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DO DUAL CREDIT PROGRAM LOCATIONS AND NUMBER OF COURSES STUDENTS TAKE MATTER: A FIRST LOOK AT DUAL CREDIT IN NEW MEXICO

Yasushi Morimoto

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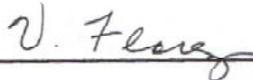
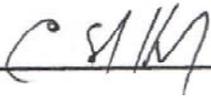
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Approved by the Thesis Committee:



, Chairperson



**DO DUAL CREDIT PROGRAM LOCATIONS AND NUMBER
OF COURSES STUDENTS TAKE MATTER:
A FIRST LOOK AT DUAL CREDIT IN NEW MEXICO**

BY

YASUSHI MORIMOTO

**B.A, BUSINESS ADMINISTRATION,
EARLHAM COLLEGE, 2002**

THESIS

Submitted in Partial Fulfillment of the
Requirements for the Degree of

Master of Public Administration

The University of New Mexico
Albuquerque, New Mexico

July, 2011

DEDICATION

Steph, Dad, Mom, Jenny, Nick, and Mariko; thank you so much for your support. I would not have been able to come this far if it wasn't for you.

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Finally, I could not have completed this thesis without the love and encouragement of my family. In particular I am indebted to my wife, Stephanie, who continues to be supportive at every step of our life together. Words cannot express how much I appreciate everything you have done for me. You are the center of my world. I also owe much to my in-laws, Carol, Denis, Jenny, and Nick, for providing valuable feedback and edits of this paper. You have been incredibly generous in your love and I feel very fortunate.

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ABSTRACT OF THESIS

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M.A., Public Administration, University of New Mexico, 2011

ABSTRACT

Dual Credit programs allow secondary students to earn high school and college credit simultaneously upon completion of the requisite course. Over the past decade, the number of states that have established legislation authorizing these programs has nearly doubled. However, there is very little existing research that conclusively demonstrates this investment in Dual Credit is justified. None of the existing research looks at the effect of Dual Credit program location on student success, or presents a conclusive finding as to whether the number of Dual Credit courses students enroll in affects student success differently. This thesis takes a first look at these two research questions relative to the academic performance of New Mexico students in the first year of college.

The findings indicate that students who enrolled in a Dual Credit program on high school campuses outperformed those at college campuses in New Mexico. In addition, students who took a higher number of Dual Credit courses also were better prepared for college-level academics. These results can be compared with the outcomes from other studies conducted in different states to help determine what type of Dual Credit instruction model produces the best results to attain student success, something vital in guiding national discussions as to how Dual Credit programs should be implemented.

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Chapter 1: Introduction

In light of technological advancements and other changes in society, it is no longer sufficient for a student to simply graduate from high school if he or she hopes to attain middle-class status. Most students now need some form of postsecondary credentials, ranging from technical career certificates that are awarded by community colleges to baccalaureate degrees that are awarded by universities (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007). New Mexico is no exception. According to a recent report published by the National Skills Coalition, 71% of jobs in New Mexico are projected to require some form of education beyond high school in 2016 (National Skills Coalition, 2010). Ensuring that there is an adequately trained workforce to meet the economic demands of the state poses considerable challenges to administrative and elected officials.

Things have also changed substantially over the last two decades in the field of postsecondary education. The predominant issue nationally used to be finding the means to increase postsecondary access for as many high school graduates as possible (Adelman, 1999). Today, however, the major challenge faced by policymakers and educators has switched to finding an effective way to ensure that students succeed once they enter college. Although nationally more than 83% of students enroll in postsecondary institutions by the time they reach age 26 (Adelman, 2006), many find themselves to be ill-prepared for college-level academics.

Research has shown that, although there are a number of factors that affect a student's potential for success in college, rigorous high school course offerings make the biggest impact (Adelman, 1999; Adelman, 2006). Therefore, it is not surprising that

educators and researchers have searched for a "tool" with which to increase rigor in the curriculum. Ideally, this "tool" would not only improve academic rigor in high school, but also address a number of other issues that affect student success. These problems include dealing with the high school "Senior Year" problem,¹ ensuring that students are ready for college-level academics, improving postsecondary student retention, accelerating the time needed for students to graduate with postsecondary credentials, and helping underrepresented students and students from low social economic status (SES) to succeed in college.

Given the importance placed on improving high school rigor as a means to ensure postsecondary student success, it is natural that accelerated instruction methods like Dual Credit² have gained broad national acceptance. Although there is a wide variety as to the definition of Dual Credit programs, they generally allow high school students to earn secondary and postsecondary credit simultaneously.³ Policymakers and educators often support these programs as a "magic bullet" capable of addressing multiple issues at once. It is in this vein that many proponents have cited various reports appearing to demonstrate the overwhelming success of Dual Credit programs. However, these reports do not describe a complete picture as they do not control for the academic aptitude of students before entering the program. Consequentially, even though there is very little empirical evidence that supports the presumption that Dual Credit programs help students succeed in college, these programs have spread across the United States in a relatively

¹ A problem in which high school seniors are no longer academically challenged for a number of reasons. This may be because the student has completed the majority of high school graduation requirements and only has a few required courses left or has received an acceptance letter from a postsecondary institution, among other reasons.

² Dual Credit programs are also known as Dual Enrollment programs in the academic literature, and the two terms are interchangeable. In New Mexico, the term "Dual Credit" is more commonly used, so in this thesis New Mexico's nomenclature will be used.

³ More detailed definitions of the Dual Credit program will be discussed in subsequent chapters.

short amount of time. From a fiscal perspective this is of concern, as the implementation of Dual Credit programs typically requires a high level of state and local support, and public budgets cannot afford to support a costly educational program with unproven effectiveness. This is especially the case as many states have been reducing the amount of state support towards education, even before the economic recession. With the dramatic impact the recession has had on state revenues, it is very important to get the best results possible for the amount of state resources that are committed.

In order to adequately gauge the value of Dual Credit programs, it is necessary to go beyond the use of descriptive statistics. Most reports on Dual Credit programs only look at how well participants perform in school rather than trying to determine if students perform well because of Dual Credit itself. In the past decade, there have only been a handful of studies that have made use of transcript data and inferential statistics to evaluate the relationship between program participation and student success. While the findings of these studies have been encouraging, they are also inconclusive as to whether Dual Credit is truly helping students academically. Furthermore, none of the existing research looks at the effect of Dual Credit program location on student success, or presents a conclusive finding on if the number of Dual Credit courses students enroll in affect student success differently. What complicates the matter is the difficulty of generalizing the results of the research that has been done. This is true in part because Dual Credit programs differ in purpose, participation requirements, funding sources, and method of implementation. In addition, no national standard for Dual Credit programs has yet been developed, so each state has its own legislation and guidelines as to how Dual Credit programs are to be operated. As a result, a study that is relevant in one state

may have little bearing in another. Consequentially, there is a clear demand for further research that contributes to the existing academic knowledge of Dual Credit programs, particularly by evaluating individual components that form Dual Credit on a program-to-program basis. The results of such research can then be compared with the outcomes from other studies conducted in different states to help determine what type of Dual Credit instruction model produces the best results to attain student success, and to guide national discussions as to how Dual Credit programs should be implemented. This is why this thesis will focus on two specific components that relates to program implementation; exploring whether Dual Credit program locations and the number of courses students take affect student success differently in New Mexico.

Furthermore, this thesis attempts to take many aspects of Dual Credit programs into consideration, in the hopes of better understanding the issues surrounding the subject of Dual Credit. As such, the next chapter explores why Dual Credit programs are thought to be an effective option for improving student outcomes in high school and college. In addition, the chapter also briefly compares Dual Credit programs to other accelerated learning alternatives such as Advanced Placement, examines the spread of Dual Credit programs nationally, and outlines the challenges surrounding financing. The third chapter looks at student outcomes by reviewing three studies that utilized transcript data and inferential statistics to evaluate the effectiveness of Dual Credit programs. One examines the program from a national perspective while the other two focus on specific states. The fourth chapter explains the history and implementation of New Mexico's Dual Credit program, which has undergone significant changes in 2007 in terms of program administration and state support. The fifth chapter analyzes whether or not the location

and number of Dual Credit courses students enroll in impacts short term student outcomes in the first year of postsecondary enrollment and discusses the results of analysis. Finally, the concluding section outlines what this thesis has discovered in reviewing relevant theories, literature, and possible implications of the findings with recommendations for future areas of research.

Chapter 2: Dual Credit Program Theory and Research

What is Dual Credit and Why Have It Gained Wide Acceptance Across the Country?

Although Dual Credit programs have gained wide acceptance across the country, establishing a common definition for these programs is not an easy feat. This is because almost every state has decided to establish its own purpose and guidelines for participation in the program. However, generally Dual Credit programs allow high school students to earn high school and college credit simultaneously upon completion. Dual Credit programs have some similarities and differences from other accelerated programs that are offered to high school students, and this subject will be discussed later on in this chapter.

A separate but equally important question is why have Dual Credit programs spread so rapidly across the country? The answer can be found by reviewing existing literature on postsecondary student success. To start, many researchers and policy analysts frequently cite Clifford Adelman's 2006 *Toolbox Revisited* as the basis for supporting Dual Credit programs. This report reaffirms Adelman's earlier findings that the rigor of a high school curriculum is the single most robust indicator determining whether a student will succeed in college.

Are Dual Credit Programs The Key To Postsecondary Student Success?

Using national data,⁴ Adelman tracked a cohort of students from 1992 through 2000 to see if they obtained their postsecondary credentials within that eight-year time frame. Students were included in the cohort for analysis if they had at any point attended a four-year institution by the time they reached age 26. Based on his findings, Adelman concluded that postsecondary access was no longer the largest issue facing educators.

⁴ NELS:88/2000 data from the US Department of Education.

This was because 83% of the students had entered some type of postsecondary institution by age 26, with 68% of students choosing to attend a four year institution during the same time period.

With this in mind, Adelman highlighted factors that improved the likelihood of students earning postsecondary credentials, as opposed to researching how to improve postsecondary student access. In the report, he identified a number of factors that affected postsecondary student success:

1. The academic intensity and rigor of high school course curriculums.
2. Whether or not a student earned 20 or more credit hours by the end of their first year of college.
3. The fact that students did not have excessive no-penalty withdrawals and no-credit repeats.⁵
4. Making effective use of the summer term prior to starting college by earning at least four credit hours.
5. No delay in entering college after graduating from high school.
6. Whether or not a student came from a low SES background.⁶

Furthermore, both Adelman (2006), and Joni Swanson (2008) pointed out that academic momentum is an important factor in students eventually earning their college credentials. When students do not earn at least 20 credits by the end of their first year in college, are only part-time students, or choose not to enroll in postsecondary institutions immediately after high school, they do not generate sufficient academic momentum and eventually may decide against earning a college degree.

⁵ Such as taking multiple remedial courses.

⁶ Low SES had only a minor impact on student success.

One of the surprising findings from *Toolbox Revisited* was that institutional retention was not as important an indicator of student success as was previously thought. This is because even if a student transfers from one institution to another, as long as the student maintains their academic momentum, he or she still has a good chance of success. However, as mentioned previously, the major factor impacting student success was whether or not he or she had the opportunity to enroll in rigorous high school course offerings, such as advanced math and English classes. Ninety-five percent of students who did so then enrolled in a four-year institution and earned a baccalaureate degree during the course of their studies. Keeping this in mind, the question becomes what constitutes a "rigorous high school course," and what types of classes provide the biggest return on states' investment in education. Obviously, simply renaming a course in of itself accomplishes nothing. In order for the program to be effective, substance must be added to the syllabus (Adelman, 2006).

At the same time, it would be ideal if rigorous coursework in high school could address other factors highlighted in Adelman's report that affect student success. For example, is it possible to both increase high school course rigor and help students earn college credits, so that it becomes easier for them to reach that crucial tipping point of 20 credits by the end of their first year of college? Can program administrators bridge the academic disconnect between expectations in high school and college course offerings? Or perhaps improved coursework could help transform students' self image, so that they realize that they, too, are college material by experiencing and successfully completing postsecondary courses. In fact, educators' and policymakers' desire to find a single

solution that can address multiple problems simultaneously has contributed to promoting Dual Credit programs as capable of providing all of these benefits for students.

While Adelman (2006) did not find accelerated courses⁷ to be a significant factor influencing a student's postsecondary success,⁸ he still argued that Dual Credit programs in particular are promising. Adelman's endorsement is not unfounded. After all, by the time students reach 11th and 12th grade, they are focused on taking standardized tests, preparing to apply for college, and just waiting to graduate high school⁹ (Venezia, Kirst, & Antonio, 2003). So, why not have students enter college with enough postsecondary credits generated through rigorous, accelerated instruction that will both count towards high school graduation and also fulfill the general core requirements of a college or university? Adelman's findings that accelerated courses did not contribute to students' postsecondary credential attainment may have been due to the fact that the number of credits was too small to make any difference. The average number of accelerated credit hours completed was only 1.4 with a standard deviation of 0.7 credit hours. However, earning at least four credit hours during the summer semester prior to starting college in the fall was found to positively influence student success. So it may be premature to accept Adelman's conclusion that accelerated credit hours do not help students once they reach a postsecondary institution, on the grounds that students simply did not take enough of them to have any effect.

⁷ There are many types of accelerated programs in addition to Dual Credit, which will be covered later.

⁸ This could be due to differences in Dual Credit program offerings from the 1990s compared to the last decade.

⁹ This is also commonly referred to as the "Senior Year" problem.

Explaining Dual Credit And Various Accelerated Programs

The previous section touched briefly on what proponents of Dual Credit programs and accelerated programs in general, hope to accomplish. Below is what commonly identified in the literature as what an accelerated program like Dual Credit should ideally be able to achieve:

1. Increase the rigor of high school curriculums.
2. Address the disconnect that exists between high school and college academic expectations.
3. Allow students to graduate from college sooner than the average time period of 4.56 years.
4. Make the 11th and 12th grades in high school academically useful, and address the "Senior Year" problem.
5. Have more low SES and underrepresented students obtain postsecondary credentials.
6. Improve collaboration and communication between high schools and colleges.

While the main objective of this paper is to explore the effect of Dual Credit course location and the number of Dual Credit courses taken by New Mexican students, it is important to point out that Dual Credit is not the only accelerated program that is available to students nationally.

According to the Western Interstate Commission on Higher Education's (WICHE) 2006 report, accelerated programs can be classified into four types: Advanced Placement, Career and Technical Education, Dual Credit programs, and International Baccalaureate

programs.¹⁰ The two most popular forms of accelerated programs many states have in place are Advanced Placement and Dual Credit programs (WICHE, 2006). This is because participation in the International Baccalaureate program is relatively small, and the Career Technical Education program is more closely aligned with Dual Credit programs, as it offers college-level courses that have a technical career focus. In fact, many Dual Credit programs include Career Technical Education courses as a subset of the program's course offerings.

Typically, Advanced Placement programs are offered at high school and taught by high school instructors who have specialized training. If the students wish to receive a college equivalent score in a specific subject area, then they must take a national examination developed by the College Board upon completion of the course. However, a postsecondary institution retains the option to accept or reject the score as equivalent to college level courses depending on the specific requirements of that institution.

In comparison, most Dual Credit programs allow high school students to enroll in college courses and earn both high school and college credit simultaneously upon completion. However, unlike Advanced Placement programs, there is a wide disparity in how specific Dual Credit programs operate, and eligibility requirements may also differ from state to state. For example, a minimum Grade Point Average (GPA) requirement is put in place for some states but not for others.¹¹ Instructors may be high school teachers, hired as adjunct professors by the college, or regular faculty members. The location of a

¹⁰ In New Mexico there is also concurrent enrollment, which allows high school students to take postsecondary courses that have not been approved for Dual Credit funding for either college or high school credit. However, the subject of concurrent enrollment is omitted from this thesis as the line between Dual Credit and concurrent enrollment is blurry.

¹¹ Florida requires a minimum GPA of 3.0, while New Mexico does not have a GPA requirement. Some states, like Illinois, have no state statutes on Dual Credit, while others, like Tennessee, let the college determine eligibility requirements. Many other variations in rules and regulations exist across the United States.

Dual Credit course may be on a high school campus, a college campus, online, or at some other location such as a community center. There are even variations in the composition of the class. A Dual Credit course can be filled with high school students exclusively or may consist of both high school and college students. Finally, who pays for the cost of these Dual Credit courses may vary depending on each state's legislation and policy.¹²

The Big Question: Choosing between Dual Credit and Advanced Placement Programs

Assuming that accelerated programs do, in fact, help students succeed in postsecondary settings, policymakers and educators must then determine which program to endorse. If state funding permits, a desirable option may be to fund both programs. However, in light of the recent recession many legislatures are very conscious of budgetary constraints. Therefore, in light of finite resources the question must be asked: Advanced Placement or Dual Credit, which program yields the best results and who benefits the most from each program?¹³

To start, one advantage of Advanced Placement courses is that they are nationally standardized. For many institutions, so long as a student obtains a score of three or higher in the examination after completion of the Advanced Placement course,¹⁴ it is considered to be equivalent to the college course in that specific subject area. Conversely, Dual Credit classes do not require a national examination to be recognized as college courses. For this reason these students may find it easier to both accumulate college credits and also to gain the academic momentum necessary to obtain postsecondary credentials. This is because, unlike Advanced Placement courses, Dual Credit courses earn both high

¹² Minnesota pays for the costs of tuition, while in Washington both the state and nonprofits cover these expenses, and Hawaii asks GEAR UP, a federal program, to foot the bill. Some states even have students apply for reimbursements.

¹³ The issue of Dual Credit programs and funding will be discussed further in subsequent sections.

¹⁴ Although it is uncommon, it is possible to take an Advanced Placement examination without enrolling in a course.

school and college credit simultaneously.¹⁵ They are actual college courses that generate a college transcript issued by a postsecondary institution upon completion, rather than requiring a national examination. For Dual Credit classes, simply completing the course with a grade of "C" or higher is sufficient for most institutions.

Having consistent program content and requirements is attractive when conducting educational research on evaluating the effectiveness of instruction. Advanced Placement programs may be significantly easier to analyze than Dual Credit programs because the latter vary from state to state. However, this does not mean that one is necessarily superior to the other. With a wide range of course offerings, instruction locations, and eligibility requirements, a Dual Credit program that is administered correctly and based on proper research should have the potential to outperform an equivalent Advanced Placement program. This is especially true when considering the ease of transferability of college credit hours, the opportunity for students to experience the college environment and the wide range of courses that the Dual Credit program has to offer.¹⁶

The cost of participating in an Advanced Placement or Dual Credit program can be an important factor for students who come from low SES backgrounds. Both types of programs can be structured to solve this problem, if the resources and political will to use them appropriately exists. Advanced Placement courses can be offered at a reduced cost for low SES students, while tuition and related expenses such as books, fees, and

¹⁵ There are exceptions to this rule as well. Some states require a student to decide if the credit will count towards high school or college.

¹⁶ Issue of transferability of both Advanced Placement and Dual Credit courses may warrant further discussion. Some institutions may not accept Advanced Placement credit if it is below a certain level while four year institutions may refuse to accept Dual Credit courses for transfer. This is one of the reasons why some argue that Dual Credit courses should be limited to those that are guaranteed to transfer under state law.

transportation can be made free for these participants in Dual Credit programs. In addition, Dual Credit courses can be academic or career technical, allowing for a wider variety of academic offerings and meeting a broad range of student needs.

Dual Credit and Advanced Placement programs may differ, for example in who offers the instruction. Advanced Placement courses are taught by high school teachers who have been trained to teach the Advanced Placement course offerings while Dual Credit programs may be taught by college instructors or by high school teachers who qualify as college adjunct faculty. If a Dual Credit course is taught on a college campus with other college students by a college instructor, it might give high school students a much-needed college experience, instilling confidence that may help students succeed in postsecondary academics. Overcoming the challenge of a "real" college course especially with other college students can change the students' mind about their ability to succeed in college. In fact, when Hawaii's Dual Credit students were asked where they would prefer to take a class, 75% of students indicated that a college campus was their preference (Swanson, 2008). Furthermore, research suggests that if a student can be better acclimated to the expectations of college classes they are more likely to be successful college freshmen (Hughes, Karp, Bunting, & Friedel, 2005). If the goal of policymakers and educators is to see low SES and underrepresented students succeed in college, then finding ways to have them become better accustomed to college needs to be a priority. According to Hanson (2005, p. 5), "[Dual Credit] gives students a taste of college, an experience that can help them develop the independence and study skills needed to succeed in college." In addition, allowing high school students to take actual college courses means that, with proper support, students may be able to successfully complete

crucial gateway courses prior to entering college, perhaps including those that typically delay students from obtaining college credentials. Finally, taking Dual Credit courses that count towards both high school and college graduation requirements may allow students to accelerate their academic progress.

The Spread of Dual Credit Programs

Regardless of what strategies a state chooses to endorse, there is clearly a strong need to better prepare high school students for college. Roughly half of students who enroll at a college directly after high school graduation find themselves to be ill prepared for the rigor of college. Many are required to take some form of remedial education, which in turn extends the time needed for those students to graduate (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007). For example at New Mexico's public postsecondary institutions during the fall 2009 semester, 47.5% of students who had graduated from high school and entered college directly afterwards required remedial education (Winograd, 2010). Nationally, the numbers present a similar picture: 42% of first year students at public two-year colleges require some form of remedial education (Davie, 2010).

One reason for this problem is that high schools already face an overwhelming burden to educate their students, and consequentially the focus of these educators and school administrators tend to simply graduate students as opposed to preparing them for a postsecondary education. However, there has been a strong desire by policymakers and educators to find a solution to this state of affairs; a "magic bullet" that solves a multitude of complex issues in a single shot. Perhaps this is why Dual Credit programs have become so popular in such a short period of time. For example, in 2005 the National Governors' Association expressed its support for Dual Credit programs as a high school

reform strategy, while at the federal level the Secretary of Education's Commission on the Future of Higher Education in 2006 expressed support for the expansion of Dual Credit programs (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007).

According to WICHE's 2006 report, state-level legislation authorizing Dual Credit programs has grown rapidly. In 2000, only 23 states had legislation that provided guidelines for Dual Credit program participation by 2005, 42 states had adopted state policies for Dual Credit programs and 40 had adopted state statutes (WICHE, 2006). The report indicates that the majority of statutes take action in the following areas:

1. Eligibility requirements for students to participate: states may require a certain GPA or ACT/SAT score, students may have to be a junior or senior in high school, submit a letter of recommendation, and/or meet a college's placement score.
2. Recognition of credit: how Dual Credit will be handled once a student completes the course. In most cases a student earns both high school and college credit, but in some states a student must specify for which institution the credit will count.
3. Financial responsibility: who is responsible for paying for tuition, fees, books, and the cost of transportation?¹⁷ It varies by state as to who takes on these costs. In some states if a student fails to complete a course he or she must pay for it, while in others students must ask for reimbursement.
4. Dissemination of Dual Credit program information: while most states require that students and parents be notified about the program, others prohibit postsecondary institutions from recruiting students on high school campuses.
5. Accountability reporting: in most states data on the program must be reported to the legislature annually. However, most of these reports take the form of

¹⁷ More on this subject is covered in subsequent sections.

descriptive statistics that do not illustrate any causal effects of the Dual Credit program on the students.

The Dual Credit Funding Issue

In light of the high level of expenditures required to operate a Dual Credit program, a state must consider whether or not it is receiving an adequate return on its educational investments (Mokher & McLendon, 2009), and policymakers do have legitimate concerns. A recurring issue is the practice of "double dipping," paying twice for educating a student once (WICHE, 2006). Double dipping occurs because a state pays both the public high school and the college since the student earns both high school and college credit for the same class. This practice may provide a significant fiscal benefit for the high school or college involved, depending on where the classes are held and which institution funds the instructor. If a Dual Credit class is offered on a high school campus and is taught by a high school instructor, then the college awarding postsecondary credit for the course could make a significant profit. After all, the institution is able to claim state funding for those students while not having to pay for the instructor or the facility.¹⁸ The reverse is true in a scenario in which all of the courses are offered at a postsecondary institution.

In addition to the double dipping issue, some states like Florida also pay for tuition, fees, books, or, in the case of New Mexico, even the cost of transportation. Although the responsibility for funding these additional costs differs by state (WICHE, 2006, p. 14), it is clear that funding Dual Credit programs is an expensive proposition. These expenses are covered in a variety of ways. For example, Massachusetts had to

¹⁸ Granted, there are other costs of the Dual Credit program that are incurred by postsecondary institutions such as recruitment, advisement, syllabus review, etc. However, even if the institution would have to pay for these additional costs, Dual Credit classes would still be quite lucrative compared to regular courses.

move away from funding the Dual Credit program altogether between 2002 and 2007 (Massachusetts Department of Higher Education, 2011), while other states like Washington rely on nonprofit organizations to help finance their program (WICHE, 2006; Mohkher & McLendon, 2009).

Even so, proponents for the program frequently argue that funding for Dual Credit is a cost-saving mechanism for the student and cost-neutral for the state. They reason that double dipping is crucial for the success of the Dual Credit program because of how the education funding model is structured. They do acknowledge that the state may have to pay twice for educating a Dual Credit student (Karp, 2008; Hoffman, 2005). However, they assume that the student would have taken essentially the same course twice anyway; once when he or she was still a high school student and again during his or her college career. Following this logic, the real problem is not double dipping per se, but rather how the state currently finances public education. Many states fund public secondary and postsecondary institutions on the basis of a head count, full-time equivalency, or credit hours. This means that the funding model is based on how many students are enrolled in an institution instead of how many graduate. As a result, there is an unintended incentive to have students remain in school as long as possible or at least to have as many students be enrolled in a class regardless of the outcome. In this way, double dipping functions as a necessary incentive for institutions to allow students to participate in programs like Dual Credit, which are intended to assist students to leave the system sooner rather than later. Finally, if the Dual Credit program is successful in accelerating the time frame for students to obtain their degrees, the state may have a well-trained workforce in a shorter amount of time than it would have otherwise. For all these reasons, supporters of the

program reason that the state could still gain from offering a Dual Credit program, despite the issue of paying twice for educating a student once.

The debate on double dipping has intensified in the current economic climate in light of severely constrained state budgets. While finding ways to improve the cost-effectiveness of educating students is a serious consideration, the primary concern is whether Dual Credit programs actually work. For if it is found not to help students succeed, then subsequent arguments as to how to finance the program become moot. Thus research on Dual Credit programs is necessary and crucial.

Chapter 3: Dual Credit Literature Review

Available Research on the Effectiveness of the Dual Credit Program

Proponents of Dual Credit programs laud them as efficient tools for improving student success. Yet many of the reports cited by these people only employ descriptive or qualitative data to support their arguments and do not use inferential statistics to evaluate whether or not Dual Credit programs are having the desired effect. In addition, the most important shortcoming of these studies are that they usually fail to control for self-selection biases. Thus the question that we need to ask is not if Dual Credit students are successful once they enter college, but rather if students do well because of these programs.

One of the challenges in reviewing the effectiveness of a Dual Credit program is a lack of good data to analyze. Many states have only recently begun to create longitudinal student databases capable of tracking students from high school through college. For this reason, not enough time has elapsed to follow Dual Credit students through their educational careers to see if they earn a postsecondary degree.¹⁹ Even if researchers are able to secure reliable longitudinal data and apply appropriate inferential statistics to account for students' prior academic abilities, the studies could still suffer from poor research design. The issue of poor research design is a serious obstacles because even if all the criteria required to conduct the perfect study are fulfilled, if it fails to address the threats to validity then the research may be producing misleading results. Finally, due to the fact that Dual Credit programs are structured differently in each state, generalizing the

¹⁹ This is one of the reasons that Florida's data is frequently used to study prekindergarten through postsecondary education. Florida is one of few states that has a longitudinal data system old enough to evaluate the long-term impact of educational policies.

findings from a review of one program to another may be very difficult without evaluating the individual components of the program.

Finding research that fulfills all of the abovementioned criteria is a challenge. This is especially true considering that within the last five years only three studies attempted to evaluate the effects of Dual Credit programs using inferential statistics. Two of these studies did so using Florida's Dual Credit program data²⁰ (Speroni, 2011), and one of them also reviewed New York's Dual Credit program (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007). The third study used national data from the U.S. Department of Education²¹ to evaluate how Dual Credit programs affect students throughout the country (Swanson, 2008). In order to better understand the effect of various Dual Credit programs and whether they are impacting students, it is necessary to carefully analyze the results of these studies.

First Literature Review: The Postsecondary Achievement of Participants in Dual Enrollment: An Analysis of Student Outcomes in Two States

Karp, Calcagno, Hughes, Jeong, & Bailey (2007) analyzed both short- and long-term outcomes for students who had participated in Dual Credit programs in New York and Florida. The authors argued that in the past, these programs had only benefited high-achieving students. To evaluate the effectiveness of Dual Credit programs, the researchers decided to investigate if all of those who participated, in particular Career Technical Education students (Karp et al. states that these students generally are not as academically motivated as their other high school peers), were successful in high school

²⁰As mentioned in the previous footnote, the state of Florida has one of the oldest and most comprehensive longitudinal student data systems in the United States.

²¹ NELS:88/2000 data.

and college. Specifically, Karp et al.'s goal was to find answers to the following questions:

1. What are the short-term effects of participation in Dual Credit programs, as measured by high school graduation and college enrollment rates?
2. How do Dual Credit programs affect students once they enroll in a postsecondary institution?
3. What are the long-term effects of participation in Dual Credit programs, as measured by persistence, GPA, and credit accumulation?
4. What is the impact of taking multiple Dual Credit courses?
5. Does the effect of Dual Credit programs vary by student demographics, such as race/ethnicity, gender, and SES?

Karp et al.'s report indicated that students who enrolled in a Dual Credit program were positively affected in both the short- and long-term. For example, Dual Credit students who participated were 4.3% more likely to earn a high school diploma, 7.7% more likely to enroll in a postsecondary institution, and be fulltime students (Karp et al., 2007). Once enrolled in college, these students were also more likely to persist to the second semester with a higher GPA than non-participants (Karp et al., 2007).

Interestingly, taking multiple Dual Credit courses produced different outcomes in Florida and New York. For students who participated in Florida's Dual Credit program, the number of classes they enrolled in had no effect. However, taking two or more Dual Credit classes in New York's program was correlated with improved student success (Karp et al., 2007). There are several possible reasons for this discrepancy, although Karp et al. did not speculate on this point in their study. For example, the academic rigor of

Dual Credit courses offered in Florida and New York may have been different.²² The variation in eligibility requirements between the two states could also have been a factor.²³ In addition, course location might also have played a role. In contrast to Florida's program, Dual Credit courses in New York are offered on high school campuses and are taught by high school instructors, a difference that underlines the difficulty of comparing Dual Credit programs across states. Even so, further research is needed to determine if taking multiple Dual Credit courses reliably improves student performance, as it certainly increases the costs associated with operating these programs.

One of the most important findings in Karp et al.'s (2007) study was the determination that low SES students benefited the most from enrolling in a Dual Credit program. While the researchers also found that Dual Credit coursework improved student outcomes for underrepresented students and students with a low high school GPA, their conclusions regarding low SES students is of particular interest. Improving academic success for these students is important because typically they do not perform as well academically as their more affluent and better represented peers. Finding a way to start to bridge the gap between these two groups has long been the goal of many legislators, and Karp et al.'s research could hold the answer. Their study suggests that legislators should structure Dual Credit programs in such a way that allows low SES students easy access. As a first step, tuition might be free for these students in order to minimize the financial burden in taking these courses. Such a step would also benefit underrepresented students

²² New York offers a range of activities intended to improve students' academic skills, such as foundations courses intended to prepare 10th and 11th grade students for the academic demands of college. Surprisingly, New York allows remedial courses to be offered for Dual Credit as well.

²³ Florida's Dual Credit program has a minimum GPA requirement of 3.0.

and students with relatively low GPAs, also groups of students who typically face challenges in gaining access to programs like Dual Credit.

However the large difference between the average high school GPA for those who enrolled in the Dual Credit program to those who did not is of concern. Any findings from Karp et al.'s study could be due to self-selection bias rather than from actual program participation.

Second Literature Review: An Analysis of the Impact of High School Dual Enrollment Course Participation on Post-Secondary Academic Success, Persistence and Degree Completion

While Karp et al. (2007) looked at the effects of Dual Credit programs on students in two states, Swanson (2008) attempted to evaluate Dual Credit programs nationally using inferential statistics. She intended her study to determine if Dual Credit students across the country:

1. Have a higher rate of persistence, continuous enrollment, and more credits generated than nonparticipants after entering college.
2. Have a shorter time to college degree completion than nonparticipants.
3. Earn college degrees at a higher rate than nonparticipants.
4. Have higher persistence and degree attainment rates after accounting for specific demographic attributes when compared to nonparticipants.

While Swanson did conclude that Dual Credit programs had some positive impact on students' postsecondary success, when compared to Karp et al. her findings were not as definitive. For example, while Dual Credit students in Swanson's cohort were more likely to be continuously enrolled in college,²⁴ this did not result in higher credit accumulation

²⁴ Continuous enrollment in and of itself is encouraging in consideration of the fact that the chance of students eventually earning a degree increases when they do not drop out of college.

or a shorter path to graduation. Interestingly, Swanson did find that Dual Credit students in general, and especially those from low SES backgrounds, were more likely to earn an associate degree and two-year college credentials. Finally, even after demographic information was used as a control, Dual Credit programs were still found to increase the likelihood of students being enrolled continuously. However, instead of increasing the chances of students earning a baccalaureate degree, it actually decreased their probability of doing so. This finding is puzzling as continuous college enrollment typically means that a student has a higher chance of earning a postsecondary credential. One possible explanation may be that Dual Credit programs might be influencing a student's decision as to the type of degrees they choose to pursue. Since the majority of Dual Credit programs are offered in collaboration with community colleges, students may have decided to pursue a certificate or associate degree instead of baccalaureate degree upon completion of the program.

In her conclusion, Swanson (2008) points out that Dual Credit programs were effective in transforming students' self images; i.e., convincing them that they are indeed, college material. This in turn supports the argument that Dual Credit programs should be targeted towards students who are unlikely to enroll in college. In addition, students who earned credits through Dual Credit programs are more likely to enter college directly after high school graduation and persist at least to their second year in postsecondary education. Yet immediate college matriculation and continuous enrollment did not shorten the time for students to graduate. This finding is counterintuitive as one would expect that the speed in which students completed their postsecondary credentials would increase if they entered college directly after high school and did not take any breaks in

their attendance. Perhaps the fact that Swanson's study looks at Dual Credit programs from a national perspective is the reason why there was no observed improvement in accelerating students' graduation time. That is, significant differences between programs in each state even out when evaluating the program from a national perspective. Some may be effective while others are not, resulting in a conflicting distribution of positive and negative results. Another possibility is that there may be differences in the effectiveness of Dual Credit classes. If some Dual Credit courses are not rigorous, it is possible that these classes simply have no effect. Furthermore, some Dual Credit courses may not transfer towards postsecondary degree requirements, and thus will not accelerate students' postsecondary credential attainment. The notion that not all courses are created equal is nothing new. As Adelman (2006) argues, simply changing a course title does not improve student success.

Third Literature Review: High School Dual Enrollment Programs: Are We Fast Tracking Students Too Fast?

Like Karp et al., (2007), Cecilia Speroni (2011) used data²⁵ from Florida's Dual credit program²⁶ to investigate two matters. The first was whether or not participating in Dual Credit programs, which offer a wide variety of courses that range equally in difficulty, have any effect on student success; especially for those who are on the margins

²⁵ Unlike Karp et al. (2007), who focused on the effect of Dual Credit programs for those who also participated in a Career Technical Education program, Speroni's (2011) data identified Dual Credit students by reviewing college transcripts. (This resulted in a 75% match with Karp et al.'s data.) In addition, Speroni's data included 10th grade standardized test scores, college placement tests, and National Student Clearing House data, which allowed her to track students who had left Florida to pursue their postsecondary careers elsewhere.

²⁶ Like New Mexico, Florida's Dual Credit program funds both high schools and colleges, and students earn both high school and college credits simultaneously. Furthermore, Florida's Dual Credit program also pays for students' tuition, fees, and books, and has a statewide course numbering system to ease transfers between institutions (again, much like New Mexico).

of academic eligibility. Second, does a particularly challenging and popular Dual Credit course, like college algebra impact students' overall academic performance?

Academic success in Speroni's (2011) research was measured by answering the following multipart question: do Dual Credit programs have any impact on high school graduation rates, college access, or the likelihood of students obtaining either an associate or a baccalaureate degree in a set amount of time?²⁷ What she found was that there was no evidence of increased student success simply due to participating in a Dual Credit program as measured by high school graduation rates,²⁸ college access, or the likelihood of earning a postsecondary degree.

However, taking a challenging class such as college algebra did have a noticeable impact on student success; it increased the likelihood of students enrolling in college by 16% and degree attainment²⁹ by 23%. The policy implication of such a finding is that enrolling in Dual Credit classes per se may not have any measureable effect on student success. Speroni's findings are consistent with Adelman's research: it matters more what courses a student takes than whether they are in the program. If the course is a rigorous like college algebra, then it could significantly improve students' postsecondary outcomes.

²⁷ Speroni (2011) tracked students for five years from the time when they should have started their postsecondary career. This means that even if students did not start their college career immediately after high school, the five year clock had already started ticking. Assessing degree attainment in this way is a concern because there may not be enough time for students to attain a degree within five years if they stayed out for a year or more. As such this method could produce inaccurate results.

²⁸ It is important to keep in mind that one of the reasons that the impact on high school graduation was not noticeable in Speroni's (2011) research may be due to the fact that 55% of Dual Credit students in Florida participate in the program only in their senior year. The majority of the remaining Dual Credit students enroll in the program during the 11th and 12th grades. Students who have already made it to their senior year in high school are more likely to graduate.

²⁹ This statistic counts associate and baccalaureate degrees only. The report does not mention certificates awarded by community colleges.

Limitations of the Three Research Studies

Each of these studies helps to appraise the effectiveness of the Dual Credit program, but there are also limitations and inconsistencies. Accordingly, before applying these results to policy, their validity should be carefully analyzed. To start, as mentioned earlier some studies conflict. While Karp et al. (2007) found the Dual Credit programs had positive effects, according to Spironi (2011) it is not clear if Dual Credit programs have any impact on students. This disparity may exist for a number of reasons: differences in sample population, in measures that were used to evaluate student success, or in the type of analysis scholars choose to utilize in their studies. Another issue to keep in mind is that of research design. All researchers acknowledged that their studies could not control for preexisting characteristics and self-selection. The fact that students chose to enroll in a Dual Credit program, and, in the case of Florida's Dual Credit program had to meet a 3.0 GPA requirement³⁰ may also account for the disparate findings.

Finally, there is the issue of generalization. Just because there is a positive relationship between Dual Credit programs and student success in one state does not mean that it will hold true in another as is evident from Swanson's (2008) research. She attempted to review Dual Credit programs as a whole despite the many differences between states. In addition, her research employed national data from the 1990s, a time in which there was even less standardization of Dual Credit programs than there is today and thus the question of relevancy arises.

³⁰ In addition, a letter of recommendation may also be required.

Chapter 4: New Mexico's Dual Credit Program

New Mexico's Economy and Educational Attainment

Dual Credit programs across the country vary widely from one another. These differences arise not only from the political climate and the financial resources available to each state but also from the unique combination of challenges that each set of policymakers face. For example, in the case of New Mexico, low educational attainment and poverty are serious issues. The economy of New Mexico cannot grow without a properly educated workforce and it is difficult to escape the trappings of poverty without a sufficient level of education.

Thanks in part to its two national defense labs, according to the U.S. Census Bureau, New Mexico has the largest number of Ph.Ds per capita of any state. Many are transplants from outside New Mexico however; and so the educational attainment level of its residents still requires improvement. Twenty-five percent of New Mexicans have a college degree or higher and 82% have a high school degree or above, placing New Mexico slightly below the national average(U.S. Census Bureau, 2011). Part of the problem is that not enough high school graduates are ready for the academic rigor of college. When New Mexican students enter public postsecondary institutions directly after high school, 47.5% require some form of remediation (Winograd, 2010), prolonging the time it takes students to complete their college degrees. According to the National Center for Higher Education Management System, during the 2008 academic year New Mexico's postsecondary graduation rates and ranking within the states were 40.3% (48th) and 19.2% (44th) for four-year and two-year institutions respectively(National Center for Higher Education Management Systems, 2009).

The problems students encounter in obtaining their postsecondary credentials is of great concern, considering the impact of this issue on the state's economy and the finances of New Mexican residents. As 77.6% of all jobs in New Mexico during 2008 required at least some level of college education or higher, an inadequate supply of qualified workers could stunt the economic growth of the state. In fact, many employers across New Mexico prior to the recession were reporting that shortages of skilled workers negatively impacted their businesses (National Skills Coalition, 2010).

Additionally, with 21% of families living below the poverty line (U.S. Census Bureau, 2011),³¹ New Mexico is the sixth poorest state in the nation. Policymakers urgently need to address this issue. One possible way of doing so, as mentioned previously, is by investing in education. Improving the educational attainment rate of New Mexicans could have a number of benefits, such as lowering the unemployment rate and raising the lifetime earning potential of its residents. To give a specific example, when the average educational level of a city's population is increased by two years, the benefits are shared throughout the city as a whole. The city's average wage increases by six percent for everybody regardless of individual educational attainment (National Skills Coalition, 2010, p. 24). Therefore, if New Mexico's policymakers would like to improve the economy of the state and address issues surrounding poverty, investment in education is a winning strategy. This is easier said than done, as New Mexico's revenue is small compared to other states for a number of reasons. The aforementioned poverty rate is one of them, and the relatively small population size is another. The largest industries of the state are government, the military, and the service sector, and they are not geared towards bringing in high wages. Fortunately, policymakers allocate a significant portion of the

³¹ Census 706 family income -- distribution by income level and state, 2008.

state's budget to education in the hope of addressing the root cause of the poor economic development of the state.

However, simply throwing money at education is not going to produce the desired outcomes. New Mexico's demographic background is significantly different from the rest of the country. Forty-six percent of New Mexicans are of Hispanic origin and ten percent are American Indians. Considering the fact that these students are underrepresented nationally in higher education settings and that they tend to face greater challenges in completing postsecondary credentials, finding a better way to educate is clearly important. A Dual Credit program, if implemented correctly, may be the key to improving student success in New Mexico.

[History Behind New Mexico's Dual Credit Program](#)

Until 2007, when legislators established the statewide Dual Credit program, there was wide variation as to which college courses high school students could enroll in and how secondary and postsecondary institutions treated the credits that they earned. When these students took postsecondary courses, the credits earned may have been accepted for high school unit, college credit or both. Enrollment eligibility and program availability varied not just by geographic location but also by the specific high school or college. Moreover, wide variation in the availability of funding by school districts and charter schools affected whether students were given the opportunity to enroll in college-level courses. In some areas of the state, the postsecondary institution offered to waive tuition instead of having school districts pay for it. However, such arrangements were not uniform across all counties, and in some cases high school students were asked to pay for the courses themselves. Backed by constituents who were frustrated with inequitable Dual Credit opportunities, and within the larger context of extensive high school reform

and the national hype surrounding Dual Credit programs generally, Senate Bill 943, Dual High School & Post-Secondary Credits, passed unanimously in both the House of Representatives and the Senate in 2007.

The enabling legislation required that the New Mexico Higher Education Department, the New Mexico Public Education Department, local school districts, charter schools, and public postsecondary educational institutions collaborate to standardize the various Dual Credit programs. Subsequently, five statewide meetings between all of these stakeholders were held in 2007, wherein participants discussed how best to bring order to what had been a chaotic practice. With over fifty representatives, discussions as to how to homogenize the Dual Credit program became extremely heated, especially on the topic of how college credits should equate to high school units. Some high school administrators, constrained by tight budgets, were concerned that if the ratio was too low students would graduate from high school ahead of schedule. This could result in reducing funding from the state needed to operate their schools. Eventually a compromise was reached, and it was determined that three college credit hours would equal one high school unit.

An additional area of concern was in regards to Dual Credit course locations. Initially the Higher Education Department argued that all Dual Credit courses should be offered on college campuses, so that students would have a postsecondary experience. However, it soon became apparent that, due to the size and low population density of New Mexico, not all high schools are located close enough to one of the state's 27 public postsecondary institutions. It simply is not feasible for all high school students to take Dual Credit classes on a college campus. Moreover, some colleges simply do not have the space to accommodate the numbers of high school students that such courses would

attract. Another concession was made: as long as the course is considered to be a "college-level" class and meets all of the other requirements of the Dual Credit program, it became permissible to teach these courses on high school campuses.

The following year, as the administrative code for the Dual Credit program was put in place, legislators decided to expand the program. In 2008, they enacted legislation that permitted students to take Dual Credit courses during the summer semester and allowed three state-supported schools (such as New Mexico's School for the Deaf) to participate. This was also the year in which official data collection for the Dual Credit program began. Finally, in 2010 four New Mexican tribal colleges and all Bureau of Indian Education schools were allowed to participate in the Dual Credit program, on the condition that these institutions would submit their student data to the state.

The actions taken by policymakers clearly demonstrate their commitment to using the Dual Credit Program as a major tool for improving New Mexico's educational system. However, Dual Credit legislation is only a framework that provides general guidelines as to what needs to be accomplished. The actual administration and resolution of the various complex issues surrounding the program is left to two executive agencies.

[New Mexico's Dual Credit Program Administration](#)

New Mexico's Dual Credit program is jointly operated by the Higher Education and Public Education Departments. While each department is responsible for fulfilling its statutory responsibilities within the program, in order to better coordinate their shared management they have formed a Dual Credit Council. The Council, which is comprised of three representatives from each department, is responsible for setting rules and guidelines for colleges and high schools participating in the program, reviewing the effectiveness of the program, and tackling any issues that are not addressed by the

administrative code. The Dual Credit Council, in collaboration with the larger Dual Credit Committee,³² established student eligibility criteria, provided recommendations as to how the program should be funded, and established procedures and rules for the Dual Credit program.

According to the statutes and administrative code, the objectives of New Mexico's Dual Credit program are twofold:

1. To provide high school students with the opportunity to enroll in college-level academic or career-technical courses offered by a postsecondary educational institution.
2. To permit enrolled students to simultaneously earn credit towards high school graduation and a post-secondary degree or certificate.

In general, New Mexico's Dual Credit program allows high school students to take college-level courses and earn both secondary and postsecondary credit that counts towards their degrees. Both public high schools and colleges receive funding from the state to educate these students.³³

In addition, the statutes and administrative code require that high schools and colleges fill out the Uniform Master Agreement, a document signed by representatives from both parties that lists the courses approved for Dual Credit and enumerates the responsibilities allotted to each institution. As a result, practices that used to vary widely have become more standardized over time. However, as student eligibility is determined through the use of the Master Agreement and discussions between secondary and postsecondary schools, some local variance will always persist. Furthermore, there are a

³² The Dual Credit Committee consists of representatives from colleges and high schools.

³³ New Mexico engages in "Double Dipping" as was explained earlier.

number of challenges that the Higher Education Department and the Public Education Department need to address before the Dual Credit program in New Mexico can be considered a success.

[The Funding Mechanism of New Mexico's Dual Credit Program](#)

Funding the Dual Credit program in New Mexico is a complex matter. This is principally because the state participates in the practice of "double dipping," a practice wherein both high schools and colleges receive funding from the state for students enrolled in the Dual Credit program. Another concern arises when Dual Credit courses are career oriented or technical in nature, and both the secondary and postsecondary institution might potentially receive funding from the federal government as well as the state. In such cases, "triple dipping" may occur. While such action is prohibited under Dual Credit legislation, there is not adequate staff dedicated to managing the Dual Credit program in New Mexico at this time to investigate this matter in detail.

The positive side of double dipping in New Mexico is that a high school student can enroll in the program for free because postsecondary institutions waive tuition and fees while secondary schools are responsible for acquiring the textbooks and covering transportation costs. However, the difference in how secondary and postsecondary systems operate puts a financial strain on New Mexico in other ways. One very good example of this problem is in regards to textbooks. From the perspective of educators in the postsecondary system, choosing textbooks is part of the academic freedom of faculty. As such, college educators are allowed to choose which text to use on a semester-by-semester basis. However, it would be too costly for secondary schools to constantly update instructional material. Furthermore, while the legislature allocated roughly \$1.4 million to fund the purchase of textbooks and course supplies, in 2010 school districts

claimed only \$543,795.02, with the remaining balance scheduled to revert to the state (Hudson, 2010, p. 8) due to poor administration of the fund. As a result, several high schools have restricted the number of Dual Credit courses in which students can participate. The effect of such restrictions on student success is still unknown at this time and should be the subject of further research. However, clearly one of the obstacles in the successful management of the Dual Credit program in New Mexico is rooted in differences in how secondary and postsecondary systems operate. Bridging this divide is crucial.

New Mexico's Dual Credit Courses

Due to recent changes in high school graduation requirements that were intended to improve the rigor of secondary education, Dual Credit classes are one of four types of courses a student must enroll in prior to graduation. However, this does not mean that any college class offered in New Mexico qualifies for Dual Credit. Remedial courses, developmental courses, physical education courses,³⁴ and courses that are taken for audit are restricted.³⁵ Even so, this still leaves a large number of course offerings from postsecondary institutions potentially available to Dual Credit students. In theory, high schools and colleges are supposed to decide which classes qualify as a Dual Credit course but, in some cases, the parties involved have agreed that all course offerings in a postsecondary institution's catalog are eligible. This creates a huge variance in the rigor of Dual Credit classes and could potentially water down the impact of the program. For example, it is questionable whether on keyboarding and college algebra Dual Credit courses will have the same impact on student success.

³⁴ Examples of these physical education courses include walking for fitness and tennis.

³⁵ As they do not count towards a degree.

The geography of New Mexico also creates obstacles in providing access to the Dual Credit experience. New Mexico is a large state that is thinly populated and not all high schools are located within commuting distance of a public postsecondary institution. For this reason, offering online courses or teaching them on high school campuses is necessary to ensure equal access for all Dual Credit students and over half of Dual Credit courses are not taught on a college campus. However, teaching Dual Credit classes on high school campuses can lead to further complications. First, there is the question of rigor. Some critics fear that if high school teachers offer Dual Credit courses on secondary campuses, the quality of instruction will not be as high as that offered by college faculty teaching classes with other college-level students. Second, there is the problem of scheduling. Not all high schools are on the semester system (block schedule). Instead, a class may be taught over the period of a year. In this scenario, it is possible for two sets of students to be enrolled in a class, one at college and another at high school, but for the students to take a semester and a year respectively to complete the same course.

Finally, there is the question of applying Dual Credit courses towards high school and college graduation requirements. As mentioned earlier, one of the objectives of the Dual Credit program is to allow its students to simultaneously earn credit towards high school and college graduation requirements. There are two types of courses that could meet this requirement. A course could be part of a core course curriculum or it could be an elective. If the purpose of Dual Credit program is to allow students to earn secondary and postsecondary credit simultaneously, then it is better to have the Dual Credit classes count towards the core course requirements rather than only as an elective for both high

school and college. Core courses tend to be foundation classes that are uniform across the state and in the case of postsecondary general core classes, guaranteed to transfer by state statute. However, in order for classes to count towards the high school core classes, New Mexican statute requires that the instructor be "highly qualified." Unfortunately, a recent report by the Legislative Education Study Committee suggests that there are insufficient highly qualified high school faculty to fulfill a new high school graduation requirement; that students take a fourth math course (21-13-1.1.I.(2) NMSA 1978). Dual Credit could fill this gap but the disconnect between the two systems makes this option difficult to accomplish.

From a postsecondary perspective it is even more compelling to integrate Dual Credit courses into postsecondary core requirements. While elective courses that students enroll in as part of the Dual Credit program can count towards students' postsecondary graduation requirements, if they choose to attend another institution of higher education, these classes are not guaranteed to transfer. This potentially counteracts gains made in time by participation in an accelerated program like Dual Credit. Therefore, questions should be asked as to what percentages of courses offered actually count towards the completion of New Mexico's postsecondary core requirements, as these are guaranteed to transfer between institutions by state statute.

Chapter 5: Data Analysis and Research Questions

Research Questions

This study focuses on two research questions:

1. Does the location of Dual Credit courses affect student success differently?
2. Does the number of Dual Credit courses taken affect student success differently?

Finding answers to these questions can have an impact on funding of Dual Credit, as well as shaping appropriate instruction models for the program. This impact is determined by the following outcome measures:

- a. Number of total remedial courses required in the first semester of college.
- b. Number of remedial math courses required in the first semester of college.
- c. Number of remedial English courses required in the first semester of college.
- d. Number of credit hours students take in the first semester of college.
- e. Any differences in the types of colleges students decide to attend:
 - i. Two-year institutions
 - ii. Four-year institutions
 - iii. Both two-year and four-year institutions
- f. Whether there are any differences in second semester retention for students.

The aforementioned outcomes measures are used to determine the impact of various implementation options of the Dual Credit program for the following reasons. The number of remedial courses that students enroll in is used as a gauge of student preparedness for college-level academics, as well as an early indicator of students' chances of earning a postsecondary credential in a timely manner. According to

Winograd (2010), out of those who earned a baccalaureate degree within a six-year timeframe, 76.6% did not enroll in any remedial coursework. The number of credit hours students take in the first semester of college, in addition to second semester retention rates can assist policymakers and educators in understanding whether different Dual Credit instruction options have an impact on students' momentum towards continuous enrollment and eventual degree attainment. Finally, students' decisions as to what type of college to enroll in can affect the likelihood of earning different types of degrees as well as impacting degree attainment rates.

Data Sources

Data used in this analysis is drawn from the New Mexico Higher Education Department's Data Editing and Reporting System (DEAR), which contains unit record level course enrollment as well as student demographic information from all of New Mexico's 27 public postsecondary institutions. While DEAR data contains student enrollment information that dates back to 1994, Dual Credit data collection began in the fall of 2008. Thus, the data used in the analysis of the Dual Credit program is limited to seniors who participated during the fall of 2008 and the spring of 2009. There were 3,227 public high school seniors who enrolled in Dual Credit courses, out of which 2,037 students graduated from high school during the 2008-09 academic year and entered one of New Mexico's public postsecondary institutions in the fall of 2009. Students who have either decided to attend a private postsecondary institution, a postsecondary institution outside of New Mexico, or who have decided to enter the workforce directly after high school are not included in this analysis. To answer the research questions in this study, census rather than sampling was used in the analysis of the results, because complete student participation records were available through the use of DEAR data.

Summary analysis of the data and explanation of fields

Descriptive analysis of New Mexico's Dual Credit program indicates that during the academic year 2008-2009, 48% of participants were high school seniors. Of these students, 44% were from low SES background. The majority of Dual Credit students were either Hispanic or Caucasian, 47% and 32% respectively. There is a noticeable GPA gap between the two groups favoring Caucasian students. During the spring 2009 semester, 50% of courses were either offered on college campuses or online. When comparing GPA by course location, classes offered on high school campuses produced higher grades: 3.16 and 2.86 respectively. Of the high school seniors who participated in New Mexico's Dual Credit program during the academic year 2008-2009, 91% graduated in the same year and 67% of these students enrolled in college directly after graduation. Dual Credit students also required less remediation. During the fall 2009 semester 47.1 % of recent high school graduates required some form of remediation. However, only 35% of Dual Credit students required this service. While numbers such as these are promising, inferential analysis is needed to properly evaluate the impact of the Dual Credit program. At this point, it is difficult to determine if the high level of student success is due to program participation or to the high-achieving students who choose to enroll in Dual Credit courses (i.e. self-selection bias).

Table 1: Data Field Description

Data Field	Description
Dual Credit Course Location	College, high school, or both
Number of Dual Credit Courses	1,2,3,4, or 5 or more
RemAll	Number of total remedial courses students enroll in during fall 2009 semester

RemMath	Number of remedial math courses students enroll in during fall 2009 semester
RemEng	Number of English courses students enroll in during fall 2009 semester
F09_NUM_CRIS	Credit hours students enrolled in during fall 2009 semester
College Type	2-year, 4-year, or both 2-year and 4-year
S10Retention	1 = Did enroll in spring 2010 semester, 0 = Did not enroll in spring 2010 semester

The independent variable for the first research question, "Dual Credit Course Location" has three possible values: college, high school, or both. The location in which students enroll in is determined by looking at spring 2009 enrollment data. The independent variable for the second research question, "Number of Dual Credit Courses" has five possible classifications: 1, 2, 3, 4, and 5 or more. These categories represent the total number of Dual Credit courses students enrolled in during the academic year 2008-2009. The dependent variable "RemAll" reflects the total number of remedial courses that a Dual Credit student enrolled in during the first semester of college (fall 2009). "RemMath" and "RemEng" are subcategories of "RemAll" and, like RemAll, represent the number of remedial math and remedial English courses students enrolled in during the first semester of college. For these remedial indicators lower numbers are better than higher numbers meaning that students required less remedial education once enrolled in postsecondary institutions. "F09_NUM_CRIS" indicates the number of credit hours students enrolled in during the first semester of college. Unlike "RemAll," "RemMath," and "RemEng," higher numbers are better than lower numbers because if students are enrolled in higher course loads in the first semester than the students' academic timeframe

may be accelerated. "College Type" has three possible outcomes: enrolled in 2-year institutions, 4-year institutions, or both 2-year and 4-year institutions after high school graduation. Finally, "S10Retention" is a binary field that represents whether a student is still enrolled in the second semester of college.

Table 2 and Table 3 below indicate the relationship between the two research questions and the outcomes. For outcomes relating to number of remedial courses taken the low mean indicates that students required less remediation while high mean indicates that the students required more remediation. However for the number of credit hours students enrolled in during the first semester of college the high mean indicates that students enrolled in more credit hours while the low mean indicates that students enrolled in less credit hours. In most cases simply looking at these descriptive statistics shows that there are differences between the various outcome measures but what is not clear is whether these differences are statistically significant.

Table 2: Descriptive Statistics of Outcomes by Course Location

		N	Mean	Std. Deviation
RemAll	College	1022	.57	.882
	High School	784	.47	.782
	Both	231	.53	.893
	Total	2037	.53	.847
RemMath	College	1022	.33	.520
	High School	784	.26	.478
	Both	231	.29	.540
	Total	2037	.30	.508
RemEng	College	1022	.24	.521
	High School	784	.22	.486
	Both	231	.24	.529
	Total	2037	.23	.508
F09_NUM_CRS	College	1022	5.07	1.379
	High School	784	5.42	1.385

Both	231	5.21	1.466
Total	2037	5.22	1.401

Table 3: Descriptive Statistics of outcome measures by Number of Dual Credit Courses

		N	Mean	Std. Deviation
RemAll	1	426	.75	.977
	2	611	.60	.884
	3	334	.46	.792
	4	305	.46	.794
	5 or more	361	.25	.588
	Total	2037	.53	.847
RemMath	1	426	.40	.549
	2	611	.34	.526
	3	334	.25	.471
	4	305	.28	.503
	5 or more	361	.17	.428
	Total	2037	.30	.508
RemEng	1	426	.35	.623
	2	611	.27	.548
	3	334	.22	.468
	4	305	.19	.438
	5 or more	361	.08	.292
	Total	2037	.23	.508
F09_NUM_CRIS	1	426	5.02	1.374
	2	611	5.25	1.328
	3	334	5.18	1.494
	4	305	5.16	1.401
	5 or more	361	5.50	1.422
	Total	2037	5.22	1.401

Inferential data analysis

To answer research questions 1.a through 1.d, and determine if these differences are statistically significant, a Oneway Analysis of Variance was used. The assumption of homogeneity of variance was violated for two of the measures for RemAll and RemMath

(Table 4: Test of Homogeneity of Variance for Research Questions 1.a through 1.d).

Therefore, the Brown-Forsy F-ratio is reported for RemAll and RemMath variables.

Table 4: Test of Homogeneity of Variance for Research Questions 1.a through 1.d

	Levene Statistic	df1	df2	Sig.
RemAll	8.945	2	2034	.000
RemMath	15.722	2	2034	.000
RemEng	2.519	2	2034	.081
F09_NUM_CRIS	0.744	2	2034	.475

Table 5: Robust Tests of Equality of Means for Research Questions 1.a and 1.b

	Statistic ^a	df1	df2	Sig.
RemAll Brown-Forsythe	3.121	2	864.595	.045
RemMath Brown-Forsythe	4.934	2	854.141	.007

Table 6: Post Hoc Tests 1.a, 1.b, and 1.d

		(I) DC Course Location	(J) DC Course Location	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
RemAll	Tamhane	College	High School	.102*	.039	.029	.01	.20
			Both	.044	.065	.872	-.11	.20
		High School	College	-.102*	.039	.029	-.20	-.01
			Both	-.057	.065	.759	-.21	.10
RemMath	Tamhane	College	High School	.077*	.024	.004	.02	.13
			Both	.046	.039	.562	-.05	.14
		High School	College	-.077*	.024	.004	-.13	-.02
			Both	-.031	.039	.823	-.13	.06
		Both	College	-.044	.065	.872	-.20	.11
			High School	.057	.065	.759	-.10	.21
		Both	College	-.046	.039	.562	-.14	.05
			High	.031	.039	.823	-.06	.13

		School						
F09_NUM_CRS	Scheffe	College	High	-.350*	.066	.000	-.51	-.19
			School					
		Both	-.143	.101	.372	-.39	.11	
	High	College	.350*	.066	.000	.19	.51	
			School					
		Both	.208	.104	.138	-.05	.46	
	Both	College	.143	.101	.372	-.11	.39	
			High	-.208	.104	.138	-.46	.05
	School							

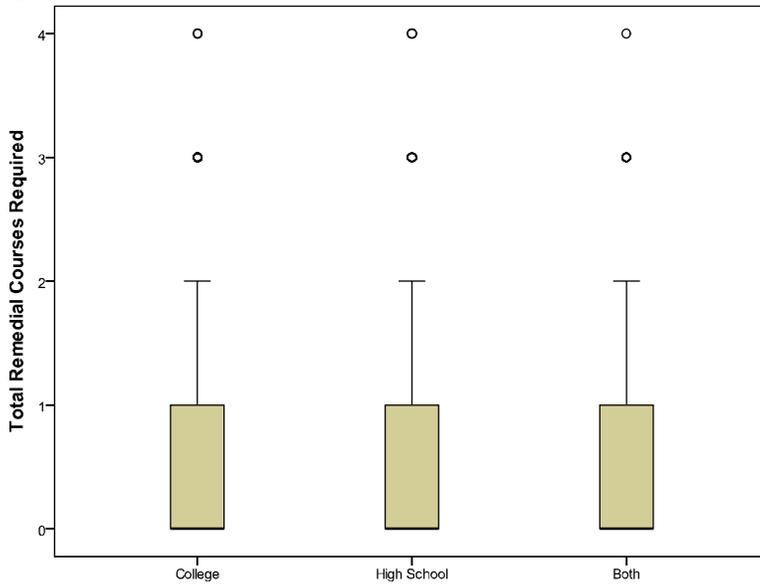
*. The mean difference is significant at the 0.05 level.

1. Does the location of Dual Credit courses affect student success differently as measured by:

- a. Number of total remedial courses required in the first semester of college.

The assumption of homogeneity of variance was violated for this measure; therefore, the Brown-Forsy F-ratio is reported. There was a significant effect of Dual Credit course location on the total number of remedial courses required, $F(2, 864.60) = 3.12, p = .045$. Post-hoc Tamhane tests showed a significant difference only between those who took Dual Credit courses in college ($M = .57, SD = .882$) and those who took Dual Credit courses in high school ($M = .47, SD = .782$). What the test indicates is that students who enrolled in Dual Credit courses at high school required less remediation than those who enrolled in Dual Credit courses at college by an average of 10% and as the differences in the data is statistically significant, it did not occur due to chance. To help understand the data further, a box plot can be found below. As you can see most of the students who enrolled in Dual Credit courses required less than one remedial courses upon entering college.

Figure 1: Dual Credit Location and Total Remedial Courses Required



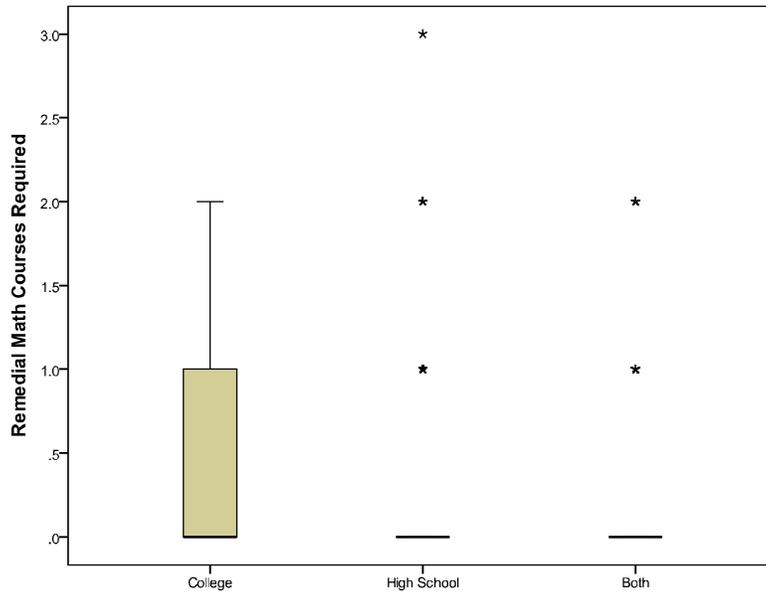
1. Does the location of Dual Credit courses affect student success differently as measured by:

- b. Number of remedial math courses required in the first semester of college.

The assumption of homogeneity of variance was violated for this measure as well; therefore, the Brown-Forsythe F-ratio is once again reported. There was a significant effect of Dual Credit course location on the number of remedial math courses required, $F(2, 854.14) = 4.93, p = .007$. Post-hoc Tukey tests showed a significant difference only between those who took Dual Credit courses in college ($M = .33, SD = .520$) and those who took Dual Credit courses in high school ($M = .26, SD = .478$). What the test indicates is that students who enrolled in Dual Credit courses at high school required less remedial math than those who enrolled in Dual Credit courses at college by an average of 7% and as the differences in the data is statistically significant, it did not occur due to chance. To help understand the data further, a box plot can be found below. Students who enrolled in Dual Credit courses at high school and both high school and college location required

less remedial math courses than those who enrolled in Dual Credit courses at college location.

Figure 2: Dual Credit Location and Remedial math Courses Required

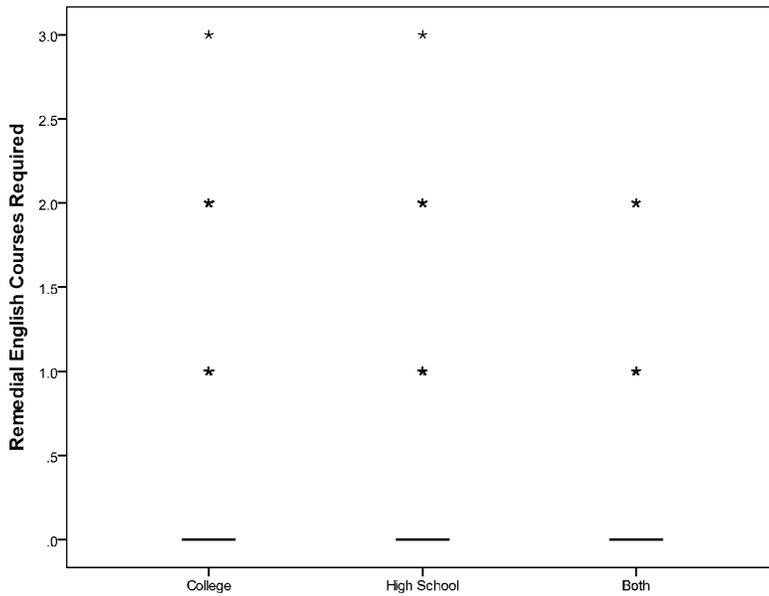


1. Does the location of Dual Credit courses affect student success differently as measured by:

- c. Number of remedial English courses required in the first semester of college.

Results of Oneway Analysis of Variance indicated no significant difference among any of the groups, $F(2, 2034) = .606, p = .546$. A box plot can be found below.

Figure 3: Dual Credit Location and Remedial English Courses Required



1. Does the location of Dual Credit courses affect student success differently as measured by:

d. Number of credit hours students take in the first semester of college.

The analysis showed a significant difference of Dual Credit course location on the number of credit hours students take in the fall of 2009 $F(2,2034)=14.05, p < .001$. Post-hoc Scheffe tests showed a significant difference only between those who took Dual Credit courses in college ($M = 5.07, SD = 1.379$) and those who took Dual Credit courses in high school ($M = 5.42, SD = 1.385$). The size of the effect is quite small: Dual Credit course location predicts only 1.4% ($\eta^2 = 1.36$) of the variability in the number of credit hours students took in the first semester of college. What the test indicates is that students who enrolled in Dual Credit courses at high school took more credit hours during the first semester of college than those who enrolled in Dual Credit courses at college by an

average of .35 credit hours and the differences in the data did not occur due to chance. A box plot can be found below.

Figure 4: Dual Credit Course Location and Number of Credit Hours Students Enroll

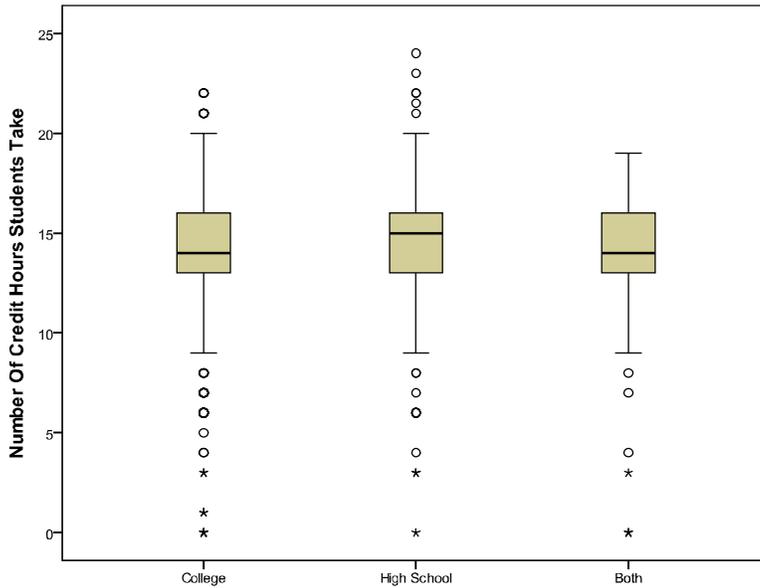


Table 7: Cross Tab 1.e Dual Credit Location and Type of Colleges Students Decide to Attend

		College Type			Total
		2 year inst	2&4 year	4 Year inst	
DC_CRS_Loc	Both	102	22	107	231
	College	454	112	456	1022
	High School	322	77	385	784
Total		878	211	948	2037

Table 8: Cross Tab 1.f Dual Credit Location and Spring 2010 Retention

		S10Retention		Total
		0	1	
DC_CRS_Loc	Both	19	212	231
	College	112	910	1022
	High School	83	701	784
Total		214	1823	2037

To answer research questions 1.e and 1.f, Chi square tests were used to determine whether student outcomes differed based on course locations. (Table 7, Table 8).

1. Does the location of Dual Credit courses affect student success differently as measured by:
 - e. Any differences in the types of colleges students decide to attend.

The result of the Chi square test indicated that the relationship is not significant at $p = .423$.

Table 9: Chi Square Test 1.e

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.876 ^a	4	.423
Likelihood Ratio	3.876	4	.423
N of Valid Cases	2037		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 23.93.

1. Does the location of Dual Credit courses affect student success differently as measured by:
 - f. Whether there are any differences in second semester retention for students.

The result of the Chi square test indicated that the relationship is not significant at $p = .471$.

Table 10: Chi Square Test 1.f

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.507 ^a	2	.471
Likelihood Ratio	1.596	2	.450
N of Valid Cases	2037		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.27.

What this means is that Dual Credit course location has no impact on either the type of postsecondary institutions students decide to attend in New Mexico directly after high school graduation or second semester retention.

From the data presented in Table 3, it appears that when the number of Dual Credit courses students take increases then the number of remediation required decreases and the number of credit hours students enrolled in during the first semester of college increases. However inferential analysis must be performed to know if these differences are statistically significant. Therefore, to answer research questions 2.a through 2.d a Oneway Analysis of Variance was used to determine whether student outcomes differed based on the number of Dual Credit courses students choose to enroll in. An assumption of homogeneity of variance was violated for three of the measures (Table 11). As such, the Brown-Forsy F-ratio is reported for RemAll, RemMath, and RemEng variables (Table 12).

Table 11: Test of Homogeneity of Variances for Measures 2.a through 2.d

	Levene Statistic	df1	df2	Sig.
RemAll	39.733	4	2032	.000
RemMath	37.574	4	2032	.000
RemEng	67.608	4	2032	.000
F09_NUM_CRIS	1.718	4	2032	.143

Table 12: Robust tests of Equality of Means for Measures 2.a, 2.b, and 2.c

		Statistic ^a	df1	df2	Sig.
RemAll	Brown-Forsythe	20.474	4	1830.269	.000
RemMath	Brown-Forsythe	12.069	4	1881.857	.000
RemEng	Brown-Forsythe	16.915	4	1756.059	.000

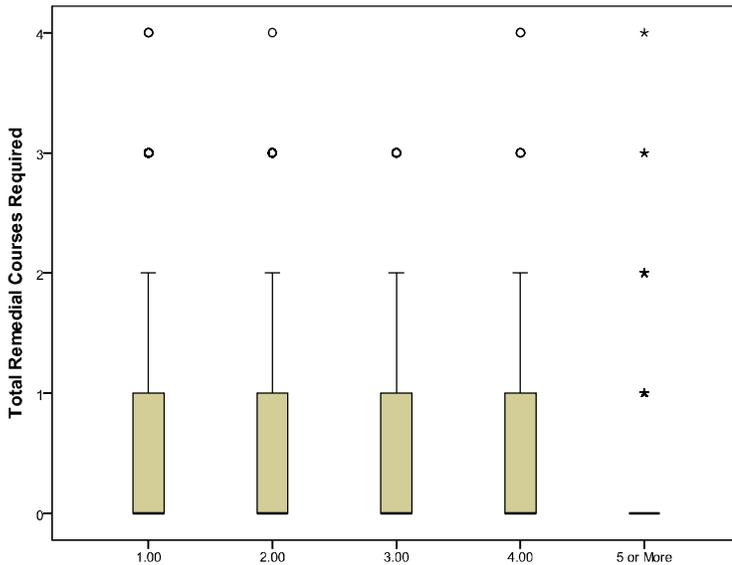
a. Asymptotically F distributed.

2. Does the number of Dual Credit courses taken affect student success differently as measured by:

- a. Number of total remedial courses required in the first semester of college.

The assumption of homogeneity of variance was violated; therefore, the Brown-Forsy F-ratio is reported. There was a significant effect on the number of Dual Credit courses and the total number of remedial courses required, $F(4, 1830.27) = 20.47, p < .001$. Post-hoc Tamhane tests showed a significant difference among almost all of the groups. Students who took more Dual Credit courses required less remediation. A box plot can be found below for additional analysis. Students who took 5 or more Dual Credit courses required very little remediation.

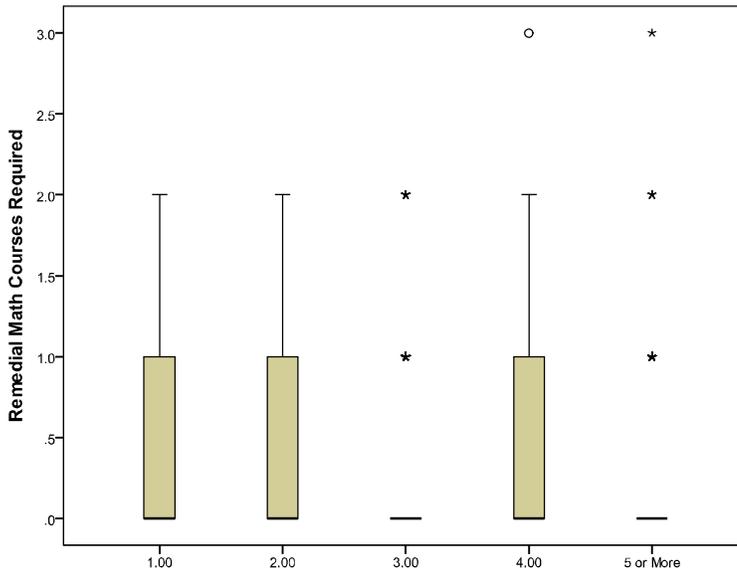
Figure 5: Number of Dual Credit Courses Taken and Total Remedial Courses Required



2. Does the number of Dual Credit courses taken affect student success differently as measured by:
 - b. Number of remedial math courses required in the first semester of college.

The assumption of homogeneity of variance was violated; therefore, the Brown-Forsy F-ratio is reported. There was a significant effect on the number of Dual Credit courses and the number of remedial math courses required, $F(4, 1881.86) = 12.07, p < .001$. Post-hoc Tamhane tests showed a significant difference among almost all of the groups. Students who took more Dual Credit courses required less remedial math courses. (A box plot can be found below.) Interestingly students who took three or 5 or more Dual Credit courses required almost no remedial math courses.

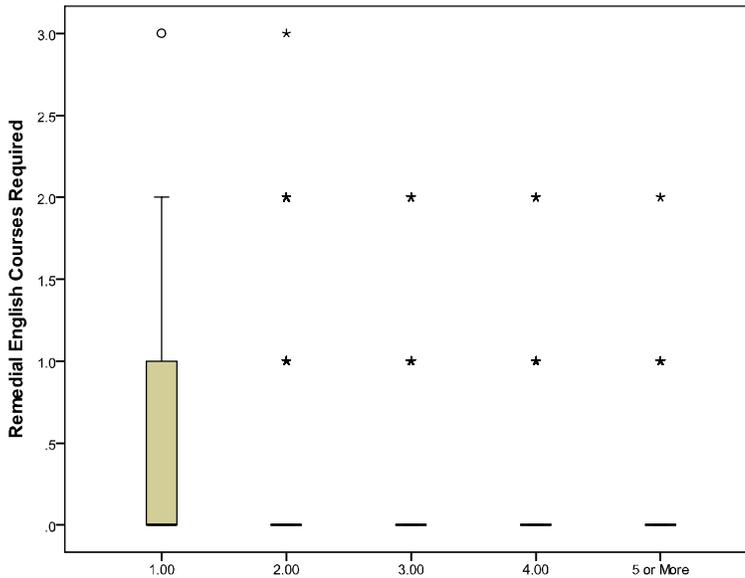
Figure 6: Number of Dual Credit Courses Taken and Math Remedial Courses Required



2. Does the number of Dual Credit courses taken affect student success differently as measured by:
 - c. Number of remedial English courses required in the first semester of college.

The assumption of homogeneity of variance was violated; therefore, the Brown-Forsy F-ratio is reported. There was a significant effect on number of Dual Credit courses and number of remedial English courses required, $F(4, 1756.06) = 16.92, p < .001$. Post-hoc Tamhane tests showed a significant difference among almost all of the groups. Students who took more Dual Credit courses required less remedial English courses. (A box plot can be found below.)

Figure 7: Number of Dual Credit Courses Taken and English Remedial Courses Required



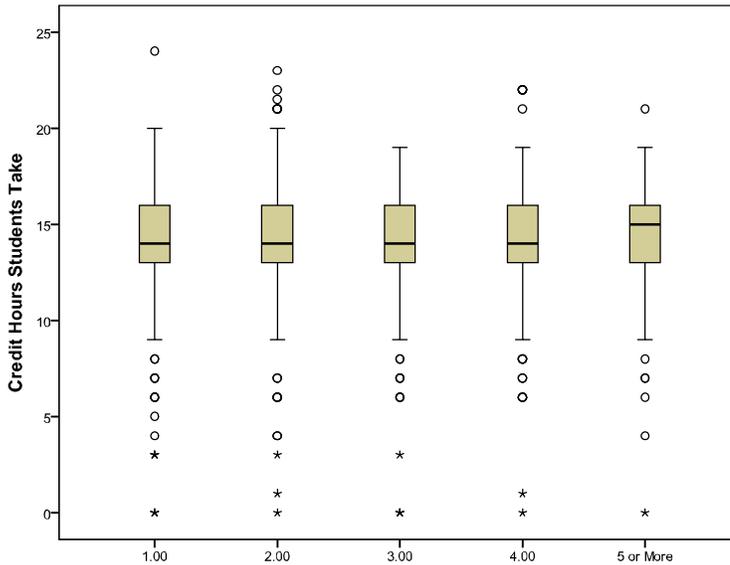
2. Does the number of Dual Credit courses taken affect student success differently as measured by:

d. Number of credit hours students take in the first semester of college.

The analysis showed significant difference among the groups $F(4, 2032)=6.197, p < .001$). The Post-hoc Scheffe tests showed a significant difference between those who took one Dual Credit course ($M = 5.02, SD = 1.372$) or four Dual Credit courses ($M = 5.16, SD = 1.201$) and five or more Dual Credit courses ($M = 5.50, SD = 1.422$). The size of the effect is quite small: Dual Credit course load predicts only 1.2% ($\eta^2 = 1.220$) of the variability in the number of credit hours students took in the first semester of college. The largest difference in the average number of credit hours students take in the first semester of college is .48 credit hours between students who took one Dual Credit courses and 5 or more Dual Credit courses. While the difference in credit hours is statistically significant, .48 credit hours may be too small to have an actual impact on

time it takes for students to graduate. The box plot can be found below to provide additional data.

Figure 8: Number of Dual Credit Courses Taken and Number of Credit Hours Students Enroll



To answer research questions 2.e and 2.f, Chi square tests were used to determine whether student outcomes differed based on Dual Credit course load. A cross tabulation of the two research questions can be found below (Table 13, Table 14).

Table 13: Number of Dual Credit Courses Taken and Type of College

		College Type			Total
		2 year inst	2&4 year	4 Year inst	
Number of Dual Credit Courses	1	204	48	174	426
	2	263	64	284	611
	3	138	38	158	334
	4	139	31	135	305
	5 or more	134	30	197	361
Total		878	211	948	2037

Table 14: Number of Dual Credit Courses Taken and Spring 2010 Retention

	S10Retention		Total
	0	1	
Number 1	61	365	426
of Dual 2	67	544	611
Credit 3	39	295	334
Courses 4	27	278	305
5 or more	20	341	361
Total	214	1823	2037

2. Does the number of Dual Credit courses taken affect students success differently as measured by:

e. Any differences in the types of colleges students decide to attend.

The result of the Chi square test indicated that the relationship is significant at χ^2 (DF = 8, N = 2037) = .036, $p < .05$.

Table 15: Chi Square Test for Measure 2.e

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.450 ^a	8	.036
Likelihood Ratio	16.472	8	.036
N of Valid Cases	2037		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 31.59.

2. Does the number of Dual Credit courses taken affect student success differently as measured by:

f. Whether there are any differences in second semester retention for students.

The result of the Chi square test indicated that the relationship is significant at $\chi^2(DF = 4, N = 2037) = .001, p < .05$.

Table 16: Chi Square Test for Measure 2.f

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.568 ^a	4	.001
Likelihood Ratio	18.764	4	.001
Linear-by-Linear Association	15.544	1	.000
N of Valid Cases	2037		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 32.04.

Discussion

The results of inferential analysis indicate that when looking at the impact of Dual Credit course locations on student success, there are statistically significant differences between students who participated in the program at a high school campus and students who participated in the program at a college campus, but not for those who took Dual Credit courses at both college and high school campuses. Specifically, students who enrolled in Dual Credit courses at a high school appear to outperform students who enrolled in Dual Credit courses at a college; students who took Dual Credit courses at a high school required less remedial courses in general, less remedial math courses, and enrolled in higher numbers of credit hours in their first semester of college. However, there were no statistically significant differences for the number of remedial English classes required in the first semester, students' decisions as to what type of college to attend, or students' chances for second semester retention.

These outcomes are unexpected, considering the existing research suggests that students who enroll in Dual Credit programs at postsecondary institutions receive greater benefits than those who take courses at high school campuses. Even so differences

between these two groups could have been due to a number of unmeasured factors, and it is premature to require that all Dual Credit courses be offered at high school campuses exclusively. For example, students' prior academic ability or their decision to enroll in the Dual Credit program may have played a role in producing different results between these groups. Another possible explanation is that the program in New Mexico is structured differently than those in other states. Finally, it is also possible that instruction on a high school campus simply produces better outcome for New Mexico students. After all, instruction at most high schools occur five days a week while instruction at a college occur two or three days a week. Whatever the reason, the results of analysis suggest a need for further research on the effect of course location on student success. Ideally, this study would be conducted using quasi-experimental design and utilize additional student academic data collected by the state of New Mexico to control for students' academic ability prior to participating in the Dual Credit program. Possible data fields that could be used as control include 11th grade high school graduation test scores, ACT/SAT scores students take prior to enrollment, or students' high school GPA.

Regarding the findings of the second research question (whether there is a relationship between the number of Dual Credit courses students enroll in and student success in college), there were statistically significant differences for all of the dependent variables. The observed tendency seems to be that the more Dual Credit courses students enrolled in, the less remediation was required in both math and English. Although this is consistent with Karp et. al's research there may be other reasons why students who take more Dual Credit courses are more successful in college than those who just take just a few. Intrinsically, it makes sense that students who can afford to (and choose to) take

more Dual Credit courses are most likely better prepared for college and have higher academic expectations than those who take only one or two Dual Credit courses. The same could be said about students' decisions as to which institution to attend, as well as whether or not students continue to be enrolled during the second semester of college. However, as in the case of the first research question because this study was unable to control for students' prior academic ability, it is not recommended that policy be changed to increase the number of Dual Credit courses that students take. Further research using quasi-experimental methods and utilizing students' 11th grade high school graduation test scores as a control is recommended regarding this issue as well.

Finally, it is important to note that while not enough time has elapsed to see if the Dual Credit program is having a positive long-term impact on student success in New Mexico, this study adds to the body of existing knowledge of Dual Credit programs complicating extent research and helping to fill in gaps. There have been very few studies that report student outcomes beyond descriptive data, and a majority of these reports highlight only the positive outcomes of the Dual Credit program. Additional research utilizing emerging longitudinal student databases which many states are currently in the process of developing surely will assist in future studies. Subsequent research should also focus on determining what types of Dual Credit instruction models are best in helping students succeed. In addition, the lack of assessment of students' academic ability prior to entering the program in the data set means that this study relies on a non-experimental design to review the impact of Dual Credit location and number of Dual Credit courses students enroll in. Thus any future research should seek additional control variables and use experimental and quasi-experimental research designs in order to establish a causal

relationship between Dual Credit participation and educational outcomes. Furthermore, while New Mexico encourages secondary students to enroll in Dual Credit classes by making this coursework one of four options for high school graduation, this fact alone does not control for students' decisions to enroll in the Dual Credit program. Finally, the availability of Dual Credit locations and the number of Dual Credit courses may be limited by individual high schools, due to geographic location as well as the availability of funds. As such, the research outcomes may be due to these unmeasured factors rather than the result of the Dual Credit program itself.

Chapter 6: Conclusion

Dual Credit programs operate on several assumptions. One is that students enrolled in rigorous coursework in high school are better prepared for college. Another is that taking college classes that apply to both high school and college graduation requirements accelerates students' educational time frames. Still another is that exposing high school students to a college environment provides multiple benefits. These may be sound assumptions in theory, but existing research suggests that Dual Credit programs are not generating enough improvements in student success to justify the large investments made by the state in offering these opportunities. If so, the question that researchers and policymakers should ask themselves is *why*. The conclusion to be drawn from the inconsistent findings in the literature suggests that the inadequacies of Dual Credit programs may lie not in their theoretical justification but rather in their implementation. If Dual Credit classes were limited to academically challenging gateway courses guaranteed to transfer for college credit by state statute, and if Dual Credit programs targeted students who would benefit the most from participating in these programs, perhaps then we would see better results.

The most likely reason why Dual Credit programs are not contributing to faster postsecondary graduation is found in the types of courses that are offered. Since classes need to be rigorous in order to have a positive impact on student success, simply classifying a course as "Dual Credit" is insufficient. This means that offering life-skills classes such as "Typing" or "How to Use Power Point" probably will have little impact on students when compared to more challenging gateway courses such as college level math or English composition. Furthermore, the rigor and quality of Dual Credit courses

may differ by location, instructor, and class composition,³⁶ and whether variation in course settings impacts student success needs to be studied further. Another policy issue of concern is course transfers. Students may be enrolled in Dual Credit classes that count towards an elective, or that are accepted at one postsecondary institution while not at another. If that is the case, then these Dual Credit courses may not be as effective at shortening the time needed to graduate and will not help to build academic momentum towards earning postsecondary credentials. Therefore Dual Credit classes should be limited to gateway courses that are part of the college general core requirements and are guaranteed to transfer to postsecondary institutions by state statute so that no credit hours are wasted. The issue of excess credit hours is of serious concern to New Mexico's public postsecondary education system as each year many students graduate having accumulated credit hours well beyond their minimum requirements. If students had not taken these extra credit hours then they would have completed their degree sooner with less cost to both themselves and the state.

On the subject of encouraging high school students who are non-college bound to change their minds, reviewing how Dual Credit programs affect low SES and underrepresented students is helpful. In both Karp et al.'s (2007) and Swanson's (2008) research, Dual Credit programs appear to have a stronger impact on the decisions of low SES and underrepresented students to attend college than on those who came from more affluent backgrounds. It is important to keep in mind that students with low SES and underrepresented students tend to be enrolled in high schools that typically do not offer many rigorous courses (Swanson, 2008, p.62). Therefore, if Dual Credit programs are

³⁶ These differences include whether the course is offered at a high school, college, or online, if the course is offered by a high school teacher or college instructor, and if the Dual Credit class is composed of high school students only or both college and high school students.

structured correctly, classes that students enroll in could function as a tipping point to change their minds about enrolling in college and could also prepare these students to meet postsecondary expectations. The difference in the type of high school that students from different SES backgrounds enroll in may also explain why Dual Credit courses do not have as large an impact for students with either high SES or strong academic skills. These students are more likely to pursue a postsecondary credential regardless of whether a Dual Credit program is available to them.

If the goal is to forge policy that helps students who are less affluent to succeed, then financial obstacles for Dual Credit participation need to be removed.³⁷ This means that at least for low SES students, tuition, fees, books, and potentially the cost of transportation should be free. In addition, if the aim of the Dual Credit program is also to encourage students that are academically challenged to improve their student performance then other barriers to program enrollment such as minimum GPAs or letters of recommendation may need to be removed.³⁸ Policies that encourage students to take part in Dual Credit programs by making it part of high school graduation requirements may also benefit students by requiring them to enroll in rigorous academic courses.³⁹ Finally, actively recruiting students from disadvantaged backgrounds and those who are underrepresented in postsecondary settings may benefit the students as well as the state if program participation could improve the chances of college degree attainment rate. As

³⁷ According to the Lumina Foundation, financial constraints are usually the largest factor in low SES students failing to enroll in college.

³⁸ This is not to say that students should be exempt from taking subject-specific college placement tests that assess student readiness to enroll in a particular course. The issue of eligibility requirements need to be weighed carefully. It should not put students in a situation where it is impossible for them to succeed but at the same time it should not act as a barrier.

³⁹ The ideal Dual Credit course is not only rigorous but also counts towards high school and college graduation requirements, is guaranteed to transfer by state statute, possibly part of a college's general core requirements, is ideally a gateway course, and is taught in a setting that would encourage students to obtain postsecondary credentials.

generally those with higher degree attainment tend to have a higher earning potential, if a state's population can become highly educated then this can have a positive impact on the state's economy.

Although the existing knowledge on the effectiveness of the Dual Credit program is growing, further research on this subject is greatly needed. Are there Dual Credit courses other than college level algebra that will improve the students' likelihood to succeed in college? Does Dual Credit actually help students who are economically disadvantaged? Why do students who enroll in a Dual Credit program on a high school campus and those who enroll in more Dual Credit classes outperform those who are taking Dual Credit program on a college campus and fewer Dual credit classes? Is it due to self-selection bias or is there another reason? These are areas in which further research is clearly needed.

Regardless of the results, policymakers should not assume that a Dual Credit program is going to help students succeed without evidence. While this thesis has looked at the impact of Dual Credit location and the number of Dual Credit courses students enroll in New Mexico, it is only a first step in reviewing the program. Additional research should be conducted to determine how to better prepare our high school students. Successfully educating all American students regardless of individual circumstances is a vital and thorny proposition but one well worth investing in.

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