research (2011) study on Texas dual credit programs and courses, a greater percentage of students taking dual enrollment courses were female. The report stated that the percentage of females taking dual credit courses was higher than the percentage of all female high school students within the State of Texas. By ethnicity, the majority of student taking dual enrollment are white with a slightly lower percentage of Hispanics. Hispanic students outnumber white students in the overall State wide population census.

The most frequently offered dual credit courses include English language courses (to include reading and journalism), mathematics courses (to include algebra and pre-calculus or calculus), science courses (that include physics, chemistry, animal/aquatic/equine science), and social study courses (which include history, government and economics). Other dual credit courses offered as electives include fine arts in music, art,

animation and foreign language courses that include French, Spanish, German, Japanese, and American Sign Language. Career and technical paths for students are made possible through courses such as business, culinary arts, automotive technology, hospitality, advertising, and computer-assisted drafting/engineering systems. Additionally, the size of a high school dictates how many and what courses are offered at each individual school because of the availability of credentialed instructors, available school resources, and interest of students. The majority of courses taken by students were social/studies followed by English language arts courses. In contrast, some of the least taken courses were mathematics and sciences courses (American Institutes for Research, 2011).

The American Institutes for Research (2011) reported on Texas dual credit programs found that male students took a greater concentration of coursework in career or technical education and mathematics than female students. Female students took a greater concentration of coursework in English language arts than male students. The report found that there was a high pass rate for dual credit course with 94% or better pass rate depending on the subject. No data were represented that provided insight to success rate of male students versus female student.

### **Seven Vectors**

Over the years, colleges and universities have studied programs and services that assist college students with learning and personal development. These programs and services lead to persistence, retention, and completion of college degree plans. Student development theories have emerged to ascertain how students develop when in college. Some of the more noted theorist credited for making major contributions to student

development theories include Chickering (1969), Erikson (1968), Havinghurst (1972), Kohlberg (1971), and Perry (1970).

Chickering and Reisser's (1993) Seven Vectors Psychosocial Theory is the best student development theory for this study because it identifies all the phases that a student goes through as he or she matures through adolescence and into college years. Psychosocial motivation theories are based on a psychological study on what motivation is, how it works, and what the benefits are. Typically, the theorists claim motivation to higher accomplishments can only happen once a lesser accomplishment has been achieved. Chickering's vectors address both the development phases of the high school age students and the progression they go through as they mature in their college years. Pascarella and Terenzini (2005) claimed that there has not been a psychosocial theorist who has had more influence on the research of college student development than Chickering, who labeled his seven dimensions vectors because each seems to have direction and magnitude. The direction these vectors take can be step-by-step or spiral direction. A central theme through Chickering's work is that the college is uniquely suited to provide a potential for human development. The college setting is the best environment for students to meet or to exceed their potential (Garfield & David, 1986).

Chickering and Reisser's (1993) added a seventh vector to the list that Chickering had created in his earlier work, *Education and Identity*, (1969). The seven vectors are widely used to gain insight into the development of college students both academically and socially throughout their college experience. Chickering's work is important to try to understand the transitions that high school students experience as they are introduced, and then thrust into higher education through the dual enrollment experience. The seven

vectors are developing competence, managing emotions, moving through autonomy toward interdependence, developing mature interpersonal relationships, establishing identity, developing purpose, and developing integrity.

### **Vector One**

Developing competence is the first vector identified by Chickering that includes intellectual, physical and manual, and interpersonal qualities. He asserted that these three kinds of competence are related specifically to college students. The first of these is college-intellectual competence whereby the student uses his or her mind to master content, and to gain intellectual and aesthetic appreciation to build a repertoire of skills to comprehend, analyze and synthesize. The next competence is physical and manual skills which can involve athletic and artistic achievements. Interpersonal competence is the third competence, which involves using initial skills of listening, cooperating and communicating to work with other students or in group functions to achieve group goals (Chickering, 2009).

Pascarella and Terenzini (2005) highlighted several psychosocial theorists whom they divide into two categories. The first category of psychosocial theorist discusses overall development, which is dominated by Chickering's seven vectors. The second category of psychosocial theorists considers identity formation. Chickering and Reisser(1993) build upon Erik Erikson's psychosocial models. Erikson is noted for his eight stages of cognitive development. His fourth stage of development, the industry versus inferiority stage is somewhat similar to Chickering's first vector in that the child begins to cope with new social and academic demands as he or she develops. This phase covers children in grades six through twelve (Chapman, 2011).



Erikson's work centers around three elements that include epigenetic principle, series of crises, and identity versus identity confusion. According to Pascarella and Terenzini (2005), epigenetic principle asserts "that anything that grows has a ground plan and that out of this ground plan the parts arise, each part having its time of special ascendancy, until all parts have arisen to form a function whole" (p. 20). This principle implies more than a "sequential, age-related, biological and psychological development" to include a view of how the environment shapes a person (p. 20). Chickering's first vector of developing competence involves an increase of intelligence, physical maturity, skills development, cultural awareness, and higher-order cognitive skills. His development, although addressing college students, can be seen as an extension of Erikson's epigenetic principle.

### **Vector Two**

Deciding to take a college credit-bearing class might be daunting to a junior or senior in high school. Managing emotions is Chickering's (1969, 1977, 2011) second major vector followed by his third vector, moving through autonomy toward interdependence. Managing one's emotions is necessary as a student strives for self-sufficiency and the pursuit of self-chosen goals. Cognitive development and emotional development are closely intertwined. Teens grow up subjected to increased demands on their physical, social, and emotional resources according to Oswalt (2010). Teens learn to cope with a range of diverse emotions as they deal with increasingly difficult academic standards, sports and/or other recreational challenges in both home and academic settings.

### **Vector Three**

Moving through autonomy toward interdependence, Chickering's (1969, 1977, 2011) third vector, helps students to think critically and to self-direct their choices as they separate from parents into reliance on themselves, peers, and other non-parental adults. This vector involves development of emotional autonomy, of goals, and of recognition of one's interdependence with others. Students begin gradually to decrease the need for approval and reassurance from parents, teachers, and peers as they move toward more independence and self-regulation. They begin to recognize interdependence is important and to seek help from appropriate people as they develop personal goals and identify necessary resources (1969, 1977, 2009).

Astin's (1993) I-E-O model encompasses several of Chickering's vectors. Astin's input-environment-outcomes model (I-E-O) is often cited to compare the influence of both institutional and student characteristics on the learning and personal development of students. In one of his studies, Astin found that "the single most powerful source of influence on the undergraduate student's academic and personal development is the peer group" (p. 4). Astin also stated that "student-student interaction had its strongest positive effects on leadership development overall academic development, self-reported growth in problem-solving skills, critical thinking skills, and cultural awareness" (p. 4).

### **Vector Four**

Developing mature interpersonal relationships is Chickering's fourth vector. Students begin to develop mature relationships, which involve tolerance and a capacity for intimacy. He maintained that "tolerance can be seen in both an intercultural and an interpersonal context" (Chickering, 2009, p.2). The college institution can help students

learn to become aware of and to respect differences, which in turn, provides them the ability to respond appropriately and objectively to the diversity that exists in this new environment (Chickering, 1977, 2006, 2011).

Student-teacher interpersonal relationships are important to a positive learning environment. When the student believes that his or her teacher cares about him or her and about his or her success, he or she is more likely to have positive achievement scores academically (Blum, 2007). Pascarella and Terenzini (2005) maintained that “maturing interpersonal relationships reflect an increasing awareness of and openness to differences in ideas, people, backgrounds and values” (p.22). This study compared academic achievement in two different settings. The relationship high school students have with their teacher in the high school setting may be very different than the relationship the high school student has with his or her teacher at the college setting, thus affecting achievement.

### **Vector Five**

Establishing identity, Chickering’s fifth vector, largely depends on the other vectors as one’s sense of self emerges. Students begin to see themselves within a social context to include family and ethnic origin, as well as religious or cultural traditions.

Development of identity involves (a) comfort with body and appearance, (b) comfort with gender and sexual orientation, (c) sense of self in a social, historical, and cultural context, (d) clarification of self-concept through roles and life-style, (e) sense of self in response to feedback from valued others, (f) self-acceptance and self-esteem, and (g) personal stability and integration (Chickering, 2009, p. 3).

As students mature and begin to understand their roles as young adults, their identities change from experimentation—such as choice of dress, music, physical appearance and social interactions,— to reflecting who they are as reflected by their family origin, ethnic heritage, and cultural traditions. With clarification of identity, Chickering contended that students at this level have left their bizarre variations of behaviors (experimentation of dress and appearance) behind in high school as they adapt to their sexual identity in a collegiate environment (Chickering, 2009). Pascarella and Terenzini (2005) noted that this vector broadens the age range and provides a comfort with self-conceptions relating to gender and sexual orientation.

High school students may find themselves in various stages of maturity. Blum, (2007) pointed out that students react to their physical and emotional surroundings, which has an impact on their behaviors and how they react to their environment. Their choices are becoming important, and they begin to self-identify who they are and how they will react to outside influences.

### **Vector Six**

Chickering and Reisser (1993) used the sixth vector, Developing Purpose for understanding college students and how they use their new sense of identity in decision making and clarifying their purpose in life. The same can be said for high school students as they begin the process of career exploration and higher education needs. Dual enrollment programs provide young adults an opportunity to begin clarifying their goals and purposes in life while they are still trying to identify who they are. Both high school and college aged students struggle to determine their vocational plans, personal interests, and interpersonal and family commitments.

For large numbers of college students, the purpose of college is to qualify them for a good job, not to help them build skills applicable in the widest variety of life experiences; it is to ensure a comfortable life-style, not to broaden their knowledge base, find a philosophy of life, or become a lifelong learner” (Chickering, 2009, p. 4).

Chickering and Reisser (1993) noted that the sixth vector “entails an increased ability to be intentional, to assess interests and options, to clarify goals, to make plans and to persist despite obstacles” (p. 209). Molasso (2006) confirmed that this vector involves developing strategies and priorities that combine vocational plans and aspirations, avocational and recreational interests, and commitments to interpersonal relationships and lifestyles to form the foundation for developing a student’s purpose. A student’s level of involvement in a variety of activities in the college environment is a good predictor of development of purpose in traditional-aged college students (Astin, 1984; Chickering & Reisser, 1993; Pascarella & Terenzini, 2005;). Through research, one can recognize that students who become involved in the college environment succeed academically. High school students are not involved in the college environment, and, as such, they may not have defined their career choice or broader calling. High school students still rely on family and high school teachers and administrators as they begin making vocational choices.

### **Vector Seven**

The final vector, Developing Integrity, is closely related to establishing identity and developing purpose. Chickering (2009) emphasized that “our core values and beliefs provide the foundation for interpreting experience, guiding behavior, and maintain self-

respect. Students bring to college an array of assumptions about what is right and wrong, true and false, good and bad, important and unimportant” (p. 4-5). Developing integrity is the process for one to set personal values and beliefs, to develop congruence in life between personal values and behavior, and to become socially responsible. Chickering and Reisser’s (1993) vectors were not meant to convey a rigid developmental sequence, but rather to suggest the development of foundational skills and character traits.

Unlike Chickering’s seventh vector, developing integrity, Erikson’s (1980) final stage, the psychosocial theory of Ego Integrity versus Despair represents aging as a stage of development. Erikson’s final stage theory is later adulthood. This stage begins when the individual experiences a sense of mortality. This may be due to a response to retirement, death of a spouse, family member, close friend, or the result of changing social roles. Ego integrity is viewed as the key to harmonious personality development—the individual views his or her whole life with satisfaction and contentment. Despair is the result of the negative resolution or lack of resolution of the final life crisis.

The intent of using Chickering and Reisser’s (1993) seven vector theory is not to convey a rigid developmental sequence, but to suggest that development within the earlier vectors provides foundational skills and character traits, which promote healthy development throughout the later vectors. For example, high school students operate in the realm of vectors one through four and college students progress through vectors four, five, and six. All individuals work through vector seven and continually revisit it. These vectors will be used to help understand high school students’ academic achievement in college credit-bearing English and mathematics courses.

### **Summary**

Knowledge needs to be present in authentic context or in settings and situations that would normally involve that knowledge. This study examined whether the settings in which dual credit students completed their college credit-bearing English and mathematic requirements made a difference. It further examined how gender, ethnicity, and high school campus size related to English and mathematics achievement.

Dual credit is an advantageous program in that students have a semester or more of their core college curriculum completed by the time they enter a full-time college career. This saves them money and time. It is important to understand whether or not the situated learning atmosphere has prepared the students for a college career through degree completion.

## CHAPTER THREE: METHOD

### Research Questions

The purpose of the study was to investigate high school graduates' achievements in English and mathematics dual credit courses relative to their on or off college campus dual credit learning experience. It further examined how gender, ethnicity, and high school campus size related to achievement. The following research questions guided the study:

#### Quantitative Research Questions

1. What is the difference in English achievement between dual credit students who completed the English component of the core curriculum requirement for a college degree in a high school setting versus students completing the requirement in a college campus?
2. What is the difference in mathematics achievement between dual credit students who completed the mathematics component of the core curriculum requirement for a college degree in a high school setting versus students completing the requirement on a college campus?

#### Research Design

The study employed an *ex post facto* causal- comparative design. *Ex post facto* research relies on observation of relationships among naturally occurring variations in the presumed independent and dependent variables (Gall, Gall, & Borg, 2007). Due to the retrospective nature of the study, the independent variable was not manipulated by the researcher because what was being investigated had already happened. Causal-comparative research is a non-experimental investigation in which researchers seek to



identify variables that may be used to distinguish between/among groups (Gall, Gall, & Borg, 2007). The independent/ grouping variable was not manipulated; thus, no causal inferences are drawn in causal-comparative studies.

In the study, the setting for the completion of the English and mathematics components of the core curriculum requirement for a college degree, hereafter referred to as the setting, was the independent variable with two levels: (1) high school (characteristic-present group) and (2) college (comparison group). There were two outcome measures: (1) English achievement and (2) mathematics achievement.

### **Participant Selection**

Data were collected from The College because whether students took courses at a high school or The College, The College maintained final grades. Data were also collected from the independent school district to determine high school campus size. The participants for the study were high school students from multiple high schools who had enrolled in The College in fall 2010. There were 428 students who had taken the English dual credit course of which 342 were off-campus students (characteristic-present group) and 86 had taken the course on campus (comparison group). There were 82 students who had taken the mathematics dual credit course of which 25 were off-campus students (characteristic-present group) and 57 had taken the course on campus (comparison group). Due to the non-probability nature of the sampling, external validity was limited to study participants.

An application to conduct the study was submitted to the Institutional Review Board (IRB) at Texas A&M University-Corpus Christi (Appendix A) and permission to conduct the study was obtained from The College (Appendix B).

### **Data Collection**

The College's student information system (SIS) was used to obtain the quantitative data, which included achievement scores in English and mathematics. Additionally, data on gender, ethnicity, and high school size of the study participants were made available to the researcher. Permission to use the data for the purpose of the study was obtained from The College.

Data were collected from The College based on the college credit-bearing end-of-course grade reported by the high schools for each of the students who took their English and/or mathematics dual credit courses during fall 2010. The students were identified by the end-of-course grades reported to the college. Some of the data was collected from students who took their dual credit course at The College and some of the data was collected from students who took their dual credit course at the high schools.

### **Data Analysis**

The data were coded and analyzed, using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize and to organize the data. A series of Chi-square Test of Independence (Daniel, 1995) was performed to examine differences between the two samples of on-campus and off-campus students on the basis of the demographic characteristics of gender, ethnicity, and high school size. The English and mathematics achievement grades were treated as ordinal data ( $A = 4$ ,  $B = 3$ ,  $C = 2$ ,  $D = 1$ , or  $F = 0$ ). A series of Mann-Whitney U tests (Field, 2009) were performed to compare the characteristic-present and comparison groups on the basis of the two outcome measures. The test statistic is  $Z$ . The effect size,  $r = Z/\sqrt{N}$ , where  $N$  is the total number of subjects in both samples, was used to examine the practical significance of the

findings. The effect sizes were characterized as .1 = small effect, .3 = medium effect, .5 = large effect (Cohen, 1988).

### **Summary**

This chapter outlined the research design used to investigate high school students' achievement in English and mathematics dual credit courses relative to their on or off college campus dual credit learning experience. Dual enrollment data for English and mathematics courses were collected from The College and descriptive statistics were used to summarize and organize the data. A series of Chi-square Test of Independence were used to test differences between the two samples of on-campus and off campus students. Results of this study will be addressed in chapter four.

## CHAPTER FOUR: RESULTS

### Introduction

The purpose of the *ex post facto* study was to compare students' achievements in English and mathematics dual credit courses relative to their on or off college campus dual credit learning experience. It further examined achievement according to gender, ethnicity, and school size. The study was guided by the following research:

1. What is the difference in English achievement between dual credit students who completed the English component of the core curriculum requirement for a college degree in a high school setting versus students completing the requirement in a college campus?
2. What is the difference in mathematics achievement between dual credit students who completed the mathematics component of the core curriculum requirement for a college degree in a high school setting versus students completing the requirement in a college campus?

Quantitative data were collected and analyzed to answer the research questions. The College provided the researcher with the quantitative data, which were coded, entered into the computer, and analyzed by the use of the Statistical Package for Social Sciences (SPSS).

### Results

The data for the quantitative component of the study were obtained from two samples. One sample included the students who had taken the dual credit English course ( $n = 428$ ). The students who had taken the dual credit mathematics course ( $n = 82$ ) formed the second sample.

## English Results

There were 86 on-campus students referred to as The College setting and 342 off-campus students referred to as the high school setting. The only demographic data that were made available to the researcher were gender, ethnicity, and high school size. The majority of the students in both groups were female. The majority of the on-campus students were Hispanic, followed by white, and other. The off-campus group was fairly evenly divided between Hispanics (46.20%) and whites (48.00%), followed by other (5.80%). The majority of the students in the on-campus sample (60.50%) were from small high schools (2A), while the majority of the off-campus students (51.20%) were from large high schools (4A). A series of Chi-square Test of Independence were performed to examine differences between the two samples of on-campus and off-campus students on the basis of the demographic characteristics. Gender differences between the groups were not statistically significant; whereas, ethnicity and high schools size differences were statistically significant. Results are summarized in Table 1.

**Table 1***A Profile of Participants, English Sample*

English Dual Credit	The College Setting (n = 86)		High School Setting (n = 342)	
	f	%	f	%
Gender <sup>a</sup>				
Female	62	72.10	206*	60.40
Male	24	27.90	135*	39.60
Ethnicity <sup>b</sup>				
Hispanic	62	72.10	158	46.20
White	19	22.10	164	48.00
Other	5	5.80	20	5.80
Size <sup>c</sup>				
199 & less	4	4.70	22	6.40
200 – 249	52	60.50	20	5.80
430 – 989	1	1.20	42	12.30
990 – 2064	29	33.70	175	51.20
2065 & more	0	0.00	83	24.30

<sup>a</sup>  $\chi^2(1, N = 427) = 3.53, p = .06$

<sup>b</sup>  $\chi^2(2, N = 428) = 19.71, p < .001$

<sup>c</sup>  $\chi^2(4, N = 428) = 155.93, p < .001$

\* Gender unavailable for 1 subject

English achievement was measured by the end-of-the-course grades (A = 4, B = 3, C = 2, D = 1, F = 0). The data were treated as ordinal and mean ranks were compared. The Mann-Whitney U test showed that group differences were not statistically significant,  $z = 1.00, p = .32$ . The effect size ( $r = z/\sqrt{N}$ ) was negligible ( $r = .05$ ). Results are summarized in Table 2.

**Table 2***Setting Differences on English Achievement*

The College Setting (n = 86)		High School Setting (n = 342)		Z	r**	p
Mean Rank	Mean*	Mean Rank	Mean*			
203.28	2.86	217.32	3.13	1.00	.05	.32

\* Data were treated as ordinal and mean scores are reported for the ease of interpretation:

4 = A, 3 = B, 2 = C, 1 = D, 0 = F

\*\* Effect size, .10 = small, .30 = medium, .50 = large

As reported earlier, group differences on the basis of ethnicity and high school size were statistically significant. To rule out ethnicity and high school size as potential confounding variables, group differences on the basis of English achievement scores were tested at each level of ethnicity and high school size, using Mann-Whitney U test. As can be seen in Tables 3 and 4, none of the group differences were statistically significant. All effect sizes were either negligible or small. Thus, ethnicity and high school size could have not impacted the results.

**Table 3***Setting Differences on English Achievement by Ethnicity*

	The College Setting			High School Setting					
	N	Mean Rank	Mean*	n	Mean Rank	Mean*	Z	r**	p
Hispanic	62	106.47	2.77	158	112.08	3.01	.62	.04	.53
White	19	89.39	3.00	164	92.30	3.24	.24	.02	.81
Other	5	13.70	3.40	20	12.82	3.20	.26	.05	.79

\* Data were treated as ordinal and mean scores are reported for the ease of interpretation: 4 = A, 3 = B, 2 = C, 1 = D, 0 = F

\*\* Effect size, .10 = small, .30 = medium, .50 = large

**Table 4***Setting Differences on English Achievement by High School Size*

	The College Setting			High School Setting					
	N	Mean Rank	Mean*	n	Mean Rank	Mean*	Z	r**	p
199 & less	4	10.00	2.50	22	14.14	3.14	1.10	.22	.27
200 – 429	52	38.93	2.73	20	30.18	2.40	1.65	.19	.10
430 – 989	1	6.50	3.00	42	22.37	3.74	1.70	.26	.09
990 – 2064	29	111.33	3.14	175	101.04	2.98	.92	.06	.36
2065 & more	0	NA	NA	83	42.00	3.34	NA	NA	NA

\* Data were treated as ordinal and mean scores are reported for the ease of interpretation: 4 = A, 3 = B, 2 = C, 1 = D, 0 = F

\*\*Effect size, .10 = small, .30 = medium, .50 = large

**Mathematics Results**

There were 57 on-campus and 25 off-campus students. The participants were described on the basis of gender, ethnicity, and high school size. The majority of the students in both groups was female. The majority of the on-campus students were Hispanic (77.20%), followed by White (14.00%), and other (8.80%). The majority of the off-campus group was White (68.00%) followed by Hispanic (28.00%), and other



(4.00%). The majority of the students in the on-campus sample (93.00%) were from small high schools (2A), while the off-campus students were from small high schools, 2A (52.00%) and medium high schools, 3A (48.00%). A Chi-square Test of Independence showed no statistically significant differences between the two samples of on-campus and off-campus students on the basis of gender. Due to insufficient number of subjects, the test of independence was not performed on the basis of ethnicity and school size. Results are summarized in Table 5.

**Table 5**

*A Profile of Participants, Mathematics Sample*

Mathematics Dual Credit		The College Setting (n = 57)		High School Setting (n = 25)	
		f	%	f	%
Gender <sup>a</sup>					
Female		37	64.90	16	64.00
Male		20	35.10	9	36.00
Ethnicity <sup>b</sup>					
Hispanic		44	77.20	7	28.00
White		8	14.00	17	68.00
Other		5	8.80	1	4.00
Size <sup>b</sup>					
199 & less		2	3.50	0	.00
200 – 249		53	93.00	13	52.00
430 – 989		0	.00	12	48.00
990 – 2064		1	1.80	0	.00
2065 & more		1	1.80	0	.00

<sup>a</sup>  $\chi^2(1, N = 82) = .00, p = 1.00$

<sup>b</sup> Test of Independence was not applicable because there were cells with expected count of less than five.

Mathematics achievement was measured by the end-of-the-course grades (A = 4, B = 3, C = 2, D = 1, F = 0). The data were treated as ordinal and mean ranks were

compared. The Mann-Whitney U test showed that group differences were not statistically significant,  $z = 1.35$ ,  $p = .18$ . The effect size ( $r = z/\sqrt{N}$ ) was small ( $r = .15$ ). Results are summarized in Table 6.

**Table 6**

*Setting Differences on Mathematics Achievement*

The College Setting (n = 57)		High School Setting (n = 25)		Z	r**	p
Mean Rank	Mean*	Mean Rank	Mean*			
39.28	1.93	46.70	2.40	1.35	.15	.18

\* Data were treated as ordinal and mean scores are reported for the ease of interpretation: 4 = A, 3 = B, 2 = C, 1 = D, 0 = F

\*\* Effect size, .10 = small, .30 = medium, .50 = large

Group differences on the basis of ethnicity and high school size could not be investigated due to insufficient number of observations. To examine the impact of these demographic characteristics as potential confounding variables, a series of Mann-Whitney U test was performed to examine group differences at each level of ethnicity and school size for which there were data. As illustrated in Table 7 and 8, none of the differences were statistically significant and effect sizes were small.

**Table 7***Setting Differences on Mathematics Achievement by Ethnicity*

	The College Setting			High School Setting			Z	r**	p
	n	Mean Rank	Mean*	n	Mean Rank	Mean*			
Hispanic	44	24.64	1.77	7	34.57	2.71	1.68	.24	.09
White	8	14.13	2.50	17	12.47	2.71	.57	.11	.63
Other	5	3.60	2.40	1	3.00	3.00	.32	.13	.75

\* Data were treated as ordinal and mean scores are reported for the ease of interpretation: 4 = A, 3 = B, 2 = C, 1 = D, 0 = F

\*\* Effect size, .10 = small, .30 = medium, .50 = large

**Table 8***Setting Differences on Mathematics Achievement by High School Size*

	The College Setting			High School Setting			Z	r**	p
	n	Mean Rank	Mean*	n	Mean Rank	Mean*			
199 & less	2	1.50	4.00	0	NA	NA	NA	NA	NA
200 – 429	53	31.25	1.77	13	42.65	2.62	1.97	.24	.05
430 – 989	0	NA	NA	12	6.50	2.17	NA	NA	NA
990 – 2064	1	NA	NA	0	NA	NA	NA	NA	NA
2065 & more	1	NA	NA	0	NA	NA	NA	NA	NA

\* Data were treated as ordinal and mean scores are reported for the ease of interpretation:

4 = A, 3 = B, 2 = C, 1 = D, 0 = F

\*\*Effect size, .10 = small, .30 = medium, .50 = large

**Summary**

The study was limited to only those students receiving college credit in English 1301 and Mathematics 1314 for the fall 2010 semester. The small number of students in this study made it difficult to provide generalizations. However, the analysis of these data sets indicated that there are no significant differences in achievement scores for

students who took their English and mathematics college credit courses at The College campus to those students who took their English and mathematics college credit courses off-campus at the high school location.

## **CHAPTER FIVE: SUMMARY, CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS FOR FURTHER RESEARCH**

### **Introduction**

Dual credit programs have become an essential part of how high school students approach higher education, which allows them the opportunity to earn college credit for coursework they complete while still in high school. However, the literature indicates that different campus settings produce different outcomes of academic achievement (Renn & Patton, 2011). Nevertheless, dual credit programs are designed for students to have similar outcomes regardless of campus settings. This chapter examines the achievement scores of dual credit achievements in English and mathematics courses taken at a high school setting and at a college setting. The results could help improve the understanding of how faculty and administrators view the effectiveness of the setting in which students complete college credit core curriculum. This study explored the students' achievement in English and mathematics dual credit courses relative to their on or off college campus dual credit learning experience. One setting was a high school campus and the other was a community college campus. It also examined academic achievement according to gender, ethnicity, and campus size.

The study was guided by these research questions:

1. What is the difference in English achievement between dual credit students who completed the English component of the core curriculum requirement for a college degree in a high school setting versus students completing the requirement in a college campus?

2. What is the difference in mathematics achievement between dual credit students who completed the mathematics component of the core curriculum requirement for a college degree in a high school setting versus students completing the requirement in a college campus?

Two of the core curriculum courses for any major college degree plan include first year English and college algebra, the latter referred to as mathematics in this study. Studies on the issue of college versus high school preparedness have not been investigated. Faculty and administrators have mixed opinions over the setting where high school students complete college credit courses. The overarching question in this study was to examine two groups of high school students enrolled in dual credit courses at a college and high school to determine if there was a difference in achievement level. Overall, campus environment did not affect academic achievement although previous literature indicated that it should. For English only, ethnicity and campus size affected achievement. The remainder of the chapter addresses both non-significant and significant findings of the research.

### **Conclusions**

The study originated from a conversation with a few of The College's faculty who were skeptical of the quality of instruction dual credit students were receiving at the high school setting. Because campuses have different effects about how students view themselves within a learning environment, it seemed most prudent first to determine if there was a difference in the achievement scores by dual credit students who took the English and the mathematics college credit-bearing courses by setting. Once this was completed, further analysis found that gender was not statistically significant for English

achievement, but ethnicity and campus size were. Furthermore, gender ethnicity, and campus size were not statistically significant for mathematics.

Chickering and Reisser's (1993) seven vectors theory and other literature provide insight into student behavior in early college programs. This theory provides a way to view dual credit courses offered in two very different settings. One setting is a college campus and the other is a high school setting. The seven vectors include (a) developing competence, (b) managing emotions, (c) moving through autonomy toward interdependence, (d) developing mature interpersonal relationship, (e) establishing identity, (f) developing purpose, and (g) developing integrity. The definitions of these vectors are explored more thoroughly in Chapter 2 of this study.

### **English Achievement**

All tables discussed in this section can be found in Chapter Four of this study. There were 86 students who took the English dual credit course on the College campus and 342 students who took the English dual credit course at their local high school. Table 1 profiled the participants in three areas, gender, ethnicity, and size. Size was defined as the population size of census count for the high school participants attended. The researcher examined the independence between the two samples of participants.

Differences for gender were not statistically significant between the two groups, although the literature suggests that learning environments affect students differently (Blum, 2007; Chickering & Reisser, 1993; Mace 2009; Tagg, 2003). One of the major effects is that a high school campus is a familiar place where students, regardless of gender, have support and friends, but a transition to a college campus can produce breaks in friendships with fewer support structures, thus student performance can decrease.

However, the results showed no statistical difference in student performance. Females on average outperform males in reading and writing and take more credits in academic subjects while in high school. The percentage of degree completion between male and females is the same, which suggests that degree completion is gender neutral (National Center for Education Statistics, 2011). The study showed no difference in achievement scores by gender attainment, which indicates dual credit programs can be gender neutral, assuming students are able to manage their goals appropriately. According to Chickering and Reisser (1993), vector two relates to students' ability to manage emotions as necessary to self-sufficiency and pursuit of goals; whereas a high school campus may provide friendship and support for students' success, those high school students at The College campus may have the necessary emotional maturity to adapt to the environment for their success.

It is also noted that the number of females outnumbered the males in each of the groups. A possible reason for more females electing to participate in a dual credit course might be maturity. Chickering and Reisser (1993) identified developmental vectors to explain overall human development. Chickering's fifth vector, Developing Identity, particularly a sense of self in a social, historical, and cultural context, helps explain the results. Other literature appears to confirm this. At least in Texas, a greater percentage of females take dual credit courses. Regionally, the, the social, historical, and cultural context appears to be a driving force for more females than males taking dual credit courses (American Institutes for Research, 2011).

A study by Greene and Winters' (2006) found that "female students graduate high school at a higher rate than male students. Nationally, 72 percent of female students



graduated, compared with 65 percent of male students” (para. 2). Research has shown that girls physically mature faster than males. This might account for the differences in girls participating in dual credit English as compared to the males taking dual credit English in both groups.

Table 1 of the study indicated a statistically significant difference on the basis of ethnicity between the two groups. The percentage of Hispanic students who participated in dual credit English in both groups was higher than the white students who participated. At The College setting, the Hispanic students outnumbered the white students three to one. One reason that more Hispanics enrolled in dual credit English might be the location of the study. Hispanics in the region of the study make up 61% of the population whereas Whites make up 33% of the population where the study took place (U.S. Census Bureau, 2010). The state average of Hispanics in high school is 48%, which is 13% less than the population of the area where the study was conducted. Allen (2010) found that demographic data on dual enrollment programs is not collected nationally, leaving researchers little information on social or academic backgrounds of participants.

In the study, the number of Hispanic students taking dual credit English at the high school setting was slightly lower than the white students taking dual credit English at the high school setting. Chickering and Reisser’s (1993) sixth vector, Developing Purpose, may be a reason that slightly more white students participated in the dual credit program. Students use their sense of identity to make decisions and clarify their goals. More Hispanic students are identified as first-time-in college students; whereas, a majority of white students are following the footsteps of parents and even grandparents.

White students would see themselves entering a college or university upon graduation and self-selecting to participate in dual credit English.

The percentage of white students taking dual credit English at the high school setting was twice as high as the percentage of the white students taking dual credit English on The College campus. A county census review showed that the ratio of Hispanics to white students varied by only a few percentage points in several of the rural high schools (U.S. Census, 2010). This would explain why the ethnicity of students participating at the high school setting would be more evenly distributed. The College is located close to a university. Census reported documented that white families are slightly more affluent than Hispanic families. White families may have elected to send their children to the university because money was not an issue.

School size between the two groups in Table 1 was statistically significant. High school students who took dual credit English at The College campus were largely from small high schools of 200 to 249 students. The second largest percentage of students taking dual credit English at The College were from mid-size high schools of 990 to 2,064 students. The mid-size high schools had close proximities to The College, but the small schools were located in rural areas. Rural students who selected to attend dual credit English at The College might be seen as developing purpose and intentionally selecting to leave the safety of their high school setting and make plans for their futures despite obstacles such as travel and cost. A possible reason for the statistical significance based on school size might be because a small school has fewer resources due to its size and more students took advantage of participating in a dual enrollment program to earn college credit. The rural student might be striving for self-sufficiency and the pursuit of

self-chosen goals as identified in Chickering's third vector, moving through autonomy toward interdependence (Chickering & Reisser, 1993). Another indicator might be that the high school was too small to provide dual credit English at the high school setting, and students interested in the program had to come to The College campus. According to the Nueces County Census, 13 of the 23 high schools have populations under 400 students (U.S. Census, 2010).

Table 2 of the study showed the end-of-the-course grades given for English college credit. There was no statistical significance between the two groups of students who took the dual credit English course at The College or at the high school settings. The students at the high school setting received slightly higher grades than those at The College. Dual enrollment programs for both groups appeared to broaden and enhance students' academics and lessen the time spent at an institution of higher learning upon graduation (Allen, 2010). Students are establishing an identity apart from other high school students and see themselves achieving at a higher level at both settings. Seeing themselves within a different social context provides a direction and purpose. Students are operating in vectors five and six as established by Chickering and Reisser (1993). Additional research from a study presented by Tagg (2003) claimed that "students' beliefs and attitudes about schooling are intimately connected to beliefs and attitudes about themselves" (p. 48). Allen (2010) referenced an Iowa psychology instructor who matched high school dual enrollment students with high ability students in a college campus class. There were no differences between students on college campuses and in the high school campuses. This study found no differences in academic performance as well. This seems to mirror vector one (Chickering & Reisser, 1993). Vector one asserts

that competence plays a key role in success. Intellectual competence is present and aesthetic appreciation leads a student to build a repertoire of skills for comprehension, analysis, and synthesis. Thus, dual enrollment program student-success may not be so much about the campus setting as it is about student competence to participate in the program.

As reported in Table 3, group differences for English achievement for both groups were not statistically significant when tested at each level of ethnicity. Both the Hispanic and white students received a slightly higher achievement grade for their English dual credit class than those students who took the course at The College campus. Students' familiarity with their instructors and classmates at the high school setting may be a resulting factor of slightly higher scores. High school students taking college credit-bearing English at The College may have had some anxiety about being placed in a classroom with older students who have experienced more years of formal schooling. In vector three, moving through autonomy toward interdependence, Chickering (2009) noted that new relationships replace old ones and students strive for a need for independence in addition to inclusion. Students might have struggled with feelings of anxiety and of inclusion in the College setting resulting in slightly lower scores, but it is noted there was not a statistically significant difference.

At each of the group settings, white students' achievement scores were slightly higher than Hispanic students. The National Center for Education (2011) report confirmed that the Hispanic-White achievement gap still remains a challenge while white students continue to have, on average, overall higher scores on all assessments. Hispanic students at this age identify themselves through their family's ethnic heritage and origin.

They define themselves as part of their religious and culture traditions and their traditional role in society (Chickering, 2009). Hispanics, who have not traditionally seen themselves as scholars, are emerging with a new sense of identity as seen in Chickering's fifth vector. These slightly lower achievement scores might be a result of family support and lack of a family tradition to attend college.

Achievement differences tested at the level of high school size were not statistically significant between the two sample groups in Table 4. However, both the small and mid-size high school students had slightly higher achievement scores at the high school setting than those at The College campus. Students at the high school setting were more familiar with their peers, teachers, and surroundings than those students at The College. The students at The College might have felt a need to study more due to feelings of anxiety and inadequacy. Another possible explanation might be that there are more student support services in a college setting for college level courses. High school classes meet for 50 minutes, five days a week as opposed to only 50 minutes for three days per week.

The Freshman English text is composed of a reader that contains literary essays and a writing handbook. Students are required to create an essay on a topic that they have chosen or that has been assigned, organize their thoughts, compose, edit and revise their composition. At the high school campus, students are with their English instructor for five days a week for a minimum of 50 minutes a day and access to the instructor throughout the day for 180 days per semester. At The College campus, students see their instructor for one hour and twenty minutes twice a week for sixteen weeks. The requirements are the same for the course, but access to the instructor both in hours and

time does not compare to the high school campus experience. The students taking dual enrollment courses are chosen through placement exams, therefore, they are expected to perform at a college level.

However, the students at the high school campuses have slightly higher scores. They tend to be more familiar and comfortable with their instructor and they have a greater opportunity through time and access to learn from the instructor than those students who are at the college campus. Students at the high school setting are still in the process of managing their emotions and tend to cling to what is familiar for reassurance and support. High school students who take their dual credit courses at the college setting have left their familiar high school setting, peers, and familiar instructors behind and may still desire that sense of security they left behind (Chickering, 2010).

To enroll in the English college-credit course, students must have passed the Exit-level Texas Assessment of Knowledge Skills (TAKS), must have taken the Texas Higher Education Assessment (THEA), and received a sufficient score, or students must have passed TAKS and received an exemption from THEA because of sufficient TAKS, SAT or ACT scores (Texas Education Agency, 2010). Because the focus for students is high school graduation, teachers will often recommend students drop from the college-credit class if they are in jeopardy of not passing. This affords dual credit instructors the advantage of having more students with a higher grade average per class. For additional support at the college campus, students must access a college writing center where they may feel inadequate with yet another unfamiliar learning environment. The college has a mandatory 50 minute writing lab or ENGL1301 once per week attached to the course, but the high school students taking ENGL1301 have an entire week to do the lab on-line.

Students can work on lab assignments at any time or place, and save and go back to already completed work for revisions. More importantly, they have the high school dual credit instructor constantly reminding them to do the lab.

### **Mathematics Achievement**

All tables referred to in this section can be found in Chapter Four of this study. There were 57 students who took the mathematics dual credit course on The College campus and 25 students who took the mathematics dual credit course at their local high school. Participants were described in three areas, gender, ethnicity, and high school campus size. Group differences for gender were not statistically significant between the two groups.

The majority of females outnumbered the males in both groups. Studies have shown that females typically do not participate in mathematics courses (American Institutes for Research, 2011; and National Center for Education Statistics, 2011). One possible reason for more females taking the mathematics course is more time for preparation and study than the males. This course was taken in the fall semester in a region where high school football is a major event in all of the high schools. Only male students play this sport. In Table 5, more female students took the mathematics dual credit course at both The College campus and at the high school. Dual enrollment programs attract students that want to get through college in a shorter amount of time and those students who want to take advantage of the lowering the cost of a formal education. Some males go into the military for the salary, the benefits, and the later use the GI Bill for education. Going into the military is culturally acceptable in the Coastal Bend region of Texas and often encouraged by school counselors and family members (Kleykamp,

2006). Also, curricula at both high schools and colleges now emphasize science, technology, engineering, and mathematics (STEM ) (Anderson & Kim, 2006).

Therefore, mathematics may be less of deterrent for females as it was in the past. This also suggests that vector six may impact decisions and performance. Chickering and Reisser (1993) noted that this vector “entails an increased ability to be intentional, to assess interests and options, to clarify goals, to make plans and to persist despite obstacles” (p. 209). The study of mathematics may be becoming less of an obstacle for females, whether by STEM influences or increased ability to be intentional by students participating in dual credit programs.

The fact that more females took the mathematics course might be due to them meeting the academic requirement through test scores to take the course. Data from the National Center for Education Statistics (2011) showed that girls have a higher grade point average than male students upon graduation from high school. Although more male students score higher on tests in physics, engineering, and computer science, the normal economy draws more males to the workforce for military, construction, oil field, and factory jobs. More males in the workforce decrease the number electing to go to college.

According to the American Council for Education there has been a decline in the number of male students attending higher education largely due to the increased number of female low-income whites and low- and middle-income Hispanics electing to attend college (King, 2006). The data in Table 5 indicated a much larger percentage of Hispanics taking mathematics at The College. This would correlate with the American Council report on an increased number of low- to middle-income Hispanics attending college. White students outnumbered the Hispanic and other ethnic groups at the high



school campuses. The reason may be that there are more low income white students in the more rural areas that offer dual enrollment programs at the high school setting.

Although Chickering and Reisser's (1993) vectors do not appear to be related, Erikson's (1980) stage of Ego Integrity is related. It maintains that individuals experience a sense of mortality as they develop based on a number of issues, such as a change in social roles. So, as students mature and come to grips with their environment and the limitations and options provided by that environment, they seek ego integrity to bring a harmonious aspect to their personality for satisfaction and contentment as they deal with their situations.

Due to insufficient number of subjects, the chi-square test of independence was not performed on the basis of ethnicity and school size. However, Hispanic students made up the majority of students participating in the mathematics dual credit course on the College campus, while white students made up the majority of students at the high school setting. Statistically, Hispanics in the region of the study make up 61% of the population whereas whites make up 33% of the population (U.S. Census Bureau, 2010). The average Hispanic population in the State of Texas is 48% while the region population is approximately 61% Hispanic. A possible conclusion for more white females participating at the high school setting could be due to the size of school represented and male students participating in sports programs. This study was conducted in the fall semester and the major school sport was football, which could mean that male students were pursuing their personal interests by choosing a sport activity over academics.

High school students who took dual credit mathematics at The College campus were largely from small high schools of 200 to 249 students. This might be attributed to

the lack of early college programs at small school districts. Smaller districts have a smaller pool which to choose teachers, so they might find it more difficult to hire teachers who the district can credential in mathematics. That might account for the fact that small districts in rural areas have students bussed to The College campus. Allen's (2010) research found that larger public high schools are more likely than small schools to offer dual credit programs. Based on theory, students from small high schools might be seen as exercising their decision making skills by selecting to leave the safety of their high school and desire to make future plans toward achieving their vocational plans and aspirations as indicated by Chickering's sixth vector, Developing Purpose (Chickering, 2009). The high school learning environment provides a safe environment so that students can focus on learning yet provide the social interactions that teenage students desire through clubs, sport competitions, and class field trips. Those students electing to attend college at a college campus are demonstrating purposeful behavior and the desire to encounter a new learning environment without the need to be surrounded by their friends.

Mathematics achievement measured by the end-of-course grades in Table 6 was not statistically significant between the two groups. The students at the high school setting received higher end of course grades than those at The College. Mathematics is generally a more difficult course for many students. Kamil (1998) is convinced that students have a fear of math because it is taught in a way that is impossible for a student to understand. She clarified that math is taught as a set of rules to memorize with no relationship to real life. Chickering's Vectors indicate a progression, which allow them to develop their own numerical concepts and invent solutions that make sense to them.

Students participating in the dual credit mathematics program are beginning to exercise their decision-making abilities and are establishing an identity apart from other high school students. Attending the mathematics course at The College setting may give them a sense of achievement not felt at a high school setting. Students are operating in vectors five and six as established by Chickering and Reisser (1993).

Vector five is establishing identity. Becoming involved in a life changing program such as completing dual credit courses, enables students to make a statement to their peers. This suggests that they are now ready to move forward with earning college credits toward a degree in a field of their interest. They are comfortable enough in knowing who they are and making choices for themselves that do not include their peers. Vector six is developing purpose (Chickering & Reisser, 1993). By succeeding in dual enrollment courses, students are choosing future directions and making academic choices that will help them succeed in future careers. The fact that high school students may have out-performed students at the college level, in general although not statistically different, leads one to believe that they did not feel a sense of anxiety due to the familiarity of their instructors and classmates.

Tables 7 and 8 showed the impact of group differences based on ethnicity and school size. None of the differences were statistically significant. Table 7 reported the overall end-of-course-grade by ethnicity. White students outscored the Hispanic students for the end of course grade. The results in this study showed there are no statistical differences between the two groups; this implies that the learning environment on both campuses was such that students performed similarly. The course requirements are the same for both campus groups, which is another reason that there were no statistical

differences in the academic score earned. The literature suggests that different environments should produce different outcomes. However, the given study showed the contrary. Program structure may mitigate the effects of campus environment.

An achievement gap exists between white students and Hispanic students in all subjects. The gap is even greater in mathematics than English according to the National Center for Education (2011). Cultural differences in how Hispanic students see themselves and participate in academia are one reason that they do not perform at the same level as the white students. Chickering's (2009) fifth vector theory, establishing identity may explain why Hispanic students have slightly lower achievement scores in mathematics. The Hispanic culture defines their family structure and typical career choices. As noted by the National Center for Education Statistics (2011), 5.6% of Hispanic students drop out prior to graduation as opposed to 1.9% of white students. These statistics may suggest that the Hispanic culture views education differently than the white cultures. These slightly lower achievement scores might be a result or lack of family support to attend college and lack of a family tradition to attend college. However, the results of the study showed that the campus settings did not make a significant difference in achievement scores as they were not statistically significant between the two groups.

Upon enrolling in dual credit programs, students make choices as to the subject matter and number of dual credit courses they will take. They must decide what they will study, how often they will interact with their instructor, balance extracurricular activity, balance study, recreational time and work. Students at the high school campus have the advantage of being able to access their teacher on a daily basis. However, they must

make an effort to put in extra time and study to complete the extra work associated with a dual credit class than their peers do. As described by Chickering's fifth vector, students begin to form their identity of who they are and who they want to become. Through their choice to earn college credits while still in high school, dual enrollment students move immediately into Chickering's sixth vector by developing their purpose in life.

The college campus makes it easy for students to feel good about following their dream of achieving a college degree. Although The College campus is much larger than the high school campuses, Hispanic students seem to make the transition just as easily as the white or other ethnic groups. High school students are motivated by external rewards and the most common reason, according to Tagg (2003), is that students do well in school so they can get into college. High school students are selected for dual enrollment programs because of good test grades and recommendations from instructors. Students have already seen themselves at exceptionally talented in one of five important areas which include mathematics, science, music, athletics, or art. Students are creating a new sense of identity and purpose for their future.

Achievement differences tested at the level of high school size was not statistically significant between the two sample groups in Table 8. However, students from the small high schools had a slightly higher achievement scores than those at the College campus. Tagg (2003) asserted that smaller student classroom sizes and more time with instructors result in better achievement scores. Blum's (2007) study claimed that high school students were more productive in the high school setting where they interacted with their peers, teachers, and surroundings than those students at The College campus. A possible explanation for small high schools to have slightly higher

achievement scores than their peers taking dual credit mathematics at The College setting is that students at the college felt a lack of close support from their teachers, family and peers leading to feelings of anxiety or of inadequacy. This may be one instance where, although not statistically significant, students' sense of comfort (Chickering & Reisner, 1993) may be affected by the classroom size.

This study showed that there was no statistical significance in math achievement between the two groups. It very well could be that although campus settings have different expectations (Chickering & Reisner, 1993), the expectation of participating in college level courses overrides the campus environment according to the Vectors.

### **Discussion**

In recent years there has been a push for dual enrollment programs across the United States. Many states such as Texas have put dual enrollment course offerings into legislation to try to reduce the cost of higher education and to provide more students an opportunity to participate in college credit-bearing courses prior to high school graduation. Students are afforded the option of enrolling in dual enrollment courses at their local high school, at a college or university campus or on-line instruction. Mace (2009) referenced a 2005 National Center for Education Statistics report that reported 98% of public two-year institutions and 77% of public four-year institutions had high school students taking college course for credit on their campus.

Dual enrollment programs are here to stay. Therefore, postsecondary institutions, both public and private are challenged to provide support for these programs and possibly to increase course offerings. Concerns in the field might be the challenge of quality of instruction and rigor of college credit-bearing courses offered at the high school campus.

Farrell and Seifert's (2007) study noted that "postsecondary institutions and high schools enter into dual-enrollment programs for well-intentioned reasons. The most common issues concern students' academic preparation, the availability of college student services, faculty preparation and training, and lack of formal evaluation measures" (p. 70). Many colleges and universities have adopted a statement on their websites such as the one used by Northwest Missouri State University: "To ensure an appropriate rigor for dual credit courses, the instructors and course content for dual credit must be approved by the subject matter department at Northwest Missouri State University" (Northwest Dual Credit Program, n. d.). The Texas Education Agency (2010) stated that the college is responsible for the college course material and awards the college credit upon successful completion of the course. This ensures rigor of the college credit-bearing course leaving parents, students, policy makers, and educators with confidence that dual enrollment courses are offered at a college level. The results of this study showed that both English and Mathematic achievement outcomes were not statistically significant between the students who took their course at the high school with those who took their courses at The College.

The premise that dual enrollment programs offered at the high school setting are not up to the same standards as the same courses offered at The College can be mitigated by a number of studies. Dual enrollment programs allow younger high school aged students to begin this path of maturity by providing them with the opportunity for academic success and the natural succession into vector six, developing purpose. Garfield and David (1986) claimed that the central point of Chickering's work surrounding the identification of one's life events, as seen through the seven vectors,

promotes the idea “that the college or university is uniquely suited to promote the development of human potential” (p. 483). College courses are designed to develop students academically thus allowing students to establish a more mature identity and advance their purpose in life. Pascarella’s and Terenzini’s (2005) research claimed evidence of significant changes in students’ values, attitudinal, psychosocial and moral dimensions during the college years.

Another concern is the college preparedness of the high school student. The intent of higher education was to give students a limited number of skills, insights, and points of view that would somehow help them find a good job and a satisfying life (Chickering & Reisser, 1993). The intent of dual credit has changed over the years. Originally, dual credit programs were established for the gifted students who were bored with regular high school curriculum. Later these dual credit programs expanded to the non-gifted students capable of college success but who might have trouble in the transitions from high school to college (Andrews, 2004). Some advantages of dual credit programs according to Texas Higher Education Coordinating Board (2010) include the likelihood that a student will complete high school and enroll in and persist in college, the decreases in the cost of tuition and fees for students by accelerating time to degree, the new graduates enter the workforce sooner and begin to earn wages (benefiting themselves and the economy), and the contributions to the goals of Closing the Gaps (THECB, 2010) through greater participation and increased academic success. To be accepted into a dual enrollment program, junior or senior high school students must meet college prerequisite requirements designated for the course through college placement tests. The course offered for dual credit by the community colleges must be identified as college level



academic courses and adopted by the Coordinating Board. If they are not successful, their college transcript will be marred with a permanent record of poor academic achievement. Students may experience frustration and possibly fatigue as they try to complete high school and participate in college simultaneously (Mace, 2009). Students enrolling in dual credit courses are academically prepared, but their emotional preparedness is up for debate.

This study examined the academic achievement of dual credit courses in English and mathematics offered at two locations, a college campus and a high school campus. Results reflected that academic achievement was not compromised at either location. What was apparent from the study was that a greater number of female students participated in the dual credit program than did male students. Because of the population distribution in South Texas, it is not surprising that the results showed more Hispanic students were enrolled in the dual enrollment courses. In addition, results showed that white students out-performed Hispanic students on all academic assessments. These results are consistent with results in a number of national reports (e.g., Anderson, & Kim, 2006; and King, 2006). However, results were not statistically different. This suggests that dual enrollment students are prepared and do quite well academically in college credit-bearing courses regardless of setting and ethnicity.

An advantage of providing dual enrollment classes at the high school setting is cost. Students do not have to drive to the college campus and the courses are often tuition free. Faculty at the high school can be trained by the college and can serve as adjunct instructors (Mace, 2009). As stated above, courses offered for dual credit by the community colleges must be identified as college level academic courses and students are

enrolled based on successful college placement exam scores. Because students' end of course grades in both the English and mathematics were not statistically significant, one could conclude that the quality of instruction supersedes the campus environment.

Dual credit programs are not about students acquiring the college experience, but about generating more college graduates. As dual credit history points out, dual credit programs shifted from being offered to gifted high school students to average high school students who could be successful in college but who had difficulty transitioning into college. This study showed that there were no statistically significance differences between English and mathematics achievement between the two learning environments – The College campus and the high school campuses. There was no statistical significance by gender or ethnicity. These results were expected and reflect that the learning environment for dual enrollment programs does not matter. It also suggests that students whose age is one to two years below that of college freshman are mature enough to be successful in college courses.

Students' self-selecting to take dual enrollment classes on a college campus can expect to pay a tuition fee and other costs associated with the college environment, such as transportation. These students will more quickly move through Chickering's (1964, 1977, 2011) third vector titled "moving through autonomy toward interdependence" (para. 9) than their peers at the high school campus. Students who experience dual credit programs may not be fearful of transitioning into a college or university upon high school graduation because they gain self-confidence and a sense of independence.

Often, students attend dual enrollment programs at a college campus because the course they want to take is not offered at the local high school campus. Allen (2010)

referenced the lack of qualified teachers who are credentialed to teach specific college credit-bearing courses at the small, rural high schools. Both the rural and the urban student have a desire to attend college and earn a college degree. The goal to succeed academically may be the one best reason that academic achievement in English and mathematics were not statistically different.

### **Implications**

Offering dual enrollment classes provides a number of advantages and disadvantages for everyone involved. These programs give high school students an opportunity to take postsecondary courses at two-year and four-year institutions as well as on high school campuses. Programs provide students with opportunities to engage in rigorous academics, save tuition money, decrease number of years needed for degree attainment, encourage students to pursue a four-year degree, and encourage partnerships between high schools, colleges, and the community. Disadvantages are seen by a lack of consistent eligibility requirements, college preparedness, state and federal policy regulations, varied tuition fees assessed across state institutions, and inconsistency in academic rigor. As dual enrollment programs increase, there are a number of decisions that can be made that will help advance the programs and provide a positive experience for students, faculty, and administrators.

Overall, the results showed no statistical difference in English scores between students at the high school campus and The College campus. Since there are concerns about high school student readiness for college, Blum (2007) suggested that high school administrators and teachers need to provide programs that prepare students for college courses both academically and emotionally. Chickering's (1969, 1974, 1977) seven

vectors indicate that development is not simply an internal maturation process, but one that requires appropriate challenges and support from the environment. Those who participate in dual credit courses, whether on a high school campus or college campus may already be both academically and emotionally prepared. Nevertheless, it leaves unanswered the question, how do high school personnel provide adequate preparation for those who aspire to take dual credit courses but may not be prepared?

Even though the literature (e.g., Pascarella & Terenzini, 2005; Tagg, 2003) indicates differences in campus environments, the results of this study showed students scored similarly between the two campuses. However, caution should be taken. A college campus generally has older, more mature individuals attending. For high school students to feel accepted at or willing to attend a college campus, they may need to be made aware of the differences between a high school and college campus. Chickering (2008) suggested that higher education environments should foster broad-based development of human talent and potential. This concept was contrary to the 1970s view that colleges should not be concerned with personal values, ways of thinking, modes of learning, or interpersonal and intercultural skills (Mace, 2009). The goal of higher education was to give students a limited number of skills, insights, and points of view that would help them find a good job and have a satisfying life (Chickering & Reisser, 1993).

Adolescent students at the high school age are developmentally prepared for academic course work. The American Academy of Child and Adolescent Psychiatry (2011) described high school adolescents in terms of their movement toward independence. This study asserted that this aged person has increased independent

functioning, has established a firmer and more cohesive sense of identity, has the ability to examine inner experiences, has developed the ability to think ideas through, has exhibited emotional stability, has shown a genuine concern for others, has developed self-reliance, and has established peer relationships that remain important, but take an appropriate place among other interests (American Academy of Child and Adolescent Psychiatry, 2011). As scores did not statistically differ between campuses, it should be noted that high schools function in a similar manner regardless of the campus their learning takes place.

It is clear that the focus of dual credit is to obtain college credit. The college campus offers a different environment where students are not under as many rules as they may be governed by on a high school campus. Since dual credit programs are about college credit, academic success is the focus and distractions from other college activities may not be readily accessible. Allen (2010) referenced research that dual enrollment programs facilitate the transition between high school and college, allowing students to complete a degree faster, reduce costs for a college education, reduce high school drop rates, prepare students for college work reducing the need for remedial course work, raise the student's motivation and goal to attend college, acclimatize students to the college environment, and enhance opportunities for underserved student populations.

The implications for offering dual enrollment courses on a college campus are vast for a college's student affairs department. Garfield and David (1986) claimed that the "central idea in Chickering's work is that the college or university is uniquely suited to promote the development of human potential" (p. 483). Colleges and universities want students to consider their purposes and meanings in life, their identities and with whom

they identify, their integrity, their autonomy, and their relationships. The college experience is more than a degree: it affects the rest of the student's life. Student affairs administration should examine both academic and non-academic factors in the design and implementation of dual enrollment courses. First-year programs might need to be offered at the high school prior to the full-time-in-college experience. Dual credit programs are important to colleges because these programs result in higher college enrollments ultimately benefitting the college rather than the student.

Allen (2010) referenced concerns made by researchers and policymakers for dual enrollment programs. These concerns include little solid quantitative data supporting the claims of benefits, low or uncertain academic quality, limited oversight of academic rigor, college course experience not duplicated in high school courses, capability of high school teachers to teach college-level courses, transferability of credits, costs involved in the programs, liability with under age high school students on college campuses, lack of policies to ensure students are prepared to begin college-level work and limited access for low-income, minority, and academically underprepared students. In spite of these concerns, Allen stated that 98% of public two-year institutions had high school students taking college courses during the 2002-03 academic year (2010).

### **Recommendations for Further Research**

For future study, there are several recommendations that should be considered. One recommendation would be to replicate the study at a larger institution or one that examines a dual credit course across the state. At the time the study was conducted, the State of Texas began providing free on-line dual credit courses for both the English and Mathematics courses used in this study. Also, the two universities within a thirty mile

radius of The College began actively recruiting at high schools to gain dual enrollment populations. In 2010, The College set a goal to have 20,000 students by 2020. A different sample will provide different results—this is a given.

Another study might examine achievement scores for dual enrollment courses offered in the evening or weekends. Does the time of day affect the student's end-of-course grade? Smaller high schools may need to offer dual credit courses after the regular school day ends because they do not have credentialed instructors to teach the college course at their campuses. Students completing a full day at the high school may need to travel 30 to 40 minutes to a college campus and then evening classes. Do the academic achievement scores differ depending on the time of day the student takes the course? Dual enrollment courses are offered in the evening at colleges across the Nation. Pierpont College and Technical College advertises evening and weekend college for high school students on its website (Pierpont, n.d.). Students, who aspire to a college education and are willing to give up their evenings and weekends in the pursuit of college credit, are moving through a number of Chickering's vectors that include moving through autonomy toward interpersonal independence, emotional independence, instrumental independence, developing autonomy, developing mature relationships, establishing identity, and developing purpose (Chickering & Reisser, 1993).

This study, along with others (Aldeman, 2006; Allen, 2010; Anderson & Kim, 2006; Bailey, Hughs & Karp, 2002) reported that there was no statistical difference in the locale in which students took their dual enrollment courses. What might be studied is the effect of achievement outcomes for a course taught on the college campus where multiple aged students are enrolled along with the 16 or 17 year old high school student.

Academically there is no difference, but how does the high school age student cope psychologically or socially?

According to Mace (2009), frequent arguments made against dual enrollment students are that the high school students are unprepared, and immature, and bring down the level of discussion when these students are mixed with the older college students at a college or university campus. A recommendation would be to compare a dual enrollment course made up of just high school students with a mixed group of high school and college age students in the same course. Areas to consider would be classroom discussion, discipline issues, student project collaboration, and end-of course achievement scores. How will universities be affected by accepting college students who have earned a semester of two of college credit courses? Will prerequisites change in catalogue degree plans?

Future research is needed to determine how dual enrollment programs are linked to higher education concerns for retention, persistence, and degree completion. Research studies that examine the longitudinal impact of dual enrollment students upon high school graduation are important. What is not known is the number of dual enrollment students who enroll in college and complete a degree, and how many of these students do not attend college but rather enter the workforce. Evidence that addresses the gaps in understanding the overall impact of dual enrollment programs might persuade policymakers and institutional leaders to allocate additional resources to improve and to continue the dual enrollment programs.

Other research concerns include academic preparedness, rigor of instruction, sufficient amount of trained instructors, quality of evaluation measures, access to



academic support services, and transferability of courses to college programs other than the college where dual credit courses are held. How should a high school student be academically prepared to take a dual credit course? Placement exams are the only criteria by which a high school student is determined to be academically prepared to take a college credit-bearing course. Additional studies that looked at a student's social maturity, interpersonal skills, study skills, and motivation might provide a deeper insight to academic preparedness. Dual credit instructors must be credentialed by the institution providing the college credit. There are many factors that affect the rigor of instruction and the professional development or training of the dual credit instructor.

Studies at other institutions that look at the curriculum, delivery, course assignments, and end-of- course grade would help dispel skepticism that dual enrollment programs taught at a high school campus are not as rigorous as the same dual credit course taught on the college campus. Studies that look at academic support services and resources at the high school and at the college would help explain why there are little to no differences in the dual credit achievement outcomes regardless of what campus the student took the dual credit course. High school advisors would be able to provide better guidance to students if there were more information on what dual credit courses transfer to which universities and specific degree plans. Students do not find out how many of their dual enrollment courses will be accepted at a four-year institution until they have already made the commitment to that institution.

### **Summary**

High school students by law are required to be offered a minimum of twelve hours of college credit courses by the Texas State Legislation. This means that dual

credit program have been immersed into high schools across the State. Students no longer try to gain admission into a dual enrollment program, but now are in a position of deciding where they want to take their college credit bearing course. This study compared the result of English achievement and mathematic achievement for dual enrollment courses offered at the College and the high school setting. Student achievement scores for both groups were not statistically significant. The results of the study showed that it did not matter if students were prepared for their college credit-bearing course at a college or a high school setting.

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## APPENDIX A

### Application for Review of Research Involving Human Subjects Institutional Review Board (IRB)

#### Texas A&M University-Corpus Christi

#### Instructions:

1. **Complete CITI Training (*beginning January 1, 2011*)**
  - Note: The Certificate of Completion will be automatically emailed to the Research Compliance Officer upon completion.
2. **Complete Form**
  - Form must be typed, complete, single-sided and free of typographical/grammatical errors.
3. **Attach Documents to Application**
  - ☒ Completed IRB Form
  - ☐ Consent Documentation as applicable: Informed Consent Form, Assent Form, Translated Informed Consent Form, and Translated Assent Form
  - ☐ Recruitment Materials as applicable: Flyers, Letters, Phone Scripts or Email
  - ☐ Permission from site of study as applicable
  - ☐ Grant/Contract Application as applicable
  - ☒ Any other documents referenced in this application as applicable (survey instrument, interview questions, debriefing form, payment schedule, etc.)
4. **Submit Application**
  - Review of application will not begin until all required documentation is received.
  - Submit this application with **original signatures** (PI, Co-PI, Faculty Adviser *as applicable*) and any additional documentation to:

**On Campus:** Erin Sherman, Office FC 168

**Mail:** Erin Sherman, Research Compliance Officer - 6300 Ocean Drive, Unit 5844  
Corpus Christi, TX 78412

If you have any questions or need assistance completing this application, please call  
Erin Sherman at (361)825-2497 or email [erin.sherman@tamucc.edu](mailto:erin.sherman@tamucc.edu)

#### Exempt Research

Are you requesting exempt status for the project? ☒ Yes ☐ No

If yes, based on which category outlined on page 4-5? 7.1.2

**Expedited Review (*Expedited review does not mean rushed approval. Please allow at least two weeks for the expedited review process.*)**

Are you requesting an expedited review of the project? ☐ Yes ☐ No

If yes, based on which category outlined on page 5-6? \_\_\_\_\_

#### I. IDENTIFICATION OF PROJECT

##### a. Principal Investigator, Information:

Agnes L. Flores  
5359 Vick Lane  
Robstown, Texas 78380

361-537-4621  
 Aflores11@islander.tamucc.edu  
 Department of Education Leadership

**Co-Principal Investigator or Faculty Advisor Information**

Caroline Sherritt, Ph.D.  
 Professor  
 Faculty Center 213, 6300 Ocean Drive  
 Corpus Christi, TX, 78412  
 361-825-2438  
 Caroline.sherritt@tamucc.edu  
 College of Education, Texas A&M University-Corpus Christi

**Co-Principal Investigator or Faculty Advisor Information**

Randall Bowden, Ph.D.  
 Professor  
 Faculty Center 213, 6300 Ocean Drive  
 Corpus Christi, TX, 78412  
 361-825-2537  
 Randall.Bowden@tamucc.edu  
 College of Education, Texas A&M University-Corpus Christi

**b. Project Classification:** Doctoral Dissertation

**c. Title of Project:** Exploring College Readiness of Dual Enrollment Students Completing Courses on a Higher Education Campus Versus Students Completing Courses at Their Local High Schools

**d. External Funding:** Yes ☐ No ☒

**e. Grant (External Funding) Submission Deadline** (if applicable): \_\_\_\_\_  
**Funding Agency** (if applicable): \_\_\_\_\_

**f. Starting Date:** Upon approval of the IRB

*(If you will start as soon as approval is received, you may enter "Upon IRB Approval" for the starting date)*

**g. Estimated Completion Date:** May, 2012

**II. PROJECT OBJECTIVES** *(Be specific and thorough.)*

The main objective of the study is to investigate high school graduates' achievement in mathematics and English dual credit courses relative to their on or off college campus dual credit learning experience. In Addition, the

study will provide students' perspectives of how well their dual credit experience prepared them for a college education.

The following **quantitative research questions** will guide the study:

1. Is there a difference in mathematics achievement between dual credit students who completed the mathematics component of the core curriculum requirement for a college degree in a high school setting versus students completing the requirement on a college campus?
2. Is there a difference in English achievement between dual credit students who completed the mathematics component of the core curriculum requirement for a college degree in a high school setting versus students completing the requirement on a college campus?

The following **qualitative research questions** will guide the study:

1. What are the perspectives of dual credit students who completed dual credit courses in a high school setting regarding their preparation for college education?
2. What are the perspectives of dual credit students who completed dual credit courses in a college setting regarding their preparation for college education?

### **III. DESCRIPTION AND SOURCE OF RESEARCH SUBJECTS**

Del Mar College students who have taken a dual credit English and/or dual credit mathematics course prior to enrolling in Del Mar College will be studied. Researcher will use course credit for the quantitative portion of the study to compare two non-probability samples. These samples will be determined from those taking the English and Mathematics dual credit course at the local high school and the other sample will be those students completing the dual credit course on the college campus.

A non-probability sample of former dual credit students at least eighteen years of age or older enrolled in Del Mar College will be invited to participate in focus groups. The focus groups will take place in a meeting area on Del Mar College Campus secured by the researcher. Focus groups will be approximately one and one half hours in length and will be recorded using a video recorder.

### **IV. METHODS AND PROCEDURES** (*Be specific and thorough.*)

The quantitative component of the study employs an ex post facto causal comparative design. Ex post facto research is a research design that relies on observation of relationships between naturally occurring variations in the presumed independent and dependent variables (Gall, Gall, & Borg, 2007). Due to the retrospective nature of the study, the independent variable is not manipulated by the researcher because what is being investigated has already happened. Causal-comparative research is a non-experimental investigation in which researchers seek to identify a cause and effect

relationship between an independent variable and a dependent variable (Gall, Gall, & Borg, 2007).

In the proposed study, the setting for the completion of the mathematics and English components of the core curriculum requirement for a college degree, hereafter referred to as the setting, is the independent variable with two levels: 1) high school (characteristic-present group) and 2) college (comparison group). There are two outcome measures: 1) mathematics achievement and 2) English achievement. Due to ex post facto nature of the study, no causal inferences will be drawn.

The qualitative component of the study will utilize focus groups to collect the data needed for the qualitative component of the study. The primary purpose of focus group is draw out respondents' attitudes, feeling, and beliefs within a group context which then are useful in providing interpretations of data collected through quantitative methods (Gibbs, 1997). According to Gall, Gall, & Borg (2007), focus group technique avoids putting the interviewers in a directive role. They ask the questions to initiate discussion, but then allow the participants to take major responsibility for stating their views and drawing out the views of others in the group.

**Quantitative data will be obtained from Del Mar College Office of Institutional Research.**

For the qualitative component of the study, the perspective of the students will be documented by the qualitative data obtained from the focus groups. **The consent to participate in the focus groups will be obtained in person (see attached).** In accordance with the Explanatory Sequence Model, quantitative data are analyzed and interpreted first. Based upon the quantitative results, lead questions will be formulated to better understand the empirical findings and explores the perspective s of students regarding their preparation for college education.

**Qualitative data will be collected via focus groups made up of DMC students who have completed dual credit courses prior to enrolling in college.**

**V. SPECIFIC RISKS AND PROTECTION MEANS**

No risk

**VI. BENEFITS VS RISKS**

Benefits of the study will add new knowledge to the field by:

- a. Investigating data to determine if there is a difference in the GPA of students who took dual credit English and Mathematics on the college campus versus those student taking dual credit English and Mathematics off campus; and
- b. Attain a better understanding of how students perceived their dual credit experience.

**VII. METHODS FOR OBTAINING "INFORMED CONSENT" FROM SUBJECTS**

Student Focus Group Consent Form

*If waiver of signed informed consent is requested, check here. ☐  
Justification must be provided for waiver.*

### **VIII. QUALIFICATIONS OF THE INVESTIGATOR(S) TO CONDUCT RESEARCH**

#### Certification

### **IX. FACILITIES AND EQUIPMENT TO BE USED IN THE RESEARCH**

Existing data will be used. Meeting rooms in the Del Mar College Student Success Center will be used to conduct the focus groups.

### **X. RESPONSIBILITY OF THE PRINCIPAL/CO-PRINCIPAL INVESTIGATOR(S)**

By complying with the policies established by the Institutional Review Board of Texas A & M University-Corpus Christi, the principal investigator(s) subscribe(s) to the principles stated in “The Belmont Report” and standards of professional ethics in all research, development, and related activities involving human subjects under the auspices of Texas A & M University-Corpus Christi. The principal investigator(s) further agree(s) that:

- A. Approval will be obtained from the Institutional Review Board before making any change in this research project.
- B. Development of any unexpected risks will be immediately reported to the Institutional Review Board.
- C. An annual review and progress report will be completed and submitted when requested by the Institutional Review Board.
- D. Signed informed consent documents will be kept for the duration of the project and for at least three years thereafter at a location approved by the Institutional Review Board.

### **XI. SIGNATURES**

***ALL SIGNATURES MUST BE ORIGINAL.*** The Principal Investigator should keep the original copy of the Form B and submit a copy with original signatures for review. Type the name of each individual above the appropriate signature line. Add signature lines for all Co-Principal Investigators, collaborating and student investigators, and faculty advisor(s). The following information should be typed verbatim, with added categories where needed:

Principal Investigator: Agnes Flores

Signature \_\_\_\_\_

Date: \_\_\_\_\_

Co-Principal Investigator / Faculty Advisor: Dr. Caroline Sherritt



Signature \_\_\_\_\_

Date: \_\_\_\_\_

Co-Principal Investigator / Faculty Advisor: Dr. Randall Bowden

Signature \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX B



January 31, 2011

Mrs. Agnes Flores  
Del Mar College  
101 Baldwin Blvd.  
Corpus Christi, Texas 78404

Dear Mrs. Flores,

As Chair of the Del Mar College IRB, I have carefully reviewed the “Dual Enrollment Programs: A Comparative Study of High School Students’ College Academic Achievement at Different Settings” project and grant approval. This project is exempt from full IRB review as it constitutes practices commonly accepted under educational settings, produces minimal risk to human subjects and presents no confidentiality concerns that go beyond the common educational setting. This is in accordance with federal regulations 45 CFR 46.101(b)(1) and 45 CFR 46.110(b)(1). We wish you the best on this project.

If you have any questions, please contact me.

Sincerely,



Alan Clark, Chair  
Institutional Review Board  
Del Mar College  
(361) 698-1429 office; (361) 850-0899 cell  
aclark@delmar.edu