

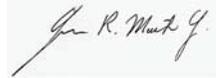
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PROGRESSION AND COMPLETION RATES OF REMEDIAL STUDENTS IN A
COMMUNITY COLLEGE SETTING

By

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A DISSERTATION IN PRACTICE

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Abstract

This quantitative, retrospective study for the Dissertation in Practice analyzed progression and completion rates of first-time freshmen college students who were placed into remedial courses and those who were placed into college level courses. The cohort was made up of first-time freshmen students who enrolled in the fall of 2013 at a rural community college in New Mexico. An enterprise resource planning system called “Banner” was utilized to gather demographic information, remedial and non-remedial course enrollment data, and information pertaining to progression and completion of certificates and degrees. The majority of students in this study tested into remedial level math and English with a low percentage completing college with a certificate or an associate’s degree. Statistical measures included frequencies of multiple variables, probit regression, Pearson’s Chi-Square, and Fisher’s Exact test. While several predictors for completing college were identified, successful completion of a college-level or gateway English course was the single variable found to predict successful completion of a certificate or an associate degree. Making evidence-based changes in placement practices and remedial teaching methods can increase the number of students who complete college level English, while increasing the number of remedial students who graduate with a certificate or an associate’s degree.

Keywords: remedial, community college, first-time freshmen

Dedication

This research is dedicated to my wonderful grandmother who raised me to love learning and to use what I have learned to help others.

“Everything begins with the initiative of an individual.” Robert K. Greenleaf

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CHAPTER ONE: INTRODUCTION

Developmental education or remedial education has existed in one form or another at institutions of higher learning since the 17th century (Arendale, 2011). While it originated as a form of tutoring, it has evolved into multiple forms of learning assistance that typically address student deficiencies in the areas of math, grammar, and reading. According to Arendale (2011), up until the 1940s, the majority of students who received developmental education were white males. Overtime, the makeup of remedial students has changed. Today they are more likely to be part of a minority ethnic group and include males, females, veterans, and first-generation college students (Chen, 2016).

Developmental education has evolved far beyond tutoring into an independent division of adult post-secondary education. This unique division is responsible for providing multiple levels of math and English courses designed to increase in difficulty to help prepare students lacking competency for college-level courses (Boatman & Long, 2018). Upon admission, incoming freshmen are placed in either developmental or college level math and/or English using a variety of placement methods. Methods may include the ACCUPLACER exam, the SAT or ACT, high school GPA, and other types of normed exams such as the TABE (Test of Adult Basic Education) (Barnett & Reddy, 2017). Barnett and Reddy (2017) noted that some schools may use one placement measure or a combination of the different types of assessments.

While incoming freshmen are placed into remedial education at both four-year and two-year institutions, two-year institutions or community colleges have the greatest number of remedial students (Chen, 2016). Nationally, up to 39% of incoming freshmen at four-year institutions and 68% of incoming freshmen at two-year institutions test into

remedial level courses (Skomsvold, 2014; Radford & Horn, 2012). In New Mexico, 86.4% of first-time freshmen entering the community college setting test into remedial level courses (NMHED, 2018). Remedial course requirements lengthen a student's time for college completion. While students can use financial aid to pay for remedial courses, the courses do not count toward college credits. This may lead to a student spending their allotted financial assistance before they have completed the courses required for their degree.

Although college administrators, faculty, and legislators are interested in the methods used to place incoming freshmen into remedial courses, they are also concerned with college outcomes for this specific population. As mentioned earlier, students use financial aid to pay for remedial courses. According to the NMHED (2014), states and students have spent up to \$3 billion dollars on remedial education. Remedial education spending in New Mexico has been as high as \$22 million dollars a year as part of the overall higher education budget. However, the student outcomes for this population do not reflect the amount of money invested. At community colleges across the country, only 22.3% of students who start in developmental courses ever take and complete a college-level course and only 9.5% graduate in three years (NMHED, 2018). To address the widespread lack of college preparedness and poor remedial outcomes, several states have enacted remedial education reform legislation (Hagedorn & Kutnetsova, 2016; Wilson, 2012). The states that enacted remedial reform that included standardized placement practices and alternative remedial education methods have reported significant improvements in remedial student outcomes (Hagedorn & Kuznetsova, 2016; King et al.,

2017). Still, many states with poor remedial student performance measures continue to use non-evidence-based placement methods and traditional remedial teaching practices.

Statement of the Problem

New Mexico legislators have postponed remedial education reform despite spending millions of dollars on developmental education (NMHED, 2018) and getting very few remedial student college graduates in return. While the NMHED (2015) made recommendations to standardize admission placement procedures and adopt alternative remedial education methods, New Mexico's public higher learning institutions have mostly avoided making any changes. They continue to use a variety of placement methods with no standardization and have adopted alternative remedial education practices in a haphazard fashion. Remedial course requirements lengthen a student's time for completion because courses do not count toward college degrees.

Minority students make up the greatest percentage of students who test into remedial education courses. According to Chen (2016), 78% of Black students and 75% of Hispanic students test into remedial level courses at two-year institutions, compared to 64% of white students. According to the NMHED (2014), at four-year institutions across the country, 36% of white students test into remedial level courses compared to 66% of Black students and 53% of Hispanic students. In New Mexico, 59% of Native American students and 68% of Hispanic students test into developmental education. The high percentage of minority students who test into remedial level courses could be contributing to the overall low number of minority college graduates (Musu-Gillette et al., 2017).

Purpose of the Study

The purpose of this retrospective, quantitative study was to determine if there is a difference in performance outcomes for first-time freshmen students who enroll in remedial courses compared to students who enroll in college-level courses at a rural community college. Performance outcomes included certificate completion within two years, degree completion within 4 years, and completion of a gateway math and/or English course. These measures served as the dependent variables. The independent variables were enrollment in remedial courses and college-level gateway courses.

Research Question

The primary issue of this study concerned the effectiveness of remedial education in a rural New Mexico community college. Effectiveness of remedial education can be measured by performance outcomes related to college progression and completion.

The study attempted to answer the following research question and the corresponding hypotheses:

Do students placed into remedial courses complete college at a lower rate than those placed into gateway courses?

H₁ Students placed into remedial courses complete college certificates at a lower rate than students placed into gateway courses.

H₂ Students placed into remedial courses complete associate degrees at a lower rate than students placed into gateway courses.

H₃ Students placed into remedial math courses successfully complete gateway courses in the same subject at a lower rate than students placed into nonremedial math courses.

H₄ Students placed into remedial English successfully complete gateway courses in the same subject at a lower rate than students placed into nonremedial English courses.

H₅ Students placed into remedial math successfully complete gateway courses in the same subject at a higher rate than students placed into remedial English courses.

H₆ Students placed into remedial math successfully complete certificates and degrees at a higher rate than students placed into remedial English courses.

Aim of the Dissertation in Practice

The aim of this Dissertation in Practice was to improve remedial student outcomes at a New Mexico community college through informing remedial education practice at the local level and remedial education policy at the state level. New Mexico has a long history of poor remedial student performance. With most first-time freshmen testing into remedial level courses, and New Mexico being a minority-majority state, poor remedial outcomes are linked to fewer minority student graduates coming from the state's public institutions of higher education. Leadership styles in state government and college administration have helped to perpetuate the poor outcomes.

The research from this Dissertation in Practice took place in a rural community college with a predominantly minority student population. The findings will be useful for informing remedial education practice at other minority serving institutions. The literature review provides evidence that further advances understanding of leadership styles that are most effective in an education environment.

Definitions of Relevant Terms

The following terms were used operationally within this study.

ACCUPLACER – a computerized placement test that covers reading, writing and math given to students entering two- or four-year colleges (College Board, 2019).

American College Testing (ACT) – the ACT is a standardized test used for college admissions in the United States.

COMPASS – a college placement test that includes modules in reading, writing skills, essay writing, math and English as a Second language (Test-Guide, n.d.)

Developmental education – also referred to as remedial education. An educational strategy using course sequences in reading, writing, and math to assist college students who are underprepared for college-level coursework (U.S. Department of Education, 2017).

First-time freshman – a student who is entering the college setting for the first time.

Gateway course – the first course in a sequence of college-level math or English courses.

Remedial education - intended to improve a person's ability to read, write, or do mathematics...(Remedial education, n.d.)

Scholastic Aptitude Test (SAT) – The SAT is a standardized test for college admissions in the United States.

Self-actualization – to realize fully one's potential (Self-actualization, n.d.).

Methodology Overview

This quantitative, retrospective study attempted to determine if students who were placed in remedial courses completed associate degrees or certificates at a lower rate than students who were placed into gateway courses. Two-hundred-and-eighty-one students who enrolled as first-time freshmen at a rural New Mexico community college were assessed for progression and completion of courses, certificates, and associate degrees over a four-year period. Using an enterprise resource planning system, student enrollment and program completion was tracked from fall of 2013 through spring of 2017.

Delimitations, Limitations, and Personal Bias

Limits of this study are related to internal and external validity. The study attempted to measure student success based solely on the independent variable of enrollment in remedial courses. It did not take into account other factors that influence college completion such as receiving academic support including tutoring, financial aid, or other types of social assistance related to transportation, housing, food, and income. Making the assumption that taking a remedial course is the only factor influencing college success can threaten the internal validity of the study.

Additional limitations included the sample size. Some of the *p*-values declared to be not statistically significant at the .05 level using probit regression or Chi Square tests may have been due to Type II errors. The sample sizes of the students who completed the college certificate ($n = 12$) and the associate degree ($n = 15$) may have been too small to provide sufficient statistical power to identify statistically significant relationships.

Delimitations of this study included the location of the research project and the sample population. The location of the study was at a rural community college. The

college population was also unique, in that 94% of students identify as a racial minority (University of New Mexico Gallup, 2018b).

Personal bias was considered due to the researcher's employment at the research site. The researcher was aware of the large percentage of freshmen who test into remedial level courses and the long history of poor remedial student performance. Despite steady freshmen enrollment, overall progression and completion rates remain very low. This knowledge could influence how the research findings were interpreted. It was important to recognize this bias during all phases of the research project.

Reflections of the Scholar-Practitioner

Looking at the population of students who require remedial education reveals a very vulnerable population of individuals who are performing basic academic skills at a significantly low level. This low level of performance in reading and math impacts their ability to critically think and problem solve as adults. Going through life with minimal problem-solving skills limits the experiences that optimize self-actualization.

As a college administrator, I feel a sense of duty and responsibility to help find solutions that lead to better learning outcomes for our remedial students. As a transformational and servant leader, I can help motivate and inspire others to overcome political and institutional barriers to change. Through change, faculty, administrators, and legislators can determine policy and practice that will improve the college outcomes and life experiences of our most vulnerable students.

Poor remedial education outcomes are well documented in the literature, as are recommendations to improve those outcomes. Like many other remedial students around the country, remedial students in New Mexico struggle to complete college. Research

pertaining to remedial student performance in a community college setting in New Mexico can provide insight into what problems may exist and what solutions may be appropriate. The solutions could benefit the students where the research took place as well as students in other community colleges around the state. The findings from the study could also be useful for developing statewide policy related to remedial reform. Multiple states around the country have used evidence from the literature to make positive changes for their remedial college students. The remedial student outcomes demonstrated by this research can help to influence remedial teaching practices, determine best-practice placement methods for incoming freshmen, and shape remedial education policy at the local and state level.

Summary

Developmental education or remedial education has evolved from its humble beginning as simple tutoring to a stand-alone division of education in institutions of higher learning. Although remedial education can be found at both two-year and four-year institutions, community colleges have the largest number of remedial students (Chen, 2016). Despite offering sufficient numbers of remedial courses, students who start college at this level complete college at much lower rates than their peers who never take a remedial course (Shields & O'Dwyer, 2017). Studies have found that these low completion rates can be related to poor placement methods for incoming freshmen (Barnett & Reddy, 2017), as well as the overall structure of remedial education and teaching practices (Goudas & Boylan, 2012). The proposed study can help identify outcomes of remedial students in a community college setting, enabling the researcher to

inform college faculty, administrators, and legislators and affect change in remedial education practice and policy.

CHAPTER TWO: LITERATURE REVIEW

This literature review will provide information about remedial education including historical and current practice, financial aspects, remedial student outcomes, remedial education reform and theoretical foundations for implementing change in a community college setting. First, the history of remedial education, financing developmental education, remedial student placement practices, and traditional and alternative remedial teaching methods will be explored. This will be followed by remedial student outcomes and the implementation of remedial education reform. Finally, leadership theories pertaining to transformational leadership and organizational change will be considered to promote change in a community college setting.

Remedial Education

Developmental education or remedial education has existed at institutions of higher learning since the 17th century (Arendale, 2011). While it originated as a form of tutoring, it has evolved into multiple forms of learning assistance that address student deficiencies in the areas of math, grammar, and reading. The University of Wisconsin offered developmental programs as early as 1849 (Breneman & Haarlow, 1998). Harvard followed suit in 1879, developing an entrance exam. In its first year of use, more than 50% of Harvard applicants required assistance prior to taking college level courses (Casazza, 1999). As early as 1889, authors were writing at length about students being under-prepared for college (Canfield, 1889).

According to Arendale (2011), up until the 1940s, the majority of students who received developmental education were privileged white males. Overtime, the makeup of remedial students changed. As a result of the Civil Rights Act of 1964, the Higher

Education Act of 1965, and open enrollment at community colleges across the country, remedial students of today are more likely to be part of a minority group and include males, females, veterans, and first-generation college students (Chen, 2016; Payne & Lyman, 1998). While four-year institutions continue to offer remedial courses, as a result of open enrollment, two-year institutions have the greatest remedial student population (Chen, 2016).

The Role of the Two-Year College in Providing Developmental Education

For the past 50 years, community colleges have helped increase college opportunities for students from all walks of life (King et al., 2017). Munsch et al. (2015) spoke to the importance of developmental education and the two-year college design. The authors noted that the Truman Commission highlighted the importance of the community college back in 1947 in the publication “Higher Education for American Democracy.” The commission acknowledged the need to provide education to individuals in communities where access to college was unavailable, while also meeting the needs of local employers.

The community college environment and the developmental education that it offers provide access and choice to members of rural and urban communities across the country. Without it, recent high school graduates and nontraditional students would not seek higher education or earn a degree. Post-secondary education improves economic opportunities for students, helping students who come from low-income families move into the middle class with access to a better life. Obtaining advanced education also benefits society as a whole. Gardenhire-Crooks et al. (2010) noted that higher education contributed to improved health, less crime, better social integration, and citizens who are

more politically active. Munsch et al. (2015, p.6) stated that, “Developmental education is the great equalizer in higher education.” The combination of developmental education and an open access community college provide students with opportunities to pursue academic goals and improve their sense of self-efficacy.

While the open-access practice of two-year institutions increased student opportunities, it also brought to light the lack of college preparedness for many student applicants (King et al., 2017). To address the lack of college-preparedness, colleges developed their own remedial courses in the areas of math, reading and grammar. While some students only need one or two courses to reach college level competency, other students require multiple courses or one to two years of coursework before they enter their first college level course.

While the lack of college preparedness at the community college level is apparent, whether or not developmental education should be offered at the college level is a longstanding debate. In the late 19th century, authors acknowledged the need for post-secondary education preparatory courses but found the use of state funds to prepare students for college work as wasteful (Canfield, 1889). Canfield (1889) argued that primary and secondary schools were not preparing students for college level work and that money was being spent twice to accomplish the same goal.

Student Representation in Developmental Education

Nationally, Blacks, Hispanics, low-income, and first-generation students make up the largest percentage of students enrolled in remedial courses (Chen, 2016). Native American students also test into remedial education at higher rates than their Asian or White peers (Frank & Fitzgerald, 2015). In the California college system, Cuellar-Mejia

et al. (2016) found that 87% of African American and Latino students enrolled in remedial courses compared to 70% of Asian American and 74% of White students. The authors also noted that 86% of low-income students in California enrolled in remedial level courses. In New Mexico, according to the “College Readiness” report (NMHED, 2014), students who identified as Native American tested into remedial level education at a rate of 59%. In the same report, Hispanic students were found to test into remedial level courses at a rate of 68%, while 79% of low-income students remediated prior to taking a college level course.

Legislation increased access to higher education for underrepresented students leading to greater ethnic diversity. However, college outcomes for minority students who make up the majority of students taking remedial courses is negatively impacting representation of minority groups among college graduates. Remedial reform through changing placement practices and developmental education curriculum can address the achievement gap of underrepresented groups (Rodriguez et al., 2018).

The Costs and Benefits of Funding Developmental Education

While the need for developmental education and open access to higher education through community colleges is well documented, the argument against spending on developmental education continues today (Gallard et al., 2010). According to Scott-Clayton et al. (2012), the direct cost of providing developmental education is approximately \$7 billion dollars a year. Students attending both two-year and four-year institutions pay approximately \$1.3 billion in out-of-pocket expenses to take remedial courses (King et al., 2017). Out of the \$1.3 billion, \$920 million was spent by community college students. Students also take on financial debt to pay for developmental education.

Students who borrow money to take remedial courses at both two-year and four-year institutions, accumulate up to \$380 million in federal student loan debt each year (King et al., 2017).

Poor remedial student progression and completion rates play a role in the negative financial impact of developmental education. Public colleges are often funded using a formula that incorporates graduation rates. Developmental education students are the most at-risk for dropping out and stopping out of college. If colleges stopped offering developmental education courses and did not admit students who were not college ready, their graduation rates would improve and their government funding would increase (Munsch et al., 2015). This may explain why more than a dozen states have stopped funding remedial classes at 4-year institutions (Clotfelter et al., 2015). While doing away with developmental education could potentially improve graduation rates and financial reward to schools, the student headcounts for colleges would drop and tuition revenue would decrease. With this in mind, much of the negative financial association to developmental education could be decreased by implementing measures to improve remedial student outcomes (Gallard et al., 2010).

Gallard et al. (2010) looked at this issue from the cost/benefit model used in the world of business. They noted that the financial benefit of developmental education if done correctly, could be achieved for both higher education institutions, as well as for society as a whole. If colleges could offer effective remedial education, remedial students would progress further and have a higher likelihood of graduating. Both of these factors would increase the financial revenue for institutions of higher education through an

increase in tuition and through formula funding for public colleges used by state legislatures.

Students who don't complete a degree but make some progress fair better than students who only complete high school. Kane and Rouse (1995) looked at the economic impact on students and society for those students at two-year institutions who graduated from college and those who only acquired a portion of a college education. They found that students who completed an associate degree had a 10% to 25% higher income than their peers who only graduated from high school. They also noted that for nondegree completers, there was a 5% to 8% economic increase for each year of community college completed.

Remedial Education in New Mexico

According to the NMHED (2014), New Mexico has four public four-year institutions and fifteen two-year institutions that offer developmental education. The agency noted that completion rates for developmental education students vary widely within and between the two types of institutions. Completion rates at four-year universities range from 15% to 47%, while two-year college completion rates range from 2% to 28% (NMHED, 2014).

Nationally, demographics of remedial students reflect increased rates for students falling into certain income brackets, as well as those who belong to specific ethnic groups (Gallard et al., 2010). The professional setting for this study is a community college with a 94% minority majority, low income, student population made up of predominantly Native American students followed by Hispanic students (NMHED, 2014; University of

New Mexico Gallup, 2018b). Seventy-seven percent of incoming freshmen who graduated from the local school district test into remedial level courses (NMHED, 2014).

National Remedial Education Placement Practices

Higher education institutions use a variety of methods to determine what courses an incoming freshman should take to begin to meet the general education requirements in the areas of math and English. Barnett and Reddy (2017) and Marwick (2004) noted that schools may use one method or multiple methods to determine college readiness. Some schools use scores from the ACT or the SAT exam (Barnett & Reddy, 2017). Marwick (2004) found that some schools utilize high school transcripts to make the determination by looking at types of math and English courses the student took and the corresponding grades. As of 2018, 33 out of 50 states had state or systemwide developmental education assessment and placement policies (Education Commission of the States, 2018).

Marwick (2004) found that some schools use standardized tests such as the ACCUPLACER or COMPASS exam, either as a stand-alone measure or in conjunction with transcripts to determine placement. The author also noted that using a standardized test as the only placement measure can result in placement error. Belfield and Crosta (2012) found that using high school GPA in conjunction with a standardized placement test could reduce placement error rates by half in both math and English. The practice of using a standardized test as a stand-alone placement measure is particularly problematic for those students who test just below the remedial education cutoff score. Remedial students in this group appear to benefit from persistence to their second year of college, however, the same benefit does not carry over to degree completion (Calcagno & Long, 2008).

Marwick (2004) also pointed out that some institutions using the ACCUPLACER test determine their own cut-off scores, creating inconsistencies for remedial placement between schools. While some states have standardized their placement practices (Wilson, 2012), many others still let public schools decide what works best for their institution and their student population. In New Mexico, there is no state or systemwide developmental education assessment or placement policy, leaving schools to make their own determination (NMHED, 2014).

At the community college where the study took place, placement practices include several components. If a freshmen student has taken the ACT or SAT, those scores are considered first. If there are no ACT or SAT scores, the high school transcript will be considered along with ACCUPLACER scores. If the ACT or SAT scores do not place the student in college level math and/or English, the student must take the ACCUPLACER to make the placement determination along with the high school GPA.

Traditional Remedial Education Methods

Traditional post-secondary remedial education is intended to address skill deficiencies in reading, and/or writing, and math (Bahr, 2012; Pascarella & Terenzini, 2005). Traditional developmental math courses are sequential beginning with basic arithmetic, followed by elementary algebra, and intermediate algebra with each course typically lasting one semester (Ariovich & Walker, 2014). Blitzer (2017) described the math content specific to each level. Elementary algebra addresses deficiencies in multiple basic areas including but not limited to whole numbers, integers, fractions, decimals, and percentages. Elementary or introductory algebra can include linear equations with one or two variables, exponents and polynomials, and factoring polynomials. Finally,

intermediate algebra addresses basics of algebraic functions, linear inequalities, radicals and exponential and logarithmic functions.

Traditional remedial English content has a basic and intermediate level (Casil, 2019) and is often taught as two separate courses, starting with developmental reading followed by developmental writing with each course taught over one semester (Bers, 2018). Casil (2019) discussed the differences between basic and intermediate remedial English. Basic remedial English courses are typically one semester and cover sentence- to paragraph-level writing. They address deficiencies in vocabulary and reading comprehension skills. Intermediate level remedial English courses go one step further in strengthening vocabulary and writing skills. Students are expected to master writing good paragraphs and longer, more complex essays. Grammar is a focus in both levels including punctuation.

At the University of New Mexico Gallup, remedial math is offered as pre-algebra, introduction to algebra, and intermediate algebra. Most of the courses are taught over the entire semester with the exception of three sections of intermediate algebra which are taught as accelerated courses over an eight-week period. There is only one remedial English course at the branch campus, and it includes vocabulary, reading, and writing skills.

Any time a student is placed in a traditional remedial math or English course, their path to college completion has automatically lengthened past their peer who is placed into college-level courses. While students can use financial aid to pay tuition for remedial courses, the courses do not count towards degree completion. Depending on the

student's lack of college preparedness, they may be in school for an additional three or more semesters before they take their first gateway course (Bailey et al., 2010).

Traditional Remedial Education Outcomes

College graduation rates in the United States vary based on the type of institution attended. According to the National Center for Education Statistics (NCES) (2018), on average, 60% of first-time, full-time students who attended four-year institutions completed a bachelor's degree within 6 years. By comparison only 30% of first-time, full-time students who attended community colleges completed a certificate or associate's degree within 150% of the normal time required for completion.

Several studies have documented that remedial education is one factor that contributes to low college completion rates. Overall, if a student enrolls in a remedial course, his or her chance of completing college is significantly lower than their peer who never took a remedial course (Roksa et al., 2009). In an earlier study, Roksa et al. (2009) found that only 30% of remedial students ever completed a certificate or a degree. More recently, Shields and O'Dwyer (2017) reported that at four-year institutions, 39% of students who take remedial courses finish a college degree, compared to 59% of students who never take a remedial course. Complete College America (2012) found that in the community college setting, only 9.5% of remedial students graduate within three years. Several authors identified remedial education to be a barrier to college completion versus the bridge to college level courses that it is touted to be (Crisp & Delgado, 2014; Marwick, 2004; Roksa et al., 2009). In New Mexico, only 17% of students who take remedial courses at a four-year institution graduate (NMHED, 2014). Community colleges have the greatest percentage of remedial students (Chen, 2016), which could be

part of the explanation for the large difference in graduation rates between two-year and four-year institutions.

Poor college progression of remedial students contributes to low graduation rates. Complete College America (2012) reported that remedial students in four-year institutions complete their remedial courses at a rate of 74.4%, while their peers at a community college have a 62.2% remedial course completion rate. Remedial students at a four-year college who complete their remedial course sequence complete a college-gateway course at a rate of 36.8%. Community college remedial students have a 22.3% college-gateway course completion rate. In New Mexico, it should also be noted that at least 30% of students who place into remedial education never enroll in a course (Complete College America, 2012).

The type of remedial courses that a student is placed into may also impact progression and completion. Overall, more students place into remedial math than English. Bailey et al. (2008) noted that in the community college setting 59% of students were placed in remedial math, while 33% were placed into remedial English.

Calcagno and Long (2008) found that students placed in remedial math completed college level math courses at the same rate as nonremedial students. However, remedial reading students completed college level English courses at a lower rate than their nonremedial student peers. The authors found that remedial education initially improved persistence to the second year of college. However, the persistence only marginally improved certificate or degree completion. Bettinger and Long (2009) provided additional evidence on remediation and degree completion noting that remediation may impact the student's choice of a major. They found that when students identified an

English major as an interest, they were less likely to pursue a degree in this field if they subsequently enrolled in English remediation courses. However, the opposite was true for remedial math students who were more likely to follow through to a math-related major despite taking remedial courses. Along the lines of degree completion, Crisp and Delgado (2014) noted that remedial English students were less likely to transfer to a 4-year institution compared to their peers who only took remedial math courses.

Alternative Remedial Education Methods

In response to poor college progression and completion rates of remedial students, alternative forms of remedial education have been implemented across the country (King et al., 2017). King et al. (2017) and Vidal (2017) discussed alternative accelerated developmental education models and how they allow students to enter college-level English and math courses within a shorter timeframe. One model placed students in remedial level courses that are taught in half the time of a regularly scheduled course. For example, a student placed in remedial math would take the course over an eight-week period versus the traditional 16-week schedule. The accelerated course would include an additional mandatory tutoring lab to help support student learning. Another accelerated remedial model, commonly called co-requisite remediation, places a developmental education student into a gateway college level course. An example of this method would include the placement of a remedial student into college level English, with the addition of a credit bearing lab for additional assistance. Accelerated and corequisite models funnel developmental education students into college-level courses with supplemental instruction connecting them with better prepared peers who can demonstrate successful learning strategies (King et al., 2017).

In addition to adopting the accelerated and corequisite models, other changes have been implemented in developmental math and English courses to improve completion and progression. Palmer (2016) noted how some remedial programs chose to combine remedial reading content with a college-level English course, shortening the sequence by one semester. The author also described changes to remedial math content from the traditional pre-algebra to content that reflects the student's major. In this example a program created three math pathways including a non-STEM track, a college algebra track for a traditional math pathway, and a math track designed for an applied technical degree or certificate.

In New Mexico, the alternative remedial education methods are slowly being adopted. A few public institutions of higher education have implemented accelerated math pathways (NMHED, 2016b) and corequisite English courses (NMHED, 2016a) in an attempt to improve remedial education outcomes. However, despite the recommendation of the New Mexico Secretary of Higher Education to implement alternative remedial methods, colleges and universities continue to have traditional remedial course design as the primary method of developmental education (NMHED, 2014).

Alternative Remedial Education Outcomes

Students enrolled in alternative remedial education courses progress and complete college at higher rates than their peers placed in traditional remedial courses (King et al., 2017; Vidal, 2017). King et al. (2017) reported that some schools using alternative teaching methods have seen significant improvement. Tennessee implemented the alternative corequisite model statewide for students testing into remedial math and

English. Over a one-year period, the pass rates for college level math increased from 12% to 51%, the pass rates for college-level writing courses increased from 31% to 59% and the cost of tuition for these students dropped by half.

Complete College America (2016) noted that multiple states that implemented remedial reform using the co-requisite model reported higher pass rates across math and English college level courses. Georgia, West Virginia, Tennessee, Indiana, and Colorado all implemented an alternative remedial education model in the form of corequisite courses. In the Complete College America (2016) report, students who took the corequisite courses completed their first college level course at rates 33-44% higher than students who took traditional remedial courses.

Remedial Education Reform

To address spending on developmental education and student performance related to course completion, credit accumulation, progression, and college completion, many states have opted for remedial education reform. Using evidence-based practice, the United States Department of Education made reform recommendations based on a developmental education practice guide published by the Institute of Education Sciences (King et al., 2017). Those recommendations included multiple measures to assess college readiness and placement, early assessment and college collaboration with high schools and redesigning developmental education courses.

King et al. (2017) and Barnett and Reddy (2017) noted multiple measures to assess college readiness and placement including standardized assessments in math, reading, and writing, high school GPA, the number of courses taken in math and English, and the highest level of math or English taken at the high school level. Multiple measures

could also include the consideration of how long the student has actually been out of high school (King et al., 2017). King et al. (2017) also suggested that providing pre-test preparation for students taking a standardized admission test such as the ACCUPLACER or the COMPASS test could help improve student recall and test scores. Using multiple measures to determine placement helps to ensure that students are not erroneously placed into developmental education (Barnett & Reddy, 2017).

King et al. (2017) also found that providing assessment of student preparedness prior to college admission can be helpful. Through collaboration between secondary schools and colleges, assessments can be provided during the junior year of high school. This would help identify weak areas in math, reading, or writing that could be addressed prior to college admission.

Redesigning developmental education models has also been part of remedial reform (Hagedorn & Kuznetsova, 2016; King et al., 2017). Students who are placed into traditional developmental courses spend at least one extra semester becoming college ready. Hagedorn & Kuznetsova (2016) and King et al. (2017) discussed alternative remedial teaching methods that address this issue, they included an accelerated design or the corequisite teaching model. Adopting an accelerated or time-shortened design can help students complete sequenced developmental courses within one semester, shortening the length of time necessary to complete a developmental course sequence and to achieve enrollment in a college level course. This method has demonstrated improved retention and progression for developmental education students and is particularly effective when connected to academic assistance (King et al., 2017). The corequisite model places remedial students into college-level courses while providing extra developmental

academic support. The additional support is often accomplished by adding a credit bearing lab as a corequisite or through mandatory tutoring. While redesigning the developmental education model has demonstrated improved student outcomes, it is important to recognize the need for instructor competency when teaching a new method. Providing faculty with professional development in alternative remedial practices is essential for them to be effective instructors (King et al., 2017).

Remedial Reform at the State Level

Several states have adopted measures to address remedial reform. The measures vary widely in their impact on how developmental education is practiced. Some states took small reform steps by mandating developmental education be taught only in community colleges (Brower et al., 2017). Other states went slightly further allowing two-year and four-year institutions to offer remedial courses but standardizing remedial student placement practices (Education Commission of the States, 2018). Still other states took even stronger steps, standardizing placement practices, as well as curriculum (Brower et al., 2017; Wilson, 2012). Collaboration between secondary and post-secondary institutions has been instituted in some states as part of remedial reform in an effort to address student deficiencies before they apply to college.

Thirty-three states have implemented remedial placement policies to help ensure standardization of practice in two-year and four-year colleges and universities (Education Commission of the States, 2018). While placement policies are standardized within the state, they are not standardized between states. Multiple states with placement policies use one assessment such as ACCUPLACER or COMPASS with set cut-off scores. However, other states such as Texas and Florida, wrote their own placement test to be

used by all state institutions (Brower et al., 2017; Texas Higher Education Coordinating Board, 2014).

Texas

In 2013, Texas mandated that all students entering public colleges or universities, with a few exceptions, be tested to determine placement into developmental education (Hagedorn & Kuznetsova, 2016). Around the same time, Texas created its own placement assessment with corresponding cutoff scores to help standardize the process (Texas Higher Education Coordinating Board, 2014). According to the Texas Higher Education Coordinating Board (2014), all Texas colleges and universities who administered the placement test had to use the Texas Success Initiative Assessment and corresponding cutoff scores that placed students into college level courses, developmental, or adult basic education. This helped standardize admission placement practices across the state.

In addition to addressing placement practice, they also initiated curricular changes. As of 2015, all Texas institutions that offer developmental education must use accelerated models of instruction. The models include integrated reading and writing , non-course competency-based options in each content area, and corequisite instruction with student co-enrollment in both a developmental and college-level course.

To support statewide implementation of the accelerated teaching model, the Texas Success Initiative Professional Development Program was created (Texas Higher Education Coordinating Board, 2014). According to the Texas Higher Education Coordinating Board (2014), the program utilizes needs-assessment surveys to provide research-based professional development to faculty, staff, and administrators at Texas

public institutions of higher education. In addition to training, an online peer learning directory was created to allow participants to provide and seek support from other participants around the state.

Implementation of remedial reform in Texas has not been without challenges. The Texas Higher Education Coordinating Board (2014) reported that the state has struggled to provide comprehensive, statewide, professional development and to implement the accelerated, nontraditional remedial teaching methods at all public colleges and universities. Implementation of the new curriculum, remedial student outcomes, and provision of professional development continued to be monitored to ensure ongoing improvement of remedial education at Texas colleges and universities.

Ohio

In the 2017 Ohio Higher Education Department report, the agency noted that as part of remedial education reform, Ohio implemented the Remediation-Free Guarantee. The Remediation-Free Guarantee ensured that high school student performance met a threshold where no placement tests or remediation was required upon entry into the college setting. Helping high school students meet that threshold was accomplished through collaboration between secondary and higher education.

In 2018, the Ohio Higher Education Department did a follow-up report. They noted that as a result of the secondary and higher education collaboration the previous year, a curriculum had been developed that included “transition classes” to support college bound students in need of remediation while they are still in high school (Ohio Higher Education Department, 2018). In the same report the agency documented that math transition courses were to be implemented as part of a pilot program in the fall of

2019 in Ohio's secondary education programs. For those Ohio college students who arrive from outside of the Ohio public education system, remedial education follows the accelerated course and co-requisite model.

According to the Ohio Higher Education Department (2017), another student success measure included alignment of high school math courses to academic programs of study. The steps of this measure include aligning high school math courses with student's college pathway. Pathways include Statistics, Quantitative Reasoning, and the Science, Technology, Engineering, and Mathematics (STEM) Pathway.

North Carolina

Like Ohio, North Carolina also involved high schools to address the lack of their graduates' preparation for college. This came about following legislation that mandated collaboration between the State Board of Education and the State Board of Community Colleges to develop a program that would put developmental education into high school classrooms during the senior year. Developmental math and developmental reading and English curricula were designed by stakeholders including math and English/reading faculty from multiple community colleges (North Carolina Community Colleges, 2016). Faculty who taught those courses were provided with professional development to ensure their effectiveness in the classroom.

A statewide pilot program was started during the 2016-2017 academic year and continues today. The program includes assessment during the junior year and corresponding mandatory placement of students into remedial courses for those who do not meet the benchmarks established by the State Board of Community Colleges. Assessments include ACT scores in math and English and high school GPA. Students

who have an unweighted GPA of 2.6 or higher who graduated within the five years of college enrollment can register for any gateway math or English course without taking the placement test (Rodriguez et al., 2018).

Additional research on college student performance in North Carolina supported the implementation of developmental education at the high school level. Clotfelter et al. (2015) found that traditional remedial education provided at the college level failed to improve academic performance. Students who enrolled in remedial classes were less likely to successfully complete a college level course in the same subject and were also less likely to finish college.

California

California remedial education students have long struggled to complete college. According to Cuellar-Mejia et al. (2016), only 27% of students who enrolled in one developmental math course and 44% of students who took developmental English ever completed a college course in the same subject. Their study also showed that within six years only 24% of remedial students transferred to a 4-year institution. As a result of these poor outcomes, California mandated placement practices and remedial education curriculum through Assembly Bill 705, which went into effect in the fall of 2019 (Rodriguez et al., 2018).

Rodriguez et al. (2018) noted that multiple California community colleges began to change their placement practices and remedial teaching methods to prepare for the impending legislation well in advance. Two-year institutions changed their placement practices and started placing remedial students into college-level math and English using the corequisite teaching model. Placement practices were changed from the sole use of a

standardized test to multiple measures including coursework, grades, and/or GPA in math and English.

As a result of changing placement practices, the authors reported an 11% to 38% increase in students being placed into college level English along with a 51% to 74% increase in college level English course completion within one year of first enrolling in an English course. Math student outcomes also improved showing an 18% to 51% increase in the number of students placed in college level math and a 44% to 58% increase in the number of students who successfully completed a college level math course within one year of first enrolling in any math course.

Changing instructional methods from the traditional model to co-requisite also improved student outcomes. According to Rodriguez et al. (2018), 78% of students who took co-requisite English completed a college level English course in one year, which was three times higher than students enrolled in traditional remedial English. Students enrolled in co-requisite math courses completed a college level math course at a rate of 69% to 72%. This rate is much higher than traditional remedial math students who completed college level math at a rate of 12% to 32% within one year of first enrolling in a math course.

Successful Remedial Reform Through Collaboration

Evidence-based practice exists that demonstrates ways to improve remedial student placement and developmental education teaching methods and the corresponding outcomes. However, getting educators, administrators, and policy makers to agree on what changes should be made and how to make them is a challenge. This was made evident by the failed attempt exhibited by the New Mexico Secretary of Higher

Education to persuade public colleges and universities to adopt new remedial placement and teaching practices. Collaboration on multiple levels is essential to the success of remedial reform measures. Remedial reform measures in multiple states incorporated collaboration on a local level between faculty and administrators and on a state level between leadership in higher education and K-12 (North Carolina Community Colleges, 2016; Ohio Higher Education Department, 2018; Texas Higher Education Coordinating Board, 2014; Rodriguez et al., 2018). Faculty and administrators from K-12 and higher education, along with local, state and federal leadership should have ongoing discussions on interventions and the associated outcomes (King et al., 2017).

Determination and implementation of standardized remedial practices at the state level required collaboration of stakeholders (Texas Higher Education Coordinating Board, 2014; Ohio Higher Education Department, 2017; North Carolina Community Colleges, 2016). Cawsey et al. (2016) discussed how change in organizations that use formal processes need to build influential coalitions that are not only important for the planning phase, but possibly even more important during the implementation phase. Kouzes and Posner (2012) noted that multiple stakeholder perspectives are necessary for development of successful initiatives. The authors also pointed out that successful implementation of initiatives requires the buy-in of the people who will actually be doing the work and involves the influence of leaders who build trust, facilitate relationships, and develop competence in their staff and faculty (Kouzes & Posner, 2012). A lack of stakeholder collaboration is one important reason why the New Mexico Governor and Secretary of Higher Education's remedial reform efforts failed, despite research supporting their initiative.

State Education Councils as a Model for Collaboration

The data supporting a lack of college readiness in New Mexico demonstrates a lack of alignment between curriculum and assessments between secondary and higher education. Perna and Armijo (2014) noted that the lack of alignment is due to the division of K-12 and higher education where budgets, curricula, assessments, governance, and policy are all developed independently with no collaboration between the two education entities. The authors observed that this design has contributed to students being prepared to graduate from high school, but not prepared for college level academics. They also discussed the use of a “P-16” or “P-20 Council” approach which supports K-12 and higher education coordination and collaboration to align academic requirements and expectations. This collaborative model has been adopted by several states to ensure that students move from preschool through post-baccalaureate education smoothly and efficiently. It has also been effective in the development of a shared statewide agenda in states working on education reform (Perna & Armijo, 2014).

Perna and Armijo (2014) described several components of an effective P-20 council. Since P-20 councils are mostly advisory, the members need to include legislators and possibly the governor, in order for agreed upon actions to become policy. It is also necessary to incorporate accepted decision-making procedures, rules, and norms utilized at the government level (Kirst & Usdan, 2009). Perna and Armijo (2014) noted that for a P-20 council to be effective, they must recognize the organizational structure of education specific to their state, while acknowledging the situations that are restricting change related to reform. The authors also noted that effective councils meet frequently,

have broad member representation including legislators and leadership from education and industry, and utilize longitudinal student data to inform decision making.

Remedial reform and its creation and implementation have been more effective in some states than others. As mentioned previously, some states passed legislation making reform mandatory not optional, while other states, such as New Mexico, have only made recommendations to educational institutions. In states without remedial reform policy, colleges make reform attempts using measures that are small-scale and minimally disruptive to the previous practices, which lacks the substantial impact necessary to improve college student outcomes (Edgecombe, Jaggars, Xu, & Barragan, 2014). The creation of state level policy is difficult, which encourages the continuation of traditional remedial practices or remedial reform measures that produce minimal change in student outcomes.

Leadership, Institutional Change and Remedial Reform

Despite the poor outcomes of remedial students in New Mexico, traditional remedial teaching methods have dominated developmental education in post-secondary settings. Higher education leadership lacked social influence to affect change at the state and local level. Although the directive to change the remedial education curricula came from the New Mexico Secretary of Higher Education (NMHED, 2014), only a few institutions made the adjustment. Deans of instruction and faculty were not involved in the planning process, which contributed to the resistance to change. Adoption of alternative methods have been sporadic around the state, with some schools meeting the challenge and others continuing to teach with the traditional model (NMHED, 2014).

Institutional change is political in nature, in that it requires change agents who can build coalitions and exercise social influence to persuade members to adopt new practices (Battilana & Casciaro, 2013). New Mexico has lacked this type of change agent or leadership, which has resulted in the current state of remedial education. Two types of leadership styles, servant and transformational, could help create the type of environment necessary that could lead to change at the state and local level. A leader who utilizes transformational and servant leadership principles could help promote collaboration and the commitment necessary to initiate and sustain effective local remedial education practice and state level remedial reform.

The Role of Leadership to Create Change

While poor remedial student outcomes have been well documented, along with possible solutions for improvement, making those solutions happen is another challenge. Leadership will need to occur at the institutional level and the state level to ensure change is comprehensive. New Mexico leadership at both the state and local level has utilized an authoritarian style to accomplish remedial education changes in the past with little to no improvement in outcomes. Servant and transformational leadership have been found to be effective when implementing change in educational settings (Crippen, 2005; Greenleaf, 2002; Stanley, 2008).

Servant Leadership in Education

Servant leadership was introduced as a leadership style by Robert Greenleaf in 1970 (Greenleaf, 2002). He wrote that a person in the servant leadership role genuinely serves society and through service the role of leader is bestowed by the followers onto the individual. Greenleaf emphasized the equality of human beings and recognized the

importance of developing “strong, effective, caring communities in all segments of our society” (Crippen, 2005, p. 12), including education.

The servant leader understands the importance of relationships and the power advantage they have in their organization (Kouzes & Posner, 2003). Servant leaders are respectful, ethical, and fair. Wheeler (2012) wrote that these actions help to build the trust necessary to influence followers and create collaboration and commitment to build the power of the group. This type of follower commitment contributes to their sense of ownership of new initiatives and accountability for outcomes.

Characteristics of servant leaders are reflective of how they live and lead. Wheeler (2012) noted that in addition to their sense of service, they are self-aware and authentic. They demonstrate humility, accountability, kindness, open-mindedness, advocacy, and appreciation for others. Crippen (2005) noted that servant leaders listen well and are empathetic. The author also noted that they are capable of influence by demonstrating their commitment to the growth of those around them. The servant leader’s commitment to the growth of others also helps them build community, which is critical for collaboration on new initiatives. In educational institutions where servant leadership was implemented, faculty noted that servant leaders were humanitarians who cared for and empowered others (Crippen, 2005). Crippen (2005) also wrote that faculty found servant leaders to be transformational, another type of leadership style that can be effective in the education environment.

Transformational Leadership in Education

Similar to servant leadership, transformational leadership theory recognizes the importance of relationships and the involvement and subsequent investment necessary for

leaders and followers to meet institutional goals (Daft, 2008; Rolfe, 2011).

Transformational leaders demonstrate specific attributes that promote building relationships including authenticity and flexibility (Rolfe, 2011). This type of leader is innovative (Hallinger, 2003) and able to share their vision for an organization (Jyoti & Bhau, 2015). Ward (2002) noted that their ability to lead is further strengthened through their ability to inspire and motivate their followers. Rolfe (2011) found transformational leaders to be self-aware, goal-oriented, futuristic leaders capable of catalyzing change in an organization.

With this style of leadership, there is an interdependent link between leaders and followers (Stanley, 2008). Burns (1978) described transformational leadership as a leadership practice that involves engagement leading to both parties experiencing increased motivation and morality. The author also noted that these transformational leader/follower relationships can be inspirational to both sides resulting in increased levels of action in meeting shared organizational goals. The relationships can also increase morality within the group by raising the standard of human conduct and ethical aspirations of all involved (Stanley, 2008). Transformational leadership acknowledges that followers have needs and in addressing those needs, followers are found to be more energetic and motivated (Bass, 1990).

People who create policies intended to improve school processes and outcomes assume that local leadership in education is effective (Brown et al., 2002). Characteristics of effective transformational leaders that led to improved job performance in educators include the ability to influence, to promote intellectual stimulation, provide inspirational motivation, and acknowledge the individuality of followers (Jyoti & Bhau, 2015). Jyoti

and Bhau (2015) noted that relationship building between a leader and followers, which is part of the transformational leadership style, was key to improved job performance. The authors also noted that as part of building relationships, transformational leaders interacted with followers, exhibited genuine concern, valued the follower's input and involved them in decision making for the institution. Transformational leaders also provided coaching and mentoring. Along with improved job performance of educators, transformational leadership has proven to be effective for improved student achievement and school performance (Anderson, 2017).

Transformational Leadership at the Public Level

While the benefits of a transformational leadership style are often found in research related to organizational change, this type of leadership can also be useful at the public level where collaboration is necessary between multiple entities to address major public problems. Transformational leadership theory assumes that leaders can improve the larger environment surrounding them through meaningful change (Mora, 2012). Sun and Anderson (2012) noted the effectiveness of transformational leadership as part of successful integrative public leadership. The authors found that a transformational leader working at the public level used integrative processes to promote the best collaboration possible. The unique transformational leadership processes used for this type of public collaboration included integrative thinking, integrative behavior, integrative leadership resources, and integrative structures and processes (Sun & Anderson, 2012).

When transformational leaders are trying to lead change involving multiple entities to solve major public problems, integrative thinking can improve collaboration (Sun & Anderson, 2012). Sun and Anderson (2012) described integrative thinking as a

cognitive process that acknowledges the different forces that could potentially impact collaboration. The authors described those forces as the history of the problem, how the problem currently presents itself, and future challenges that could impact a shared goal or goals. According to Sun and Anderson (2012), the transformational leader working with multiple entities should recognize that each one has its own dominant logic that will shape their perception of the problem and how it should be solved. The leader can use knowledge of each entity's dominant logic to shape the issues in a way that resonates with them allowing for growth, less defensiveness, and greater opportunity for collaboration (Ospina & Foldy, 2010).

Summary

The literature review provides evidence of poor remedial student outcomes and a need for remedial reform, both nationally and in New Mexico. Remedial student outcomes documented by multiple states that have implemented some form of remedial reform demonstrates effective alternative remedial teaching methods that are associated with increased progression and college completion rates. Despite evidence of poor remedial outcomes, institutions of higher learning in New Mexico are resistant to change long standing teaching practices and leadership is lacking to influence necessary changes. Conducting a study to look at remedial student outcomes in a community college setting could gather the evidence necessary to support change. With evidence, a leader who demonstrates a servant and transformational leadership style could provide the influence necessary to bring about change in remedial practice and state policy.

CHAPTER THREE: METHODOLOGY

The purpose of this retrospective, quantitative study was to determine if there was a difference in performance outcomes for first-time freshmen students who enroll in remedial courses compared to students who enroll in college-level courses at a rural community college. The dependent variables or performance outcomes included rates of certificate completion within two years, degree completion within four years, and successful completion of a gateway math and/or English course. The independent variables were student enrollment in remedial courses and college-level gateway courses, age, gender, ethnicity, and student status as part-time or full-time.

Research Question and Hypotheses

The primary issue that this study focused on was the effectiveness of remedial education in a rural New Mexico community college. Effectiveness of remedial education was measured by performance outcomes related to college progression and completion.

The study attempted to answer the following research question and the corresponding hypotheses:

Do students placed into remedial courses complete college at a lower rate than those placed into gateway courses?

H₁ Students placed into remedial courses complete college certificates at a lower rate than students placed into gateway courses.

H₂ Students placed into remedial courses complete associate degrees at a lower rate than students placed into gateway courses.

H₃ Students placed into remedial math courses successfully complete gateway courses in the same subject at a lower rate than students placed into nonremedial math courses.

H₄ Students placed into remedial English successfully complete gateway courses in the same subject at a lower rate than students placed into nonremedial English courses.

H₅ Students placed into remedial math successfully complete gateway courses in the same subject at a higher rate than students placed into remedial English courses.

H₆ Students placed into remedial math successfully complete certificates and degrees at a higher rate than students placed into remedial English courses.

Method

A quantitative study was the best method to measure course and college completion rates of remedial students. Frequencies of course and degree completion for one freshman cohort was calculated considering data from a four-year period. Probit regression was utilized to help identify predictors linked to college completion. Data was gathered by the institutional researcher employed by the community college in the study. An ethical consideration was protection of student identity which was accomplished by deidentifying all study data prior to analysis.

Research Design Overview

This research study involved a quantitative, non-experimental, retrospective design to investigate the differences in college progression and completion between first-time freshmen who enrolled in remedial courses and those who did not in the fall of

2013. The secondary data included rates of certificate and degree completion between the fall of 2013 and the spring of 2017, as well as successful completion of college level math and English for part-time and full-time remedial students and non-remedial students.

Participants

In 2013, approximately 13,000 first-time freshmen enrolled into developmental courses in New Mexico's community colleges (NMHED, 2014). The professional practice site for the study was the Gallup branch of the University of New Mexico (UNMG) in Gallup, New Mexico. Approximately 800 students enroll annually at the UNMG location (University of New Mexico Gallup, 2018a). This enrollment amounts to approximately 6% of all first-time freshmen who enroll annually in New Mexico's public institutions of higher learning (NMHED, 2014).

Data Collection

This study used a sample of 281 first-time freshmen students at UNMG who enrolled in remedial courses and those who did not in the fall of 2013. Following Internal Review Board (IRB) approval from Creighton University and the University of New Mexico, the campus' electronic database called Banner was used to determine student status and enrollment in remedial and nonremedial courses. The determination of degree and certificate completion was accomplished through the use of student identification numbers and collaboration with the UNMG Institutional Researcher.

Data Collection Procedures

Following IRB approval, the UNMG institutional researcher gathered enrollment data from the Banner system's electronic database. The data was coded, removing the

student identification numbers prior to doing the data analysis. The data collected was limited to that pertaining to first-time freshmen enrolled in both remedial math and English and college-level gateway math and English courses in the fall of 2013. Progression and completion rates of the student sample was assessed for the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 academic years. Student anonymity was ensured to meet the requirements of the Family Educational Rights and Privacy Act of 1974 (U.S. Department of Education, 2018).

Data Collection Tools

UNMG uses an enterprise resource planning system called “Banner.” Banner has multiple features including course registration, enrollment, advisement tools, and grade posting functionality (Ellucian, 2019). Information from Banner was utilized to determine course enrollment and successful completion of gateway college level courses in math and English. To ensure student anonymity, the UNMG Institutional Researcher coded the student information removing the student identification number. Using the Banner student identification number, the UNMG Institutional Researcher provided certificate and associate degree completion information for the population. The coded data was entered into the IBM Statistical Package for the Social Sciences (SPSS) software for analysis. The validity and reliability of the data collection tools was dependent upon the accuracy of human data entry. Considering the independent and dependent variables, the Banner database was the best resource for gathering the study data.

Ethical Considerations

It was necessary for the UNMG institutional researcher to utilize student ID numbers and transcripts to determine course enrollment, course progression, and college

program completion. To protect student identities, the institutional researcher at UNMG removed the Banner student identification numbers and coded the data prior to the organization, analysis, and synthesis of the research content. Due to the researcher's knowledge of the existing remedial education outcomes at the research site, the process of enrollment, and remedial teaching practices, great effort was taken to minimize the effect of personal bias and its impact on researcher interpretation of the findings.

Summary

The purpose of this study was to identify the factors that may predict the successful completion of a college certificate within two years, or an associate degree within four years among a cohort of students enrolled at a rural New Mexico community college in Fall 2013. The study occurred over a period of approximately six months, during which time the student data at the University of New Mexico-Gallup branch campus was gathered, organized, and analyzed using SPSS software. One research question and six hypotheses were tested using variable frequencies, probit regression, Pearson's Chi Square, and Fisher's Exact tests. Legal and ethical concerns were a priority. The researcher ensured that IRB approval was completed at both institutions prior to any data collection, student anonymity was maintained in accordance with FERPA regulations, and the potential for bias was recognized and avoided.

CHAPTER FOUR: RESULTS AND FINDINGS

The purpose of this retrospective, quantitative study was to determine if there was a difference in performance outcomes for first-time freshmen students who enrolled in remedial courses compared to students who enrolled in college-level courses at a rural community college. The study attempted to answer the following research question and the corresponding hypotheses:

Do students placed into remedial courses complete college at a lower rate than those placed into gateway courses?

H₁ Students placed into remedial courses complete college certificates at a lower rate than students placed into gateway courses.

H₂ Students placed into remedial courses complete associate degrees at a lower rate than students placed into gateway courses.

H₃ Students placed into remedial math courses successfully complete gateway courses in the same subject at a lower rate than students placed into nonremedial math courses.

H₄ Students placed into remedial English successfully complete gateway courses in the same subject at a lower rate than students placed into nonremedial English courses.

H₅ Students placed into remedial math successfully complete gateway courses in the same subject at a higher rate than students placed into remedial English courses.

H₆ Students placed into remedial math successfully complete certificates and degrees at a higher rate than students placed into remedial English courses.

As part of the study, 281 students who enrolled as first-time freshmen in the fall of 2013 were assessed regarding enrollment in either a remedial or college level course and their progression and completion of an associate's degree or college certificate. Frequencies of multiple variables, probit regression, Pearson's Chi-Square, and Fisher's Exact tests were utilized to answer the research question and determine if multiple hypotheses could be supported.

Results

Data Organization and Analysis Procedures

To begin to answer the research question and determine if the hypotheses were supported, simple assessment of multiple variables was conducted to determine progression and completion rates of students. Each coded student (N = 281) was listed in an Excel spreadsheet along the y-axis with each variable listed across the x-axis. The variables included enrollment in remedial math or English, enrollment in gateway math or English, successful completion of remedial math or English, successful completion of gateway math or English, completion of an associate's degree and completion of a certificate between fall of 2013 and spring of 2017. To determine frequencies, completion of an associate degree or certificate was coded as 1 = yes or 0 = no. If a student enrolled in a remedial or gateway course and/or successfully completed a remedial or gateway course the variable was coded 1 = yes, 0 = no. Additional variable frequencies that were assessed included age, gender, ethnicity (American Indian, Hispanic, White, Asian, African American, Mixed, or Unknown) and enrollment status as either part-time or full-time. Using the Excel sum function, frequencies of each independent and dependent variable were calculated.

In addition to assessment of variable frequencies, to further address the research question and hypotheses, probit regression was used to look at the likelihood that an independent variable was a predictor for completing an associate degree or certificate. A maximum likelihood method was utilized to compute the test statistics. The dependent or response variable was originally measured as a binominal distribution with two possible outcomes, coded by 1 or 0. In this study, the event coded by 1 was the successful completion of an associate degree or a college certificate. The unsuccessful completion of an associate degree or college certificate was coded by 0. The probit regression was conducted by choosing appropriate options available in the “Generalized Linear Models...” procedure in SPSS v. 24.0 (Field, 2013). Binary probit was entered as the type of model.

Coding of Variables

The completion (coded by 1) or no completion (coded by 0) of an associate degree or college certificate by each student was entered as the response. The predictors included the completion of a remedial math course (coded by 1= Yes; or 0 = No); the completion of a remedial English course (coded by 1= Yes, or 0 = No), the completion of a gateway math course (coded by 1 = Yes, or 0 = No) the completion of a gateway English course (coded by 1= Yes or 0 = No); enrollment status (part-time = 1; full-time = 0); gender (male = 1; female = 0) and age-group classified by a median split, coded by 0 for ≤ 19 years old and 1 for ≥ 20 years old. Ethnicity was coded using dummy nominal binary variables, where 1 = a member of a specified ethnic group or 0 = not a member of the specified ethnic group. The four specified ethnic groups were American Indian, Hispanic, White, or Other including Asian, African American, Mixed, or Unknown).

However, only three specific ethnic groups were included in the analysis. The Other group was excluded, following the strict rule that the number of dummy variables in a nominal variable with more than three categories must be $k - 1$, where k = the total number of categories (Agresti, 2015). The goodness-of-fit of the data to the probit function was assumed if $p < .05$ for the Omnibus test. A predictor was assumed to have a significant effect on the dependent variable, assuming the other predictors were constant, if $p < .05$ for the Wald test statistic.

Pearson's Chi-Square and Fisher's Exact tests were conducted using the "Crosstabs" procedure in SPSS. These tests were performed to provide additional information that would either support or oppose the findings from the multivariate regression test. Fisher's Exact test was more accurate than the Chi-Square test when the expected frequencies in the cells of a cross-tabulation were less than five (Field, 2013). The relationships between the successful completion of a college certificate or an associate degree vs. the completion of a remedial math course; the completion of a remedial English course, the completion of a gateway math course, and the completion of a gateway English course, enrollment status, ethnicity, gender and age were examined using 2 x 2 cross-tabulations.

Description of Participants

The total sample size of the cohort of students who enrolled in fall 2013 was $N = 281$. Table 1 summarizes the demographic characteristics of the students. Over half of the students ($n = 160, 56.9\%$) were female. The most frequent ethnic groups were American Indian ($n = 220, 78.3\%$); Hispanic ($n = 22, 7.8\%$) and White ($n = 20, 7.1\%$). The students

ranged in age from 16 to 54 years old ($M = 20.96$; $SD = 5.82$) but most ($n = 173$, 61.6%) were ≤ 19 years old. The majority ($n = 216$, 76.9) were enrolled as full-time students.

Table 1

Demographic Characteristics of Students (N = 281)

Characteristic	Category	<i>n</i>	%
Gender	Female	160	56.9
	Male	121	43.1
Ethnicity	American Indian	220	78.3
	Asian	3	1.1
	Black/African American	3	1.1
	Hispanic	22	7.8
	Unknown	1	0.4
	Mixed (Two or More Races)	12	4.3
Enrollment Status	Part-time	65	23.1
	Full-time	216	76.9
Age-Group (Years)	≤ 19	173	61.6
	> 19	108	38.4

The most outstanding characteristic of the sample is the representation of American Indian students in the study sample. The community college in the study is situated in close proximity to the Navajo and Zuni reservations. The corresponding county has an American Indian population of approximately 79.2% (United States Census Bureau, 2019).

Table 2 provides the descriptive statistics of the independent, dependent and control variables in the study. Only one continuous level variable, Age Group, was measured in this study. The students ranged in age from 16 to 54 years old ($M = 20.96$; $SD = 5.82$) but most ($n = 173$, 61.6%) were ≤ 19 years old. The descriptive statistics for the remaining nominal, categorical variables are presented in Table 2 as frequencies and percentages. Figure 1 provides a summary of the dependent variables in the study.

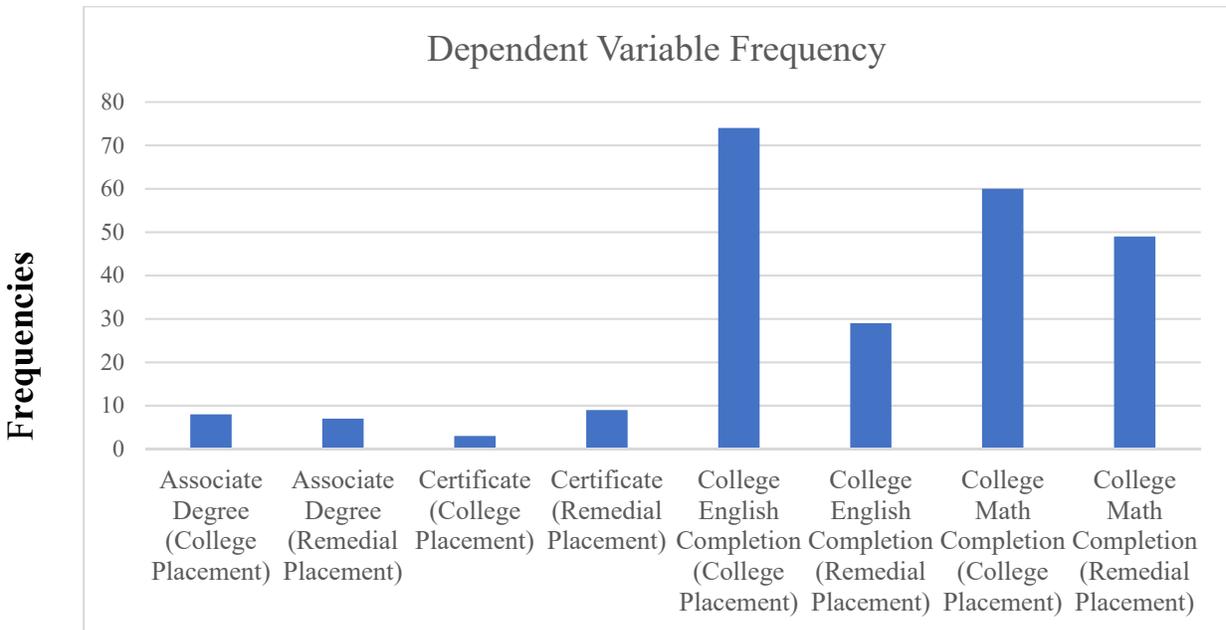
Table 2*Descriptive Statistics*

Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Ethnicity				
African American	3	1.1	1.1	1.1
American Indian	220	78.3	78.3	79.4
Asian	3	1.1	1.1	80.5
Hispanic	22	7.8	7.8	88.3
Mixed Race	12	4.2	4.2	92.5
Unknown	1	0.4	0.4	92.9
White	20	7.1	7.1	100
Total	281	100	100	
Gender				
Female	160	56.9	56.9	56.9
Male	121	43.1	43.1	100
Total	281	100	100	
College Completion				
Associate Deg	15	5.0	5.0	5.0
Certificate	13	4.6	4.6	9.6
No Credential	253	90.4	90.4	100
Total	281	100	100	
Age Group				
19 or younger	173	61.6	61.6	61.6
20 or older	108	38.4	38.4	100.0
Total	281	100	100	
English Placement				
College	98	34.9	34.9	35.2
None	63	22.4	22.4	57.7
Remedial	120	42.3	42.3	100
Total	281	100	100	
Math Placement				
College	68	24.2	24.2	24.2
None	37	13.2	13.2	37.4
Remedial	176	62.6	62.6	100
Total	281	100	100	
College Level Course Completion				
English	101	36.1	36.1	36.1
Math	110	38.9	38.9	75
None	70	25	25	100
Total	281	100	100	
Enrollment Status				
Part-time	65	23.1	23.1	23.1
Full-time	216	76.9	76.9	100
Total	281	100	100	

Note. N = 281.

Figure 1

Frequencies of Dependent Variables



Dependent Variables

Note. $N = 281$. Frequencies of college completion amounted to less than 10% of the total number of students entering in the fall of 2013. Less than 36% of the sample population completed college level English and less than 40% completed college level math.

Results, Analysis, and Synthesis of Findings

Results and Analysis of Findings

Table 3 summarizes the academic qualifications completed by the cohort of students. More students completed Remedial Math ($n = 114, 40.6\%$) than Remedial English ($n = 87, 31.0\%$) and more students were successful at completing Gateway Math ($n = 110, 39.1\%$) than Gateway English ($n = 87, 31.0\%$). Out of the total number of students ($N = 281$), relatively few students successfully completed a College Certificate in two years ($n = 12, 4.3\%$) or an Associate Degree within four years ($n = 15, 5.3\%$).

Table 3*Academic Qualifications Completed by the Students (N = 281)*

Qualification	<i>n</i>	%
Remedial Math	114	40.6
Remedial English	87	31.0
Gateway Math	110	39.1
Gateway English	101	35.9
College Certificate	12	4.3
Associate Degree	15	5.3

Table 4 summarizes the completion of remedial math, gateway math, remedial English, and gateway English for those students who completed a certificate. Of the 12 students who completed a certificate, four tested into remedial English, six tested into gateway English, eight tested into remedial math and three tested into gateway math. Students who completed certificates were more likely to have been placed into Gateway English than remedial English. However, there was very little difference between being placed into remedial math or Gateway math. It is also important to note that not all certificates have a Gateway English or Gateway math requirement.

Table 4*Math and English Course Completion for Individual Students Earning a Certificate*

Student	Remedial English n = 4	Gateway English n = 8	Remedial math n = 8	Gateway math n = 7
1			+	
2	+	+	+	+
3		+	+	+
4	+			
5		+		+
6	+	+		+
7	+		+	
8		+	+	
9		+		+
10		+	+	+
11			+	
12		+	+	+

Note. A plus sign denotes successful completion of the course in that column. In the columns labeled Remedial English and Remedial math, the absence of a plus sign denotes that the course was never taken. In the columns labeled Gateway English or Gateway math, the absence of a plus sign means the student never enrolled in the course, or enrolled and either failed the course or withdrew.

Table 5 summarizes course completion for remedial English, gateway English, remedial math, and gateway math for those students who completed an associate's degree. Of the 15 students who completed an associate's degree, one tested into remedial English, 14 tested into gateway English, seven tested into remedial math, and eight tested into gateway math. Of the 176 students who tested into remedial math and the 120 students who tested into remedial English, only seven remedial math students and one

remedial English student completed an associate's degree in a 4-year period. These findings further support the lack of college readiness and remedial student outcomes as reported by the New Mexico Higher Education Department (2014).

Table 5

Math and English Course Completion for Individual Students Earning an Associate's Degree

Student	Remedial English n = 1	Gateway English n = 15	Remedial math n = 7	Gateway math n = 14
1		+	+	+
2		+		+
3	+	+	+	+
4		+		+
5		+	+	+
6		+	+	+
7		+		+
8		+		+
9		+		+
10		+		+
11		+		+
12		+		+
13		+	+	
14		+	+	+
15		+	+	+

Note. A plus sign denotes successful completion of the course in that column. In the columns labeled Remedial English and Remedial math, the absence of a plus sign denotes that the course was never taken. In the column labeled Gateway math, the absence of a plus sign means the student never enrolled in the course, or enrolled and either failed the course or withdrew.

Table 6 and Table 7 summarize the progression and completion of students who tested into remedial level courses. Of the 176 students who tested into remedial math, 41(23.3%) students successfully completed a gateway college level course. Of the 120 students who tested into remedial English, 29 (24.17%) students completed a gateway college level course. Poor progression from remedial courses to college level courses can be related to erroneous placement of students into remedial classes, lack of support in existing remedial courses, and lack of accelerated remedial models.

Table 6*Remedial Math Students' Course Completion and Progression*

Students Who Tested into Remedial Math	Successfully completed remedial math	Successfully completed college math	Completed a Certificate	Completed a Degree
n = 176	n = 114 (64.77%)	n = 41 (23.3%)	n = 8 (4.55%)	n = 7 (3.98%)

Table 7*Remedial English Students' Course Completion and Progression*

Students Who Tested into Remedial English	Successfully completed remedial English	Successfully completed college English	Completed a Certificate	Completed a Degree
n = 120	n = 87 (72.5%)	n = 29 (24.17%)	n = 3 (2.5%)	n = 1 (.83%)

Testing of Assumptions of Probit Regression

Table 8 presents the variance inflation factor (VIF) and tolerance (1/VIF) statistics to test for multicollinearity of the predictor variables. According to Field (2013),

multicollinearity between variables demonstrates a strong correlation between two or more predictors. This type of correlation can impact the validity of the b coefficients and make it difficult to assess the individual importance of a predictor (Field, 2013). Field (2013) noted a VIF greater than 10 and a tolerance below 0.2 were both causes for concern. Given that the VIF statistics were < 10 with tolerance > 0.2 , the ten predictor variables were assumed not to be multicollinear. The results of the Omnibus tests indicated that the data were probably a good fit to the inverse normal link function. The probit regression models were therefore applicable to predict successful completion of an associate degree (Likelihood Ratio Chi Square (10) = 162.85, $p < .001$) as well as successful completion of a college certificate (Likelihood Ratio Chi Square (10) = 19.35, $p = .036$).

Table 8*Test for Multicollinearity*

Predictor Variable	Collinearity Statistics	
	Tolerance	VIF
Remedial Math	0.89	1.12
Remedial English	0.93	1.08
Gateway Math	0.60	1.68
Gateway English	0.61	1.64
Enrollment status	0.97	1.04
Gender	0.98	1.02
Age-group	0.91	1.10
American Indian	0.36	2.78
Hispanic	0.50	2.02
White	0.52	1.94

Predictors of the Successful Completion of an Associate Degree

Table 9 presents the results of the probit regression analysis to determine the statistical significance for each of the 10 variables used to predict successful completion of an Associate Degree using the probit regression coefficients (β) and Wald test statistics.

Table 9

Prediction of Successful Completion of an Associate Degree Using Probit Regression

Predictor Variables	β	SE	95% CI	Wald	df	p
Remedial Math	-0.37	0.32	[-.993, .258]	1.32	1	.250
Remedial English	-1.05	0.41	[-1.841, -.249]	6.62	1	.010*
Gateway Math	0.42	0.42	[-.404, 1.251]	1.01	1	.315
Gateway English	5.80	0.44	[4.942, 6.659]	175.38	1	<.001*
Enrollment status	0.32	0.48	[-.613, 1.258]	0.46	1	.499
Gender	-0.27	0.35	[-.943, .410]	0.60	1	.440
Age-group	0.20	0.36	[-.510, .915]	0.31	1	.577
American Indian	0.45	0.58	[-.684, 1.591]	0.61	1	.434
Hispanic	-0.53	0.62	[-.656, -.413]	0.79	1	.395
White	-0.15	0.76	[-1.649, 1.350]	0.04	1	.845

Note: * Statistically significant ($p < .05$).

Eight variables were not statistically significant predictors of successful completion of an Associate Degree indicated by $p < .05$ for the Wald test statistics. Two of the variables were statistically significant predictors of the successful completion of an Associate Degree at the .05 level, specifically completion of Remedial English ($\beta = -1.05$, Wald = 6.62, $p = .010$); and completion of Gateway English ($\beta = 5.80$, Wald = 175.38, $p < .001$). Considering the completion of a remedial English course, the negative value of β (-1.05) is correlated with a slightly decreased likelihood that the student would complete an associate degree. However, looking at the completion of Gateway English, the larger positive β value (5.80) demonstrates a strong likelihood that a student would complete an

associate degree. The significance of Remedial English as a negative predictor and Gateway English as a positive predictor of associate degree completion further supports the importance of progression from remedial courses to college level courses or the use of corequisite courses in place of traditional remedial courses.

Pearson's Chi Square and Fisher's Exact Tests

The sources of the significant relationships identified using probit regression were identified by analysis of the 2 x 2 cross-tabulations. Table 10 presents the results of Pearson's Chi Square and Fisher's Exact tests. Three statistically significant relationships were found between completion of an Associate Degree and completion of Remedial English (Pearson's Chi square (1) = 4.38, $p = .036$; Fisher's Exact, $p = .027$); completion of Gateway Math (Pearson's Chi square (1) = 15.02, $p < .001$; Fisher's Exact, $p < .001$); and completion of Gateway English (Pearson's Chi square (1) = 28.24, $p < .001$; Fisher's Exact, $p < .001$). As with probit regression, Pearson's Chi Square and Fisher's Exact Tests showed a significant relationship between Gateway English and Remedial English and completion of an associate degree. However, the simpler tests also identified a significant relationship between completion of an associate degree and completion of a Gateway Math course.

Table 10

Relationships between Predictor Variables and Successful Completion of Associate Degree using 2 x 2 Cross-tabulations

Predictor Variable	Pearson's Chi square Test			Fisher's Exact Test
	Chi square	df	p	p
Remedial Math	0.01	1	.963	1.000
Remedial English	4.38	1	.036*	.027*
Gateway Math	15.02	1	<.001*	<.001*
Gateway English	28.24	1	<.001*	<.001*
Enrollment status	0.86	1	.355	.283
Gender	0.61	1	.434	.307
Age-group	0.17	1	.676	.450
American Indian	0.65	1	.421	.330
Hispanic	1.35	1	.246	.285
White	0.01	1	.944	.710

Note: * Statistically significant ($p < .05$).

Table 11 presents the observed and expected frequencies of students in the 2 x 2 cross-tabulation between the completion of Remedial English (No or Yes) vs. the completion of an Associate Degree (No or Yes).

Table 11

Cross-tabulation of Completion of Associate Degree vs. Completion of Remedial English

Remedial English	Frequency	Associate Degree		Total
		No	Yes	
No	Observed	180	14	194
	Expected	183.6	10.4	194
	% within Remedial English	92.8%	7.2%	100.0%
Yes	Observed	86	1	87
	Expected	82.4	4.6	87
	% within Remedial English	98.9%	1.1%	100.0%

The chi-square statistic was statistically significant due to the differences between the observed frequencies and the expected frequencies. Among the 194 students who did

not complete remedial English the observed frequency of students who completed an associate degree ($n = 14$, 7.2%) was higher than the expected frequency ($n = 10.4$). Among the 87 students who completed remedial English, the observed frequency of students who completed an associate degree ($n = 1$, 4.6%) was less than the expected frequency ($n = 4.6$). The findings of the chi-square statistic demonstrated a negative relationship between taking a remedial English course and completing an associate degree. This finding is in agreement with previous data in Table 4, which shows only one student from the fall 2013 cohort took a remedial English class and graduated. It is also in alignment with the literature reporting on remedial student outcomes.

Table 12 presents the observed and expected frequencies of students in the 2 x 2 cross-tabulation between the completion of gateway math (No or Yes) vs. the completion of an associate degree (No or Yes).

Table 12

Cross-tabulation of Completion of Associate Degree vs. Completion of Gateway Math

Gateway Math	Frequency	Associate Degree		Total
		No	Yes	
No	Observed	169	2	171
	Expected	161.9	9.1	171
	% within Gateway Math	98.8%	1.2%	100.0%
Yes	Observed	97	13	110
	Expected	104.1	5.9	110
	% within Gateway Math	88.2%	11.8%	100.0%

The Chi square statistic was statistically significant due to the differences between the observed frequencies and the expected frequencies. Among the 171 students who did not complete Gateway Math, the observed frequency of students who completed an

Associate Degree ($n = 2$, 1.2%) was lower than the expected frequency ($n = 9.1$). Among the 110 students who completed Gateway Math, the observed frequency of students who completed an Associate Degree ($n = 13$, 11.8%) was greater than the expected frequency ($n = 5.9$). The statistical finding that students who do not complete Gateway math are less likely to complete a two-year degree is in congruence with the literature on remedial student outcomes. This can be due to erroneous placement of students into remedial courses or retaining traditional remedial teaching methods that impede students from taking college level courses in a timely manner.

Table 13 presents the observed and expected frequencies of students in the 2 x 2 cross-tabulation between the completion of Gateway English (No or Yes) vs. the completion of an Associate Degree (No or Yes).

Table 13

Cross-tabulation of Completion of Associate Degree vs. Completion of Gateway English

Gateway English	Frequency	Associate Degree		Total
		No	Yes	
No	Observed	180	0	180
	Expected	170.4	9.6	180.0
	% within Gateway English	100.0	0.0	100.0%
Yes	Observed	86	15	101.0
	Expected	95.6	5.5	101.0
	% within Gateway English	85.1%	14.9%	100.0%

The Chi square statistic was statistically significant due to the differences between the observed frequencies and the expected frequencies. Among the 180 students who did not complete Gateway English, the observed frequency of students who completed an Associate Degree ($n = 0$, 0.0%) was lower than the expected frequency ($n = 9.6$). Among

the 101 students who completed Gateway English, the observed frequency of students who completed an Associate Degree ($n = 15$, 14.9%) was greater than the expected frequency ($n = 5.5$).

The statistical finding that students who do not complete Gateway English are less likely to complete an associate degree further supports the literature that remedial students are less likely to graduate. Like the remedial students who do not complete college level math, this can be due to erroneous placement of students into remedial English courses or placing remedial students appropriately but without needed support. The lack of students completing college level English may also be related to retaining traditional remedial teaching methods that impede students from taking college level courses in a timely manner.

Predictors of the Successful Completion of a College Certificate

Table 14 presents the results of the probit regression analysis, based on the tests of the model effects for each of the ten predictor variables. Eight variables were not statistically significant predictors of the successful completion of a college certificate, indicated by $p > .05$ for the Wald test statistics. The two statistically significant predictors of the completion of a college certificate were completion of Gateway English ($\beta = 0.87$, Wald = 4.38, $p = .036$) and the age-group of the students ($\beta = 0.87$, Wald = 6.45, $p = 0.11$).

Table 14*Prediction of Successful Completion of a College Certificate using Probit Regression*

Predictor Variable	β	SE	95%CI	Wald	df	p
Remedial Math	0.19	0.28	[-.362, .731]	0.44	1	.508
Remedial English	-0.21	0.30	[-.802, .387]	0.47	1	.493
Gateway Math	-0.19	0.38	[-.933, .563]	0.23	1	.629
Gateway English	0.87	0.42	[.056, 1.686]	4.38	1	.036*
Enrollment status	-0.12	0.41	[-.922, .681]	0.09	1	.768
Gender	-0.25	0.27	[.773, .276]	0.86	1	.354
Age-group	0.87	0.35	[.200, 1.553]	6.45	1	.011*
American Indian	0.51	0.18	[-.180, .180]	3.08	1	.079
Hispanic	0.38	0.18	[-.180, 180]	0.98	1	.322
White	0.30	0.16	[-.168, 154]	0.86	1	.302

Note: * Statistically significant ($p < .05$)

Eight variables were not statistically significant predictors of successful completion of a college certificate indicated by $p < .05$ for the Wald test statistics. Two of the variables were statistically significant predictors of the successful completion of a college certificate at the .05 level, specifically completion of Gateway English ($\beta = 0.87$, Wald = 4.38, $p = .036$); and Age-group ($\beta = 0.87$, Wald = 6.45, $p < .011$). Completion of Gateway English as a predictor of successful completion of college is in alignment with the literature reporting on remedial student outcomes. With respect to age-group, students who were 20 years or older were more likely to complete a certificate when compared with other members of their cohort who were 19 years-of-age and younger. Both Gateway English ($\beta = 0.87$) and Age-group ($\beta = 0.87$) were positive values indicating that both predictors were correlated with successful completion of a college certificate. While the ethnicity of American Indian was not a statistically significant predictor, it was close with $p = .079$. This may be a good indicator for addressing ethnicity in future research pertaining to college completion.

Pearson's Chi Square and Fisher's Exact Tests

The sources of the significant relationships identified using probit regression were identified by analysis of the 2 x 2 cross-tabulations. Table 15 presents the results of Pearson's Chi Square and Fisher's Exact tests. Gateway English (Pearson's Chi Square (1) = 5.14, $p = .023$; Fisher's Exact, $p = .027$) and the age-group of the students (Pearson's Chi Square (1) = 7.08, $p = .008$; Fisher's Exact $p = .010$) demonstrated a significant relationship with students completing a college certificate. These findings support the results from the probit regression analysis of predictors and certificate completion. The identification of age-group as a statistically significant predictor warrants further research to help identify factors related to age that help or hinder students in their efforts to complete a college certificate.

Table 15

Relationships between Predictor Variables and Successful Completion of a College Certificate using 2x2 Cross-tabulations

Predictor Variable	Pearson's Chi Square Test			Fisher's Exact Test
	Chi square	df	p	p
Remedial Math	1.64	1	.200	.163
Remedial English	0.21	1	.648	.461
Gateway English	5.14	1	.023*	.027*
Gateway Math	0.62	1	.628	.309
Enrollment Status	0.30	1	.587	.447
Gender	0.48	1	.487	.351
Age-group	7.08	1	.008*	.010*
American Indian	0.08	1	.777	.504
Hispanic	1.36	1	.244	.240
White	0.03	1	.867	.595

Note: * Statistically significant ($p < .05$)

Table 16 presents the observed and expected frequencies of students in the 2 x 2 cross-tabulation between the completion of Gateway English (No or Yes) vs. the completion of a College Certificate (No or Yes). The statistically significant predictors (Gateway English and Age-group) identified by the Chi-square and Fisher’s Exact test correlate with the results of the probit regression test further supporting the successful completion of remedial English and progression to Gateway English.

Table 16

Cross-tabulation of Completion of College Certificate vs. Completion of Gateway English

Gateway English	Frequency	College Certificate		Total
		No	Yes	
No	Observed	176	4	180
	Expected	172.3	7.7	180
	% within Gateway English	97.8%	2.2%	100.0%
Yes	Observed	93	8	101
	Expected	96.7	4.3	101
	% within Gateway English	92.1%	7.9%	271

The Chi square statistic was statistically significant due to the differences between the observed frequencies and the expected frequencies. Among the 180 students who did not complete Gateway English, the observed frequency of students who completed a College Certificate ($n = 4, 2.2\%$) was lower than the expected frequency ($n = 7.7$). Among the 101 students who completed Gateway English, the observed frequency of students who completed a College Certificate ($n = 8, 7.9\%$) was greater than the expected frequency ($n = 4.3$).

The statistical finding that students who do not complete Gateway English are less likely to complete a college certificate further supports the literature that remedial students are less likely to graduate. This can be due to erroneous placement of students

into remedial English courses or placing remedial students appropriately but without needed support. The lack of students completing college level English may also be related to retaining traditional remedial teaching methods that impede students from taking college level courses in a timely manner.

Table 17 presents the observed and expected frequencies in the 2 x 2 cross-tabulation between the two age-groups of students (≤ 19 years or > 19 years) vs. the completion of a College Certificate (No or Yes).

Table 17

Cross-tabulation of Completion of College Certificate vs. Age (Years)

Age (Years)	Frequency	College Certificate		Total
		No	Yes	
≤ 19	Observed	170	3	173
	Expected	165.6	7.4	173
	% within Age Group	98.3%	1.7%	100.0%
>19	Observed	99	9	108
	Expected	103.4	4.6	108
	% within Age Group	91.7%	8.3%	100.0%

The Chi square statistic was statistically significant due to the differences between the observed frequencies and the expected frequencies. Among the 173 students who were 19 years of age or less, the observed frequency of students who completed a College Certificate ($n = 3$, 1.7%) was lower than the expected frequency ($n = 7.4$). Among the students who were over the age of 19, the observed frequency of students who completed a college certificate ($n = 9$, 8.3%) was greater than the expected frequency ($n = 4.6$). Due to factors related to age, students over the age of 19 were more likely to complete a college certificate. The literature review did not include studies on social factors that

contribute to diminished performance of remedial students. However, there are several social factors related to age such as access to transportation, housing, and income that could contribute to college completion. With this speculation in mind, how age and related social factors relate to college completion would be a worthwhile subject for studies in the future.

Synthesis of Findings

Secondary data were collected and analyzed looking at frequencies and using probit regression and chi-square tests relating to a cohort of $N = 281$ students enrolled at a rural New Mexico community college in Fall 2013. One research question and six associated hypotheses were addressed:

RQ: Do students placed into remedial courses complete college at a lower rate than those placed into gateway courses?

Based on frequencies observed in the data, the percentage of remedial students who completed a college degree or certificate was lower than the percentage of students who started in college gateway courses. Within the 4-year period that students were followed, of the 281 who started in the fall of 2013, 27 completed either a college degree or a certificate. Out of those 27 who completed college, 16 (59.26%) were remedial students, while 11 (40.74%) were non-remedial students. However, when the remedial and non-remedial groups were considered separately, out of 199 remedial students who started in the fall of 2013, 16 (8.04%) completed a college certificate or degree. Of the remaining 82 non-remedial students who started college the same semester, 11 (13.4%) completed college with a degree or a certificate. Comparing percentages, 8.04% of remedial students and 13.4% of college-ready students completed a degree or certificate,

demonstrating that students who started in college level courses were more likely to complete college than their remedial student peers.

Probit regression outcomes, with the support of Pearson's Chi Square, and Fisher's Exact Test results demonstrated that successfully completing a college level English course was a statistically significant predictor for completing a certificate or an associate degree. Of the 120 students who started in remedial English, 29 (24.17%) completed a college level English course. Only one student from the fall 2013 cohort who started in remedial English, successfully completed college level English and graduated with an associate degree within a 4-year period.

H₁ Students placed into remedial courses complete college certificates at a lower rate than students placed into gateway courses.

Based on frequencies observed in the data, the findings do not support the hypothesis. Twelve students out of the fall 2013 cohort completed a certificate. Nine of the 12 students started in remedial courses. Probit regression did not identify taking remedial courses as either a positive or negative predictor of completing a college certificate.

H₂ Students placed into remedial courses complete associate degrees at a lower rate than students placed into gateway courses.

Based on the frequencies observed in the data, the findings support the hypothesis by a small percentage. Of the 15 students who completed an associate degree within the 4-year tracking period, eight (53.33%) started in college level courses, while seven (46.67%) started in remedial courses. Probit regression further supported the hypothesis by finding that remedial English was negatively correlated with completing an associate's

degree. Pearson's chi-square and Fisher's exact tests also demonstrated a relationship between the same variables.

H₃ Students placed into remedial math courses successfully complete gateway courses in the same subject at a lower rate than students placed into nonremedial math courses.

Based on the frequencies observed in the data, the findings do not support the hypothesis.

Of the 121 students who took college level math, 53 started in remedial math and 68 started in gateway math. Forty-nine (92.4%) of the 53 students who started in remedial math successfully completed a gateway math course. Sixty (88%) of the 68 students who started in gateway math successfully passed the course. Remedial students had a higher success rate when taking a gateway math course than students who tested into gateway math.

H₄ Students placed into remedial English successfully complete gateway courses in the same subject at a lower rate than students placed into nonremedial English courses.

Based on the frequencies observed in the data, the findings support this hypothesis. Out of the 139 students who took a gateway English course, 41 were remedial students and 98 were college level students. Of the 41 remedial students, 27 (65.85%) successfully completed the gateway English course. Of the students who tested into college level English, out of the 98 who enrolled, 74 (75.51%) successfully completed the gateway course. Students who tested into college-level English were more successful at completing the gateway course than their remedial peers.

H₅ Students placed into remedial math successfully complete gateway courses in the same subject at a higher rate than students placed into remedial English courses.

Based on the frequencies observed in the data, the findings support this hypothesis. Out of the 53 remedial math students who took a gateway math course, 49 or 92.4% successfully passed the course. Of the 41 remedial English students who took a gateway English class, 27 or 65.85% successfully completed the course. Remedial math students are more likely to pass a gateway course in the same subject than their peers who took a remedial English course.

H₆ Students placed into remedial math successfully complete certificates and associate degrees at a higher rate than students placed into remedial English courses.

Based on the frequencies observed in the data, the findings support this hypothesis. Out of the 27 remedial students who completed a certificate or degree, five took a remedial English course, while 15 took a remedial math course. Considering college completion individually, of the 12 students who completed a certificate, eight placed into remedial math and four placed into remedial English. Of the 15 students who completed an associate degree, seven placed into remedial math and one placed into remedial English. Based on these findings, remedial math students are more likely to complete a certificate or an associate degree than their peers who place into remedial English.

Statistical tests demonstrated that the completion of a remedial math course; the completion of a remedial English course, the completion of a gateway math course and

the completion of a gateway English course were not all statistically significant predictors of the successful completion of an Associate Degree (controlling for enrollment status, gender, ethnicity, and age). Probit regression indicated that completion of the remedial English and gateway English courses were statistically significant predictors of the completion of an Associate Degree. Pearson's Chi square and Fisher's Exact tests indicated three statistically significant relationships between completion of an Associate Degree and completion of the remedial English, gateway math and gateway English courses.

The statistical tests also demonstrated that completion of a remedial math course, the completion of a remedial English course, the completion of a gateway math course, and the completion of a gateway English course were not all statistically significant predictors of the successful completion of a College Certificate (controlling for enrollment status, gender, ethnicity, and age). Probit regression indicated that completion of the gateway English course and age-group of the students were the only two significant predictors of completion of the College Certificate. Pearson's Chi square and Fisher's Exact tests also indicated statistically significant associations between completion of a College Certificate, completion of the gateway English course, and the age-group of the students.

This study found that completion of remedial English was negatively correlated with college completion. It also found that completion of Gateway English was associated with completion of both a certificate and a two-year degree. Being over the age of 19 was also shown to be correlated with completion of a certificate, while Gateway math was shown to have a relationship with completion of a two-year degree.

The findings in this study are in congruence with content from national remedial education research and the New Mexico Higher Education Department that describes widespread negative outcomes for remedial students. It should be used to advocate for changes in remedial placement practice, teaching methods, and statewide remedial reform.

Summary

First-time freshmen across the state of New Mexico are not college ready and rarely finish a degree or certificate. The majority of freshmen remedial students reside in rural areas and attend community colleges. In New Mexico, many of these rural areas have high poverty rates and a community college provides opportunity for employment that pays above minimum wage. Considering that most remedial students come from low-income, minority backgrounds, the lack of college readiness helps perpetuate poverty and the low rate of minority students with a college degree. The low number of remedial students who graduate from college illuminates the poor return on investment using tax dollars to fund remedial education.

This study demonstrated the negative impact of enrolling in remedial English and the positive impact of enrolling in college level math and English on completion of degrees and certificates. The findings are also congruent with existing research that support changes to evidence-based placement practices and remedial teaching methods that have demonstrated improved rates of positive remedial student progression and college completion. Overall, the study provides the evidence necessary to support changes in remedial practice that will address the need for improved remedial education practices, government spending, and remedial student outcomes.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

First-time freshmen arrive at four-year and two-year institutions of higher education across the country each year with hopes of discovering a field of study that will lead them to completing a certificate or a degree and ultimately an occupation with good earning potential. Unfortunately, a large percentage of these students, especially in the community college setting, are not prepared for college level courses (Radford & Horn, 2012; Skomsvold, 2014). The research describing the poor preparation of incoming freshmen was further supported by the cohort described in this study.

Once admitted to college, remedial students are placed into developmental courses to help them reach the necessary proficiency for taking college math and English. While these classes are designed to help students, being placed into remedial classes lengthens a student's time for completing a degree, makes the student question their math, reading, and writing skills, and uses limited financial aid for courses that do not count towards a degree. Ultimately, existing research and the results of this study show that students who start in remedial education are less likely to complete a degree than those who begin in college level courses (NMHED, 2018).

Results from this study identified remedial English as a negative predictor and Gateway English and Gateway math as positive predictors for college success. These findings support the need for changes in current remedial practice at the study institution, as well as other public institutions in the state still using traditional remedial practices. The literature identifies multiple solutions to improve remedial education outcomes. Placement practices should be evidence-based and provide for the most accurate assessment of a student's proficiency in math and English to ensure proper placement

into remedial or college level courses (Barnett & Reddy, 2017). Students placed into remedial level courses should be taught with methods that meet their learning needs, while getting them into college-level courses as efficiently as possible (Goudas & Boylan, 2012).

Bringing change to local institutional practice and state policy is difficult. Implementing changes to placement practices and remedial teaching methods requires leadership that informs, supports, inspires, and collaborates with stakeholders. These steps are necessary to ensure the greatest opportunity for buy-in from stakeholders, implementation of new placement practice and teaching methods, and sustaining effective changes in remedial education (King et al., 2017; North Carolina Community Colleges, 2016; Ohio Higher Education Department, 2018; Texas Higher Education Coordinating Board, 2014; Rodriguez et al., 2018).

The findings from the study and the literature review provide evidence and guidance for a proposed solution. Placement practices for remedial students need to be evidence-based and include multiple measures beyond the use of a standardized test. Remedial teaching methods must include alternative, accelerated models to ensure that remedial students are progressing and completing college in a timely manner. Remedial reform would provide standardization and utilize evidence-based placement practices and teaching methods. The demonstration of transformational and servant leadership styles can encourage the influence and collaboration necessary to implement powerful measures in an environment resistant to change.

Aim of the Study

The aim of this study was to improve remedial student outcomes at a New Mexico community college through informing remedial education practice at the local level and remedial education policy at the state level.

Proposed Solution

Evidence-Based Placement Practices

Solutions are needed at both the local and state level. Considering the local level, based on the findings of this study and research described in the literature review, a solution to poor remedial student outcomes will include evidence-based remedial student placement practices and implementation of remedial education teaching methods that have demonstrated improved college outcomes for remedial students. The literature shows that the use of a single placement measure, such as ACCU-PLACER or COMPASS, is not sufficient for determining placement (Marwick, 2004). In addition to the placement test, multiple measures including overall high-school GPA, types of high school math and English courses taken, GPA specific to math and English courses, and ACT and/or SAT scores in the same subjects can also be part of determining college proficiency (Bellfield & Crosta, 2012; Marwick, 2004). Using multiple measures helps provide a comprehensive assessment that ensures students are not placed erroneously into remedial education (Bellfield & Crosta, 2012).

Accelerated Remedial Teaching Methods

In addition to proper placement practices, remedial teaching methods need to be correlated with the students' proficiency in math and English. This study demonstrated a negative correlation between taking remedial English and completing a college degree. If

a remedial course cannot be avoided, it should be accelerated to ensure that students are not lengthening their time to degree completion beyond one semester (Texas Higher Education Coordinating Board, 2014; Ohio Higher Education Department, 2017; Rodriguez et al., 2018). Accelerated courses include remedial English courses that combine reading and writing skills into one semester, as well as math courses that allow students to complete two sequential remedial courses in one semester.

This study also demonstrated a positive correlation between college completion and Gateway English and math. Students earning placement test scores below the cutoff for college level courses, but meet the benchmarks in the other placement criteria, should be placed into co-requisite math or English courses (Palmer, 2016; Texas Higher Education Coordinating Board, 2014; Rodriguez et al., 2018). These courses have remedial students and college level students in the same classroom. However, the remedial students are enrolled in a 1-credit supplemental lab taught by the same instructor to provide them with the additional academic support they need to be successful.

Remedial Reform

A solution that addresses the overall lack of college preparedness of New Mexico's freshmen students would include remedial reform developed by a P-16 or P-20 council made up of leadership from state education agencies, higher education, public education and legislators (Perna & Armijo, 2014). Remedial reform would include determination of evidence-based, standardized placement practices in addition to curricular changes to impact college-preparedness at both the secondary and post-secondary education level (North Carolina Community Colleges, 2016; Ohio Higher

Education Department, 2018; Texas Higher Education Coordinating Board, 2014; Rodriguez et al., 2018). Reform would also define provision of professional development of faculty and ongoing assessment of remedial student outcomes following implementation of new placement practices, curriculum, and teaching methods (Texas Higher Education Coordinating Board, 2014). Legislators should be included in the collaboration so that they can write informed remedial reform legislation and be as knowledgeable as possible when determining education budgets affected by the reform.

Support for the Solution

For a solution at the local level, it is necessary to secure support for these changes from a variety of stakeholders. Support from the research site's administration, student services department, and math and English faculty who teach both remedial and college-level courses will be needed to make this a successful endeavor. The curricular changes related to creating accelerated and co-requisite model remedial courses will also require approval of both the local curriculum committee and the main campus curriculum committee. Support will also be needed from the main campus Provost's office that oversees curriculum.

Remedial reform was attempted to a small extent in the past by executive leadership in state government. While some college support for remedial reform was exhibited at that time, it was also met with significant resistance. To implement remedial reform, support of leadership is necessary from multiple areas including state agencies that oversee primary, secondary, and post-secondary education, as well as college administrators and faculty.

Factors and Stakeholders Related to the Solution

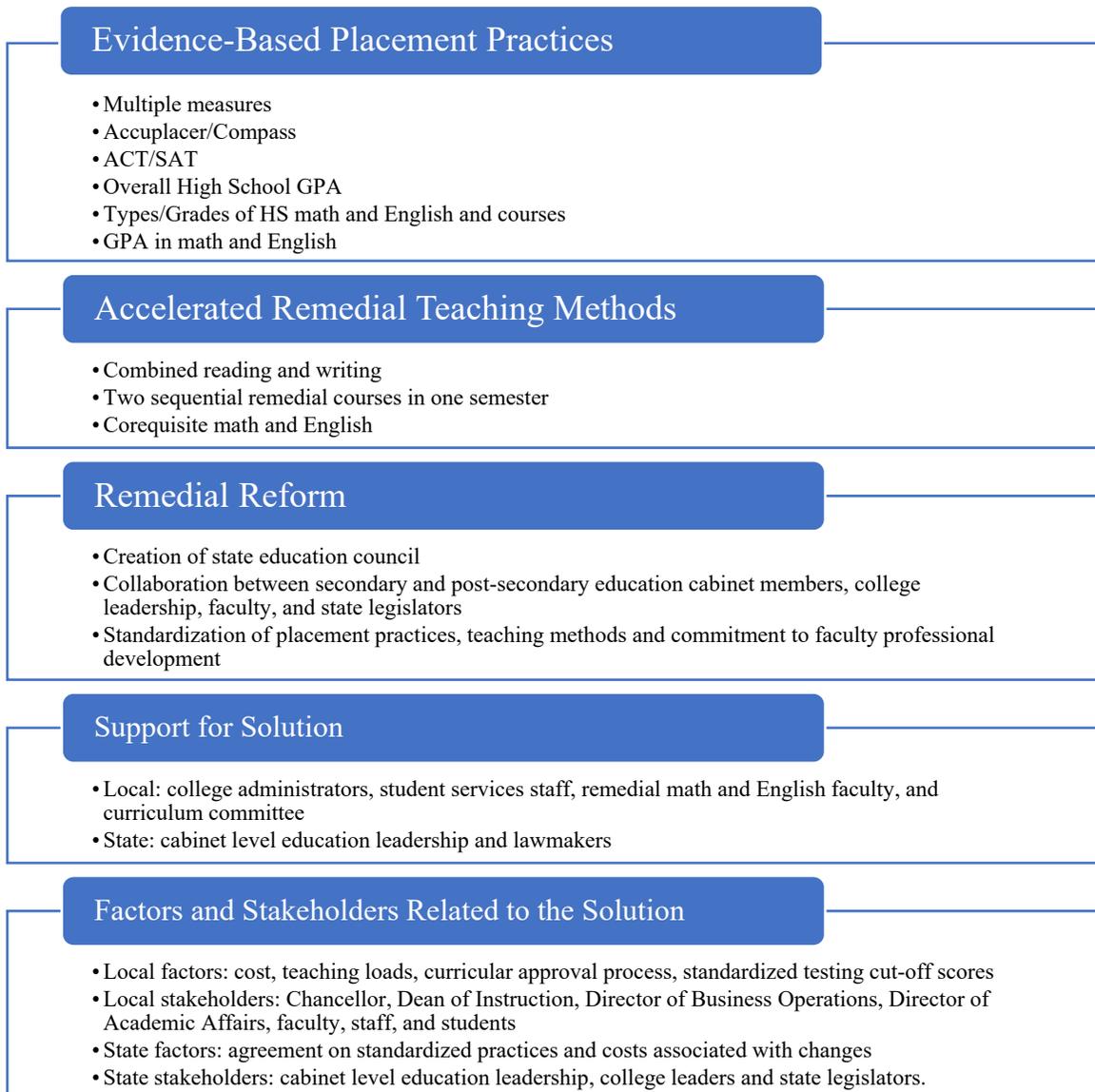
There are several factors and stakeholders at the local level related to the proposed solution. Factors that will play a significant role in whether or not changes are implemented at the local level include financial costs associated with curricular changes and the corresponding teaching loads, curricular change approval, and determination of placement test cutoff scores and high school GPAs related to placement into remedial courses. Increased financial costs will be associated with changes in how remedial courses are taught. The corequisite model which adds a 1-credit lab to an existing college level course will increase the total credits for the course, which could result in overloads for faculty who teach the courses. The alternative would be to add the lab to the college level course and have the faculty member teach fewer courses, but may result in decreased revenue. Either option may be perceived as a negative impact from a financial perspective. As stakeholders, the Chancellor, Dean of Instruction, and Director of Business Operations, will have to approve the possible financial implications before any steps could be taken on moving the curricular changes through the approval process. Other stakeholders at the local level include students and faculty. Changes to existing remedial education placement practices and teaching methods need to ensure that student outcomes will improve. Faculty are a critical part of the solution, since they are instrumental in developing and carrying out the curricular changes.

Factors that play a significant role at the state level include those involved in remedial reform. Those factors include standardizing placement practices and remedial education methods which involve collaboration of stakeholders from multiple government agencies, as well as faculty and administrators from public institutions.

Stakeholders would include leadership from the higher education and public education state agencies, Deans from public institutions of higher education, and legislators representing committees that address education funding and practice policy. Legislators would have the role of writing legislation that mandates remedial education practice, as well as approving legislative funding related to this division of higher education.

Figure 2

Proposed Solution Summary



Implementation of the Proposed Solution

The solutions mentioned here range from simple to complex, with each solution having its own set of stakeholders. Even when solutions are less complicated, they still involve organizational change and the challenges that come with it. Kouzes and Posner (2012) noted that multiple stakeholder perspectives are necessary for development of successful initiatives. The authors also pointed out that successful implementation of initiatives requires the buy-in of the people who will actually be doing the work and involves the influence of leaders who build trust, facilitate relationships, and develop competence in their staff and faculty. With these necessary initiative requirements in mind, and to increase the potential for successful outcomes, implementation of changes related to remedial education practice and policy will need to be a long, thoughtful process.

Implementation at the Local Level

Based on literature related to organizational change and that describing remedial reform in multiple states, implementing the proposed solution will take planning and collaboration of multiple stakeholders (North Carolina Community Colleges, 2016; Ohio Higher Education Department, 2018; Texas Higher Education Coordinating Board, 2014; Robbins & Judge, 2016; Rodriguez et al., 2018). Changes to placement practices is the least complex solution and has the potential for the quickest implementation. The Dean of Instruction, Director of Student Affairs and student advisors would be presented with the research findings and evidence-based practice related to remedial education placement practices. The stakeholders would be asked to use evidence-based practice to determine a

set of measures that would provide a comprehensive assessment of a freshmen student's proficiency in math and English.

Changing the remedial education curriculum is a complex process. Meetings will be held with the Dean of Instruction and Division Chairs to share the research on alternative forms of remedial education and improved student outcomes in other states that have adopted accelerated methods. If adopting alternative forms of remedial education is approved, the formation of a circle of positive influence has begun (Kouzes & Posner, 2012). A meeting with the Dean of Instruction, Division Chairs and math and English faculty would follow. The faculty would then be provided with information on local student's remedial performance, the research supporting alternative forms of remedial education and the corresponding outcomes, as well as how the alternative teaching methods differ from traditional remedial teaching methods. If buy-in from faculty is achieved, the long road through the curriculum approval process would start first at the local level followed by approval at the state level. Professional development would be provided for faculty who would be teaching the alternative remedial courses. Implementation of the new alternative remedial courses including corequisite courses could begin in fall of 2021.

Implementation at the State Level

A discussion on the need for remedial reform would begin with members of the governor's cabinet including the Secretary of Higher Education and the Secretary of Public Education. Historical New Mexico data including the financing of remedial education, placement practices, teaching methods, and poor student outcomes would be presented, followed by recommendations for comprehensive, evidence-based placement

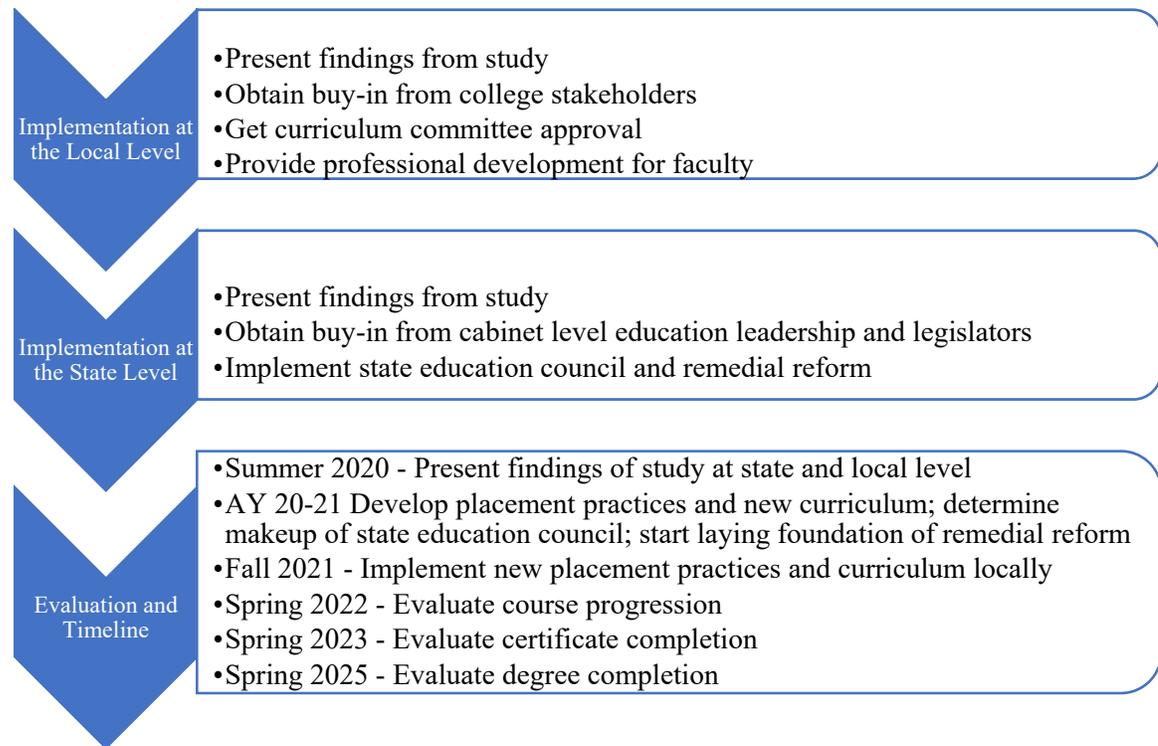
practices and alternative remedial teaching methods. The outcomes for students who enrolled in alternative remedial education courses would be provided. The importance of establishing a P-16 or P-20 council to begin the remedial reform process would also be discussed. If approved at the cabinet level, the information would move forward for discussion with legislators on the Education, Health, and Human Services committee.

Evaluation and Timeline for Implementation and Assessment

For the local initiatives at the community college, discussions with stakeholders will begin in the summer of 2020. In regard to the placement practice initiative, if buy-in is achieved with the Dean of Instruction and the Director of Student Services, new placement practices will be implemented in the fall of 2021. Evaluation of effectiveness of the new placement practices will include several measures. The number of students placed into remedial courses will be determined at the beginning of the fall 2021 semester. The percentage of students placed into remedial courses will be compared to the percent placed into remedial courses in the fall of 2020 under the previous placement practices. At the end of the fall 2021 semester, students enrolled in remedial courses will be evaluated to determine how many successfully complete their courses. The percentage of students who successfully complete remedial courses will be compared between the fall 2020 and fall 2021 cohorts. In the spring of 2022, the remedial students enrolled in the fall of 2021 would be assessed for progression to the next course in the subject sequence. The percentage of students from the fall 2021 cohort who progressed to the next course in the subject sequence would be compared to the percentage of remedial students from the fall 2020 cohort who progressed to the next course in the subject sequence.

In regard to new remedial education teaching methods, discussions with stakeholders will begin in the summer of 2020. Stakeholders will include the Dean of Instruction, Division Chairs, and faculty from math and English. If buy-in is achieved, the curricular process to create corequisite courses will start in the fall of 2020. The curriculum process takes one year to move through all of the required channels of approval. If approved, new corequisite courses in math and English will be implemented in the fall of 2021. During the year that new courses are being approved, the college will provide faculty with professional development related to teaching the new remedial education models.

If buy-in from state level stakeholders is successful, during the same academic year, the governor could create the state education council and appoint members from all levels of state education leadership including legislators who sit on education committees. Members would be charged with drafting legislation that describes remedial reform including evidence-based placement practices and remedial teaching methods with the goal of approving the legislation during the spring 2021 legislative session

Figure 3*Implementation Summary***Implications**

The findings and recommendations of this Dissertation in Practice will impact remedial education in New Mexico in a variety of ways. Remedial students from the community college in this study reflect the poor student outcomes reported by the New Mexico Higher Education Department (2014). Placement practices and remedial teaching methods utilized at the study location play a role in the perpetuation of poor remedial student performance. Implementing evidence-based practice will reduce erroneous placement of incoming freshmen into remedial courses, while placing students who need support into the alternative remedial courses that properly reflect their skill level. Utilizing research findings from the literature review can drive the change from

traditional remedial teaching methods to alternative, accelerated models, increasing the potential for remedial students to progress and complete college level courses. At the level of state policy, the literature review provides evidence supporting the formation of a state education council leading to remedial reform and standardization of remedial education practices. Ultimately, change will promote better outcomes for New Mexico's remedial students and greater opportunities for them as college graduates.

Practical Implications

The changes proposed in this Dissertation in Practice will result in remedial students being placed into alternative remedial courses including corequisite model classes. Using the model presented, students who are placed into a corequisite course take the standard college level class, as well as a supplemental lab. The supplemental lab is an additional credit hour taught by the same instructor teaching the college math or English course. Adding one credit to each section of math or English will increase the credit hours taught per course and potentially decrease the number of sections taught by an instructor. Decreasing the number of sections of math or English taught by one instructor will increase the number of faculty needed to cover the additional sections of college level courses. The additional need for faculty will need to be figured into the annual salary budget for the corresponding division.

Changes in placement practices will need to be considered by the Dean of Instruction and Director of Student Affairs prior to implementation. During the summer, the placement measures including cutoff scores for ACCUPLACER, types of English and math courses taken, GPA cutoff for math and English, and overall GPA will need to be

determined. The final determination will need to be shared with advisors prior to implementation in the fall.

The implications of successfully implementing statewide remedial reform would mean increased spending on higher education, professional development for math and English faculty at all public colleges and universities, along with standardization of placement practices and corresponding training of advisors. For students who need remedial courses, implementing alternative remedial teaching methods should increase the number of students who successfully complete college level math and English, and ultimately complete certificates and degrees.

Implications for Future Research

The research conducted as part of this Dissertation in Practice occurred in a unique setting with findings that may not be comparable to community colleges with different student demographics and remedial education needs and outcomes. Future research pertaining to remedial education outcomes could address other student variables such as age, ethnicity, gender, and income. Research pertaining to faculty adoption of alternative remedial methods and provision of professional development would also be beneficial. A larger study that looks at remedial student performance at all community colleges in New Mexico would also be valuable.

Implications for Leadership Theory and Practice

The community college is part of what makes the United States a democratic society (Boggs, 2012). Through open access, the two-year college provides a path for every citizen to pursue higher education and the many benefits that are associated with it. If students enter the community college setting lacking the preparedness for college level

courses they are likely not to complete a college level course, much less a degree or certificate, undermining open access and making the path to a higher education and a better life unavailable to low-income students and students-of-color (Dowd, 2003). With the knowledge that college administrators have regarding improved placement practices and remedial teaching methods, it is their responsibility to act as leaders to move remedial education in a direction that supports a democratic society. This can be done with servant and transformational leadership styles that promote a shared vision, inspiration, and collaboration with stakeholders at the practice and policy levels.

The implementation of servant and transformational leadership styles can help community college administrators at the institution in this study to make positive changes in remedial student outcomes. The characteristics of the two leadership styles complement each other with the potential to create an environment that supports leader/follower relationships allowing for the influence necessary to drive changes in practice. The benefits of using both leadership styles can also be applied to changing policy at the state level. As Ospina and Foldy (2010) noted, using knowledge of each entity's dominant logic the transformational leader can shape the issues in a way that resonates with each institution allowing for growth, less defensiveness, and greater opportunity for successful collaboration.

Summary of the Study

This quantitative, retrospective study involved the analysis of enrollment and college completion data of 281 first-time freshmen at a rural community college in New Mexico in an effort to better understand the factors involved in remedial student performance. The study aimed to determine if remedial students were less successful at

completing college than their college-ready peers. The study found that remedial courses negatively correlated with college completion, while completion of college level math and English correlated with college success. Age was also found to be correlated with completing college programs.

As a result of the findings, implementation of evidence-based placement practices and remedial teaching methods is recommended. Placement practices should include multiple measures in addition to a college placement test. This ensures a comprehensive assessment of a student's competency in math and English. It also prevents erroneous placement into remedial courses.

The literature shows that if a student must have remedial courses, remediation should last no longer than one semester. This is done through combining reading and writing into one course or offering two eight-week math courses to ensure progression into a college level course in the same subject the following semester. The evidence also confirms that if students are assessed to be just below the cutoff for college level courses, they should be placed into corequisite math or English classes with a mandatory lab to ensure they have the support they need to be successful.

Remedial reform is one way to implement evidence-based practice and standardization of remedial education through policy. Multiple states around the nation have utilized P-16 or P-20 councils to bring the collaboration necessary between public education and higher education to improve remedial student outcomes. Transformational and servant leadership styles in government and institutional leaders can help make this type of collaboration model a reality.

It is well documented that most freshmen students around the country and in New Mexico's public institutions of higher education are not prepared to take college courses. While remedial education is available to students, students who start out in remedial courses are much less likely to complete college than their college-ready peers. Millions of dollars are spent annually on remedial education, yet remedial students rarely complete a certificate or a degree. The recommendations made in this Dissertation in Practice would have both local and statewide implications related to remedial education practices. Ultimately, placement practices and remedial education teaching methods would be improved leading to a greater number of remedial students in New Mexico who progress and complete their college education leading to improved earning potential and a higher quality of life.

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Appendix A

To Whom It May Concern:

August 7, 2019

Sabrina Ezzell, a doctoral student at Creighton University, will be conducting research at the University of New Mexico-Gallup (UNMG) branch campus. She will be using existing deidentified student data provided by the UNMG institutional researcher. Based on the University of New Mexico Office of the Internal Review Board's criteria, Ms. Ezzell's research does not require IRB approval.

Sincerely,
Suzette Wyaco
UNMG Registrar

Appendix B

Office of the Provost
Research Compliance

DATE:	13-Sep-2019
TO:	Ezzell, Sabrina R
FROM:	Social / Behavioral IRB Board
PROJECT TITLE:	Progression and Completion Rates of Remedial Students in a Community College Setting
REFERENCE #:	2000091
SUBMISSION TYPE:	Initial Application
REVIEW TYPE	Exempt
ACTION:	APPROVED
EFFECTIVE DATE:	13-Sep-2019
EXPIRATION DATE:	12-Sep-2022

Thank you for your Initial Application submission materials for this project. The following items were reviewed with this submission:

Creighton University HS eForm~

This project has been determined to be exempt from Federal Policy for Protection of Human Subjects as per 45CFR46.101 (b) 4.

All protocol amendments and changes are to be submitted to the IRB and may not be implemented until approved by the IRB. Please use the modification form when submitting changes.

If you have any questions, please contact the IRB Office at 402-280-2126 or irb@creighton.edu. Please include your project title and number in all correspondence with this committee.