An Examination of the Relationship and Correlations Among Standardized Reading Test Scores, the Academic Success of Students, and the Completion of a Remedial Reading Course at a Mid-Sized Suburban Community College

Ellen M. Gambino
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An Examination of the Relationship and Correlations Among Standardized Reading Test Scores, the Academic Success of Students, and the Completion of a Remedial Reading Course at a Mid-Sized Suburban Community College

Abstract
While considerable attention is focused on the role of community colleges in educating the nation's workforce, concerns pervade regarding the growing number of students whose basic skills in reading, writing, and mathematics are insufficient to support success at the college-level. Community colleges contend with limited resources as they endeavor to provide opportunities to underprepared students who aspire to higher education. In order to support student success while containing costs, community colleges must examine the effectiveness of developmental program offerings. Using a quasi-experimental design, this quantitative study explored whether relationships exist between students' scores on a standardized test in reading and the success of students at a mid-sized suburban community college and whether the successful completion of a remedial reading course affects student success. The definition of success in the study included student persistence as demonstrated through consecutive semesters of enrollment as well as by academic performance. Regression analyses were used to investigate whether reading test scores could be shown to be determinants of students' success. The study's findings suggest that standardized reading test results are not predictors of persistence or short-term academic success at the course level, but that they may be significantly related to grade point average at graduation.

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An Examination of the Relationships and Correlations Among Standardized
Reading Test Scores, the Academic Success of Students, and the Completion of a
Remedial Reading Course at a Mid-Sized Suburban Community College

by

Ellen M. Gambino

Submitted in partial fulfillment
of the requirements for the degree
Ed.D. in Executive Leadership

Supervised by
Edward J. Sullivan, Ed.D.

Committee Members
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The Ralph C. Wilson Jr. School of Education
St. John Fisher College

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Dedication

It would not have been possible to complete this dissertation without the support and guidance of a number of people: family, friends, colleagues, and teachers. The guidance and patience provided by committee chair Dr. Edward J. Sullivan, from Marist College, are gratefully acknowledged. Dr. Sullivan’s willingness to read endless versions of this document and to provide advice, comments, and edits, has improved this document immeasurably.

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I want to thank my two children, Christine and Michael for their encouragement. They are without question my two greatest accomplishments.

Most of all, I want to thank my husband, friend, and biggest supporter, Larry. He read countless versions of the chapters, asking questions, providing suggestions, and
cheering me on throughout the process. He has always been behind me in everything I’ve done, and this was no exception. He was there to pick me up when I was down, and calm me down when I was stressed. Despite losing his companion to the laptop for days, weeks, months, and years, he never once flagged in his support and encouragement of this undertaking.
Biographical Sketch

Ellen M. Gambino is currently the Associate Dean of Academic Affairs at Dutchess Community College, in Poughkeepsie, New York. Ms. Gambino is a graduate of the State University of New York at New Paltz, where she received a B.A. in Education. Ms. Gambino attended Pace University and graduated with a Master of Science degree with distinction in Computer Science. She came to St. John Fisher College in the summer of 2010 and began doctoral studies in the Ed.D. Program in Executive Leadership. Ms. Gambino pursued her research in developmental education of community college students under the direction of Dr. Edward J. Sullivan and Dr. C. Michael Robinson and received the Ed.D. degree in 2012.
Abstract

While considerable attention is focused on the role of community colleges in educating the nation’s workforce, concerns pervade regarding the growing number of students whose basic skills in reading, writing, and mathematics are insufficient to support success at the college-level. Community colleges contend with limited resources as they endeavor to provide opportunities to underprepared students who aspire to higher education. In order to support student success while containing costs, community colleges must examine the effectiveness of developmental program offerings. Using a quasi-experimental design, this quantitative study explored whether relationships exist between students’ scores on a standardized test in reading and the success of students at a mid-sized suburban community college and whether the successful completion of a remedial reading course affects student success. The definition of success in the study included student persistence as demonstrated through consecutive semesters of enrollment as well as by academic performance. Regression analyses were used to investigate whether reading test scores could be shown to be determinants of students’ success. The study's findings suggest that standardized reading test results are not predictors of persistence or short-term academic success at the course level, but that they may be significantly related to grade point average at graduation.
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Chapter 1: Introduction

Introduction

Through open admissions policies, community colleges provide access to higher education to many students whose skills are below college-level in reading, writing, and mathematics (Vaughan, 2006). Research by ACT, Inc. (2006) indicated that fewer than half of all entering college students have the reading skills necessary for college-level courses, and the percentages are lower at community colleges. In order to address these academic deficiencies, Bailey (2009) indicated that most community colleges provide developmental programs including remedial coursework and a range of support services such as tutoring and supplementary instruction. He further described the common community college admissions process whereby entrants take placement tests and, based on the outcomes of those tests, may enroll in remedial courses. Perin (2005) noted that while some colleges require students to take one or more remedial courses if they do not score above a prescribed minimum on the placement tests, many colleges only recommend remedial coursework but do not require it.

This research study examined relationships exists between scores on a standardized reading test and the success of underprepared students enrolled at a community college. For the underprepared community college students who enroll in a remedial reading course, the study also investigated the impact of that intervention on students’ persistence in college and their performance in subsequent coursework.
Statement of the Problem

The American Association of Community Colleges (2011) reported that the more than 1,200 community colleges in the United States currently serve in excess of 7.4 million credit students. According to Snyder and Dillow (2010) community college enrollments represent more than 42% of all undergraduate enrollments.

For more than one hundred years, community colleges have been committed to providing access to higher education and have demonstrated that commitment through open admissions policies and low costs (Bragg, 2001). The President’s Commission on Higher Education (1947) decried extant societal barriers to higher education and asserted the role of the community college in removing those barriers by providing access to higher education regardless of economic status, race, sex, or ethnicity. The Carnegie Commission on Higher Education (1974) described the mission of the community college as the democratization of higher education in the United States. Vaughan (2006) contended that fundamental to this mission is the belief that there is a distinction between offering opportunities for education and providing genuine access to that education. Adelman (2006) asserted that, in this context, access must be more than the prospect of enrolling at a postsecondary institution or even persistence into the second year. This definition of access should include the opportunity for success including attainment of the academic credential sought.

Community college students, however, often lack the fundamental knowledge and skills necessary to achieve success in college-level work. Spellings (2006) reported that inadequate preparation of students at the secondary level severely limits access to higher education in the United States. Hoachlander, Sikora, and Horn (2003) found that 30% of
students entered community college with skill levels in mathematics that did not allow them to perform simple operations on decimals or fractions. Moreover, they found that 44% of community college students demonstrated proficiency skills in reading that did not rise above a level of the basic comprehension that would allow them to be able to make simple inferences from the reading.

**Challenges to community colleges.** Attewell, Lavin, Domina, and Levey (2006) examined the U.S. Department of Education’s data on high school graduates and reported that nearly 60% of all community college students took at least one remedial course at some point during their college career. Provasnik and Planty (2008) found that at least 29% of community college students enrolled in remedial coursework in their first year of college alone, compared to 19% at four-year institutions.

As community colleges strive to provide access to higher education and to serve underprepared students through developmental education, Boggs (2004) indicated that they function in a “perfect storm” (p. 8) that also includes pressures to hold tuitions and costs stable in a climate of declining revenues and rising enrollments. Mullin (2010) reported that community college tuitions increased only 1.8% per year adjusted for inflation in the first decade of the twenty-first century. Moreover, tuition represents only about 18% of the revenue in community colleges; the balance of the funding comes from state and local governments. Despite the fact that community colleges served 43% of all undergraduates in 2007-2008, they received 27% of the total federal, state, and local revenues allocated to public institutions of higher education.

Aud et al. (2010) estimated that community college enrollments have grown by 26.5% from 2000 to 2010, representing the largest enrollment increase in any sector of
higher education. In part, this growth is fed by the increase in the number of 18-24 year olds in the population (U.S. Bureau of The Census, Population Division, n.d.), as well as by the growing percentage of high school graduates who attend college and who choose community colleges (Provasnik & Planty, 2008). Current economic factors in the United States also contribute to the increase in community college enrollments as displaced workers seek job retraining (National Commission on Community Colleges, 2008).

As enrollments increase in community colleges nationwide, the numbers of underprepared students also increase (Calcagno & Long, 2008). Parsad and Lewis (2003) reported that 98% of public two-year institutions offer remedial courses and are much more likely to do so than other institutions of higher education. U.S. Department of Education (2003) found that the curricula of community colleges include 42% more remedial courses than public four-year colleges and 88% more than private four-year schools. Further, students in community colleges need more remedial coursework than their peers at other institutions as evidenced by the fact that 63% of underprepared community college students spend a year or more in remedial coursework. Only 38% of students in public four-year institutions and 16% in private four-year schools require that level of remediation.

Debates about the function of remedial education in community colleges. Vaughan (2006) asserted that developmental education is fundamental to community colleges’ commitment to access and student success. Bailey (2009) described developmental education as “one of the most difficult issues confronting community colleges” (p. 11). Oudenhoven (2002) asserted that the issue of remediation at
community colleges is contentious because of the multifaceted causes and the lack of clear solutions.

Critics of remedial education argue that the practice of providing pre-college level courses in community colleges is tantamount to using taxpayer dollars to teach the same material at the college-level that should have learned in high school (Saxon & Boylan, 2001). Breneman and Haarlow (1998) estimated that the cost of remedial education to the nation’s universities and colleges was about $1 billion annually. Russell (2008) calculated the cost of remedial education for just the recent high school graduates at community colleges at $1.4 billion annually. In an update of the Breneman and Haarlow (1998) study, Pretlow and Wathington (2011) examined the increased costs and disaggregated the data for community colleges. The study found that for the freshman cohort of Fall 2000, $1.96 billion was spent by community colleges on developmental education.

In addition to the costs to the taxpayer, Barbatis (2010) reported that the costs of developmental education are substantial to students. Since the credits and grades earned in remedial coursework do not count toward meeting graduation requirements, significant additional time and tuition accrue to students who commit to improving their academic skill levels by enrolling in remedial courses.

Proponents of remedial education in the community colleges address concerns about the costs by pointing to the fact that the expenditures per full-time equivalent (FTE) at community colleges are substantially lower at $4,100 when compared with $8,000 at public 4-year colleges (Provasnik & Planty, 2008). Moreover, Phipps (1998) estimated that costs for remedial education represent only 1% to 3% of the total costs of higher
education. Saxon and Boylan (2001) reported that among the programs at community colleges, only general studies programs were less expensive than remedial programs while the costs of other programs such as business and nursing were significantly higher. They concluded that, for community colleges in particular, the costs of remedial courses were not greater than the revenues they generated.

Advocates for developmental education also point to the issue of equity and maintain that developmental education is a core component of the community college mission (Vaughan, 2006). Bailey, Jenkins and Leinbach (2005) reported that community colleges enroll large percentages of students from under-represented populations including African-American and Hispanic students, as well as enrollees who come from the most disadvantaged socioeconomic groups and those who may be first-generation college students. In examining the population of all undergraduate students, the National Commission on Community Colleges (2008) found that 47% of African-American undergraduates, 47% of Asian or Pacific Islander undergraduates, 55% of Hispanic undergraduates, and 57% of Native American undergraduates attend a community college. Further, Attewell et al. (2006) found that 76% of black and 78% of Hispanic students at community colleges took at least one remedial course, compared to 55% of white community college students. Provasnik and Planty (2008) found that while recent high school graduates from the lowest socioeconomic group were least likely to enroll in any college, 44% of the enrollees attended a community college. Horn and Nevill (2006) reported that 47% of community college students came from backgrounds in which neither of their parents had an education beyond high school.
The critical role of reading. Many researchers in the field of developmental education are currently focused on students’ levels of preparation for college-level mathematics and the negative impact of remedial mathematics courses on student persistence (Adelman, 2006; Bahr, 2008; Burley, Butner, & Cejda, 2001; Fike & Fike, 2008; Illich, et al., 2004). However, Adelman (2004) described the lack of reading skills as the most serious remedial issue for students because two-thirds of those who required remediation in reading also enrolled in at least two other remedial courses.

In a study of recent high school graduates at a community college in Ohio, Bettinger and Long (2005) found that only 16% of first-time full-time students who enrolled in a remedial English course graduated within a five year period. Achieve the Dream (ATD), an initiative funded by the Lumina Foundation that works with more than 130 community colleges in 24 states, gathers and analyzes data in order to support institutional change and student success (About Achieving the Dream, 2011). In a study of more than 250,000 students at ATD schools over three years, Bailey (2009) reported that 34% of the entering students were referred to developmental reading.

Dixon (1993) found that underprepared students who completed a remedial reading course persisted at a rate more than 20% higher than students whose placement test scores were slightly higher and therefore exempt from the intervention. More recently, Cox, Friesner, and Khayum (2003) concluded that successful completion of a remedial reading course significantly correlated to the academic success of underprepared students. Fike and Fike (2008) found that successful completion of a remedial reading course had the strongest positive correlation with persistence of underprepared students. Pinkerton (2010) found that students who successfully completed a remedial reading
course had a higher success rate than students with similar levels of preparation who had not been required to take a remedial reading course.

**Concerns about the efficacy of developmental interventions.** At the core of these remediation debates is the question of the efficacy of developmental education. A number of studies have shown that remedial coursework may not actually contribute to student success. Roksa, Jenkins, Jaggars, Zeidenberg, and Cho (2009) studied first-time community college students in Virginia. They compared the success of underprepared students who took remedial courses with the outcomes of similar students who chose to circumvent the remediation. The study found no significant difference in the groups’ pass rates in college-level coursework and concluded that remediation had no salutary effect on student success. Calcagno, Crosta, Bailey, and Jenkins (2007) examined the outcomes for community college students in Florida and found that enrollment in remedial coursework decreased the likelihood that a student would graduate. Calcagno and Long (2008) examined data for community college students in Florida with mixed results. These researchers compared outcomes for students found to be marginally above and below the threshold of requiring remediation as measured by standardized tests. They concluded that for those placed into remedial courses, persistence to the second year was increased, but overall college-level course completion, and graduation rates were not improved.

While some studies have cast doubt on the effectiveness of remedial coursework, others have demonstrated the value of developmental education in supporting student success. Illich, Hagan, and McCallister (2004) conducted an analysis of data on more than 12,000 students in Texas and found that students who successfully completed
remedial courses while enrolled concurrently in college-level courses, performed as well as their peers for whom remediation was not required. Adelman (2004) found that remediation did not negatively affect either transfer or completion of an associate degree for students who completed the remedial course sequence. Bettinger and Long (2009) studied first-time students in Ohio and found that students who took remedial coursework were significantly more successful in terms of persistence and graduation than their peers with similar preparation for whom remediation was not required. Boatman and Long (2011) argued that the question of the efficacy of remediation is complex and nuanced and may depend on the level of the student’s remedial needs.

However, Adelman (2006) declared that an increasing quantity of research supports the conclusion that remediation positively contributes to student success. Shannon and Smith (2006) asserted that remedial education is a key element to realize the mission of access to higher education for the economically and educationally underprepared. Romano (2011) concluded that community colleges do in fact provide opportunities for higher education, that the democratization effect of community colleges is positive and increases educational attainment in the U.S.

**Theoretical Rationale**

Evans, Forney, Guido, Patton, and Renn (2010) described an upsurge in literature devoted to issues of student development since the late 1990s. They indicated that the underpinnings of this work can be traced to the foundational theories of cognitive and psychosocial development of the twentieth century. This study suggests a convergence between Vygotsky’s (1962) work on the centrality of language and social learning with Tinto’s work on academic integration as a predictor of the persistence of college
students. Further, Vygotsky’s work on social learning may provide a basis for discussions of the role of developmental programs in providing a social context that is central to Tinto’s theory of social integration.

Lev Vygotsky’s (1962) theory focused concurrently on the bond between thought and language, and on the relationship of that bond to cognitive development. While Chaplin (1976) admitted that Vygotsky’s work was not concerned directly with reading, she contended that it does provide a background for the role of the importance of reading to the cognitive development of college students, informing a theory of the centrality of reading skills to college success.

Moreover, Vygotsky’s assertion that all learning is social provides foundational theory to support several elements of the student support services that comprise most developmental programs. Tutoring, group study sessions and learning communities all employ elements of the social interaction that Vygotsky asserted can enable learners to develop more advanced thinking (Vanderburg, 2006). Central to Vygotsky’s (1962) work was the concept of a zone of proximal development, which he described as a state in which a learner alone cannot solve a problem or grasp a concept but may be successful with the collaboration of a more knowledgeable peer or teacher. These concepts of learning within a social context and guided learning through collaboration provide theoretical support to developmental program practices involving tutoring and supplemental instruction (Bayer, 1996).

Tinto (1975) maintained that students arrive at college with individual attributes including family background, ability, and past educational experiences. He described socioeconomic status, educational attainment of parents, and parental support for the
student’s educational aspirations as family background factors that affect student persistence. A student’s ability and past educational experiences, personality, attitude, and commitment to the goal of achieving a postsecondary degree also predict college persistence, according to Tinto.

Tinto (1987) postulated that a student’s background and attributes interact with the characteristics of an institution to determine the level of a student’s academic and social integration. The extent of academic and social integration combine with the aforementioned elements to inform further a student’s institutional commitment and ongoing goal commitment. Tinto further theorized that, as levels of academic and social integration increase, institutional and goal commitment rise commensurately and positively affect persistence.

Beginning with the work of Pascarella and Terenzini (1980), Tinto’s theories have provided the basis for more than 700 research studies (Bensimon, 2007) creating what Deil-Amen (2011) described as a “Tintonian dynasty” (p. 55). Fox (1986) researched the applicability of Tinto’s model on academically and economically disadvantaged students at a four-year urban commuter university and found that academic underpreparedness related directly to a student’s academic integration into an institution and had a direct and negative relationship to persistence. Barbatis (2010) examined the persistence of a group of ethnically diverse, underprepared students at a community college. Their findings confirmed Tinto’s position on the importance of academic and social integration, and recommended further study on models to enhance student acquisition of reading and writing skills to support student success. Karp, Hughes, and O’Gara (2011) further
substantiated the applicability of Tinto’s theory of social integration as applicable to community college students.

**Purpose of the Study**

The purpose of the study was to investigate whether a relationship exists between scores on a standardized reading test and the persistence and academic performance of community college students. The study analyzed the admissions’ placement test scores of all first-time full-time students as potentially related to outcomes of student success as measured by cumulative grade point average and persistence. In addition, students’ grades in a reading-intensive course taken in a subsequent semester will be considered for all students. Finally, this study used a quasi-experimental design to analyze the extent to which the intervention of a remedial reading course influenced the success of students who were underprepared in reading.

Bettinger and Long (2009) described the need for developmental education research that provided more than simple comparisons between the outcomes of students who require remedial coursework and those who do not. Pinkerton (2010) indicated that a quasi-experimental design similar to that described in this proposal would fill that described gap. This study used a quasi-experimental design to compare the outcomes of students participating in a remedial reading course with those of students with similar academic preparation (as indicated by placement test scores) who did not enroll in and/or successfully complete the course. This analysis of outcomes among similarly prepared groups of students will provided information regarding the effect of the intervention of remedial coursework. In order to accomplish these dual goals of measuring potential relationships between scores on a standardized reading test and student success, while
employing the quasi-experimental design to measure the effectiveness of the intervention, the study examined the data sets of eight groups of students who entered college for the first time and matriculated as full-time students at the college in fall terms between 2003 and 2007. The initial criterion for partitioning the groups was the students’ scores on the COMPASS Reading test, the testing and placement instrument in use at the college. The college established a threshold or “cut score” for placement into remedial reading. Groups 1 and 2 included only students who scored above the cut score, while the remaining groups consisted of students identified as underprepared for college-level reading due to the fact that they scored below the cut score on the reading placement test. ACT, Inc. (2006) indicates there is a standard error of measurement (SEM) associated with any cut score that provides a range of scores within which students may be considered to have equivalent levels of preparation. The study employed this concept to divide the groups further. Therefore, while Groups 1 and 2 both included students whose test scores were above the locally established threshold for placement into remedial reading, Group 2 included only students above the “cut score,” but within the SEM while students in Group 1 were above both the cut score and the SEM. Using this mode of measurement, Group 1 students were the most well-prepared for college-level reading. For the remaining groups, which consisted of students with reading scores below the cut score, the criterion of SEM was employed along with additional conditions related to remedial course enrollment and success. According to college policy, students whose test scores indicated that they are underprepared for college-level reading are advised, but not required, to take a remedial reading course. Three outcomes were possible for these students: they may have enrolled in and successfully finished the remedial reading
course, they may have enrolled in the course but not completed the course successfully, or they may have chosen not to take the remedial reading course. Table 1.1 summarizes the eight groups.

Table 1.1

*Summary Description of the Students in Each of the Groups*

<table>
<thead>
<tr>
<th>Students who did not enroll in a remedial reading course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
</tr>
<tr>
<td>Group 2</td>
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<tr>
<td>Group 3</td>
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<td>Group 6</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Students who chose to enroll in a remedial reading course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students who successfully completed remedial reading course (grade of A, B, or C)</td>
</tr>
<tr>
<td>Group 5</td>
</tr>
<tr>
<td>Group 8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Students who did not complete remedial reading course successfully</th>
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</thead>
<tbody>
<tr>
<td>Group 4</td>
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<tr>
<td>Group 7</td>
</tr>
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</table>

**Hypothesis.** The study hypothesized that for first-time full-time students at a community college there was a statistically significant relationship between standardized reading test scores and a multifaceted profile of student success indicators including
cumulative grade point average, performance in a reading-intensive course, and persistence. The study further hypothesized that the intervention of a remedial reading course has a statistically significant positive impact on that correlation.

**Research Questions**

1. What percentage of students fell into the following groups:
   - students with reading test scores above both the cut score and the SEM who did not enroll in a remedial reading course;
   - students with reading test scores above the cut score but within the SEM who did not enroll in a remedial reading course;
   - students with reading test scores below the cut score but within the SEM who did not enroll in a remedial reading course;
   - students with reading test scores below the cut score but within the SEM who chose to enroll in a remedial reading course but did not complete the remedial reading course successfully (grade of A, B, or C);
   - students with reading test scores below the cut score but within the SEM who chose to enroll in a remedial reading course and successfully completed the remedial reading course (grade of A, B, or C);
   - students with reading test scores below both the cut score and the SEM who did not enroll in a remedial reading course;
   - students with reading test scores below both the cut score and the SEM who chose to enroll in a remedial reading course but did not complete the remedial reading course successfully (grade of A, B, or C);
• students with reading test scores below both the cut score and the SEM who chose to enroll in a remedial reading course and successfully completed the remedial reading course (grade of A, B, or C).

2. What percentage of students in each group persisted to the second semester?

3. What percentage of students in each group persisted to complete two consecutive semesters?

4. What percentage of students in each group persisted to graduation within 6 semesters at the college?

5. What percentage of students in each group persisted to graduation within 8 semesters at the college?

6. What percentage of students in each group transferred prior to graduation and persist to a total of 6 semesters?

7. What percentage of students in each group transferred before graduation and persist to a total of 8 semesters?

8. What percentage of students in each group were successful as measured by a grade of C (70%) or higher in a reading-intensive course (BHS103) taken in their second semester?

9. What were the mean and median cumulative grade point averages of students in each group who persisted to graduation at the college?

10. Was there a relationship between student persistence and student scores on a standardized reading test?

11. Did the intervention of a remedial reading course affect the relationship between student persistence and standardized reading test scores?
12. Was there a relationship between student academic success and standardized reading test scores?

13. Did the intervention of a remedial reading course affect the relationship between student academic success and standardized reading test scores?

**Potential Significance of the Study**

Currently, there is national concern focused on the numbers of students who are underprepared for college, along with an acknowledgement of the heightened role of community colleges in providing the remediation necessary to support student success (Bettinger & Long, 2009; Kozeracki & Brooks, 2006; Levin & Calcagno, 2008; Shannon & Smith, 2006). At the same time, there is substantial discussion describing the dearth of research that analyzes the effectiveness of developmental education (Attewell, et al., 2006; Bueschel, 2009; Levin & Calcagno, 2008). Higbee, Arendale, and Lundell (2005) have suggested that community colleges must analyze student outcomes and assess policies and practices in order to determine the most effective strategies for developmental education.

The study proposes to extend the current literature in a number of ways. It examined whether a correlation could be shown to exist between scores on a standardized reading test and the academic integration and success of students as measured by both grades and persistence. Many of the current research studies employ persistence alone as the measure of student success. For example, Pinkerton (2010) measured success as persistence to 30 credit hours. Bettinger and Long (2009) measured student success relative to persistence, graduation and transfer behavior over six years. Fike and Fike
(2008) measured student success as persistence at two points: fall-to-spring (one semester) and fall-to-fall (one academic year).

Other researchers broadened the definition of student success to include additional factors. Cox, et al. (2003) extended the definition of student success to examine both persistence and grade point average, while Roksa et al. (2009) employed a composite of course grades, number of terms of enrollment and accumulated credits as well as graduation and transfer outcomes. However, the significance of this study to the research literature will be that it proposes to combine both a comprehensive definition of student success with a quasi-experimental design that will control for the intervention of a remedial course on similarly prepared students.

If no correlation can be demonstrated to exist between standardized reading test scores and student success in college or if a correlation exists but the study does not establish that the intervention of remedial reading positively impacts that relationship, those results should stimulate further research and engender serious discussions at the postsecondary level about developmental education policies and practices. If a correlation is determined to exist between standardized reading test scores and student success in college, those results could also instigate further research and discussions of best practices in developmental education. Furthermore, those results could inform conversations at the secondary school level with regard to the core curriculum as well as potentially influencing discussions of policy regarding competencies required for graduation.

Community colleges today must contend with limited resources as they endeavor to provide opportunities to increasing numbers of students who aspire to higher education
but who are at risk due to a lack of academic preparation. The insights gained from this research could inform the work of community college leaders as they develop policies and design programs to assist underprepared students.

Definitions of Terms

Academic integration: a concept based on Tinto’s (1975, 1987, 1993) Theory of Student Departure that is defined generally as the student’s perceived intellectual congruence with an institution’s academic systems and quality. When congruence exists, the student is more likely to become committed to the institution and to degree completion. A lack of academic integration may lead to attrition. (See also Social Integration)

Academically underprepared students: usually identified through standardized testing as needing additional skills preparation in order to be successful in one or more college-level courses.

Computer-Adaptive Placement Assessment and Support System (COMPASS): a widely used standardized placement tests for determining remedial educational needs in colleges and universities. It provides scores from a battery of components including reading, writing, and various levels of mathematics. It is a product of ACT, Inc., which also produces the ACT college entrance exams. It is the assessment tool used in the study to determine the level of student preparedness. (See also standardized test)

Developmental programs: include remedial courses coupled with a range of other academic and affective interventions that may include tutoring, supplementary instruction, study skills workshops, and the like. (Compare to Remedial)
Full-time equivalent (FTE): a measure of enrollment rather than a count of the actual number of students at a college. It is computed by dividing the total number of student credit hours by 15.

Placement policy: the set of rules in place at an institution of higher education that determine the assignment of a student to the course or program that matches her/his abilities, educational preparation, and aspirations. Standardized tests and high school grades are commonly used for placement purposes.

Remedial: the term that refers specifically to the academic coursework provided to improve students’ skills in reading, writing, and mathematics in order to support their success in college-level work. *(Compare to Developmental)*

Remedial English or writing: courses that provide instruction in basic sentence mechanics, grammar usage, and punctuation skills. These courses may be required or recommended for students identified as lacking proficiency in those areas necessary to write at the college-level.

Remedial reading: courses that provide instruction in the skills needed to comprehend and analyze information in college-level textbooks, fiction and nonfiction books, course handouts, and examinations. College-level reading skills include the broad vocabulary required for comprehension but not necessarily knowledge of specific content-area vocabulary. These courses may be required or recommended for students who do not meet entry-level requirements in reading proficiency.

Social integration: a concept based on Tinto’s (1975, 1987, 1993) Theory of Student Departure that is defined generally as the normative fit that a student perceives with an institution’s values and social systems. When a good fit does not exist, the
student is more likely to become isolated and less committed to the institution. A lack of social integration may lead a student to dropout of an institution. (See also Academic Integration)

Standardized test: A test composed of a systematic sampling of behavior, administered and scored by specific rubrics, capable of being interpreted in terms of adequate norms, and for which there are data on reliability and validity. (See also COMPASS)

Study skills: learning behaviors including time management, organizational and concentration skills that students may employ to improve the acquisition, understanding, and application of knowledge and skills.

Tutoring: services that may include any type of learning assistance to promote learning by supplementing formal instruction. Tutoring is generally provided by peers or academic professions in settings that are either in small groups or one-to-one.

Chapter Summary

This chapter described the increasing prevalence of students at community colleges who are underprepared for college-level work and the risk factors that are inherent in this lack of preparation. Existing concerns were outlined regarding the costs of remedial education to both institutions and students especially in light of questions about the value of remediation at the postsecondary level. In addition, an overview was provided of the issues that face community colleges as they grapple with the mission to democratize education while meeting the needs of underprepared students. Chapter 2 will further develop these themes.
Also presented in this chapter was a brief summary of the psychosocial theories of Vygotsky (1962) with regard to the significance of language in cognitive development along with Tinto’s (1975, 1987, 1993) Theory of Student Departure, which speaks to the importance of a student’s level of academic integration at a college. Chapter 2 will provide a more in depth review of the foundational theory and research that support this contention.

The chapter further proposed a research study to demonstrate a convergence that links standardized reading test scores with academic integration and by extension, to the success of underprepared community college students. Finally, this chapter provided a justification for researching whether a relationship could demonstrate the efficacy of remedial reading coursework. Chapter 3 will detail the methodology used in the research.
Chapter 2: Review of the Literature

Introduction and Purpose

This chapter will describe the history and mission of the community college as they pertain to issues of student access and success. In addition, theories of student development will be presented with a focus on those that serve to ground the research on student success in college.

Emphasis will be placed on Tinto’s theories that describe ways in which the combination of student attributes and institutional characteristics interact to determine the level to which a student achieves academic and social integration at a college. Vygotsky’s (1962) theory regarding the importance of language in the development of thoughts and concepts is put forth as crucial to the study of the academic integration of students. An overview of research substantiating the applicability of Tinto’s theories to underprepared college students will also be presented. Finally, research evidence is provided to demonstrate the negative impact of deficiencies in college-level reading skills on student success.

Background

The community college is a uniquely American creation that holds a distinctive position in the higher education system of the United States. The origins and development of the community college parallel the social movements and economic development of the nineteenth and twentieth centuries in the United States. Proponents of the community college refer to its development in grandiose terms. Brint and Karabel
(1989) asserted that the community college “changed the face of American higher education” (p. 6). Boggs (2010) described the evolution of the community college in America as a social movement that provided college opportunities for students facing economic and societal barriers. Without community colleges, Boggs maintained, these students would not have had access to higher education and training.

Late in the nineteenth century, Andrew Carnegie (1906) sermonized, “the best means of benefiting the community is to place within its reach the ladders upon which the aspiring can rise” (p. 536). In the early twentieth century, the vision of many in higher education was that community colleges would be the vehicle to provide those ladders of opportunity through education. In the twenty-first century, the prospect of a better life in American society is still perceived to rely on the positive relationship between education and career success.

It is both well documented and widely acknowledged that education is the path to a higher paying job and greater job security. Carnevale and Desrochers (2004) indicated that the fastest-growing and best-paying jobs require a college education as evidenced by the fact that people with at least some college hold almost 60% of jobs in the U.S. More recent data from Sommers (2009) analyzed the change in the educational level of the workforce age twenty-five and older between 1992 and 2007. That study found that the percentage of workers whose highest educational level was an associate degree increased from 7.4% to 9.9% while the share of the workforce with a high school diploma or less declined from 48.1% to 38.9%.

Kane and Rouse (1999) reported that workers with an associate degree garner 15% to 27% more in annual earnings than those with a high school diploma. Beyond
enhanced career and financial success, research from Pascarella and Terenzini (2005) showed that education positively affects an individual’s health as well as overall satisfaction with life.

Local communities benefit from the education afforded to their citizens. The National Commission on Community Colleges (2008) reported that nearly 80% of the first responders (police officers, firefighters and emergency medical technicians) and more than 50% of all nurses are educated at community colleges. Further, higher levels of education increase the likelihood that a citizen will vote (Milligan, Moretti, & Oreopoulos, 2004) and be actively involved in their local civic and community welfare activities (Pascarella & Terenzini, 2005).

On a national scale, education has been identified as an increasingly important element of America’s success in the global economy of the twenty-first century. Carnevale and Desrochers (2004) projected that between 2006 and 2016, employment for occupations requiring an associate degree will increase by 18.7% while jobs that require vocational training at the postsecondary level will increase by 13.6%. A similar projection from the Bureau of Labor Statistics indicated that between 2008 and 2018, employment in occupations that require an associate degree will increase by 19.1% (Lacey & Wright, 2009).

Another important component of our nation’s success in the twenty-first century will be workers with baccalaureate and graduate degrees (Carnevale & Desrochers, 2004). Community college education and associate degrees are often an important factor in the education of many who go on to complete both bachelor degrees and graduate education. Adelman (2006) found that more than half of all graduates of four-year
institutions attended a community college at some point in their degree path. Tsapogas (2004) found that more than 40% of those with recent bachelor and master degrees in science and engineering fields attended a community college during their educational career.

Carnevale and Desrochers (2002) warned that the educational level of a workforce directly corresponds to a nation’s rate of economic growth and will determine America’s potential for growth in the new knowledge economy. Community colleges, with their commitment to increased access to higher education, are vital to the educational and economic future of this country.

**History of community colleges.** The history of the community college is inextricably woven with the fabric of the history of United States in the nineteenth and twentieth centuries using threads taken from the evolution of public education, social movements of the period, and changes in the economy. The development of this American institution was not a linear process. Rather, it was shaped by a range of stakeholder groups with a variety of motives.

Power (1991) maintained that the roots of public education in the United States reach back at least to Jefferson’s proposal for free education as a tool to educate the citizenry for self-government and can be traced as a national policy to the Northwest Ordinances of 1785 and 1787 that allocated a portion of the land in every township to the support of education. The United States in the nineteenth century was expanding and settling a new nation that was feeling the effects of the industrial revolution. Stemming from the Populist Movement’s espousal of the need for free education for all children early in the nineteenth century, by 1850, it was a generally accepted tenet of public policy
that education was the responsibility of the government (Formisano, 2008). The accomplishment of a system of public education was left to state and local governments and was heavily influenced by the social mores of the time that regarded free public education as being akin to “alms for the poor.” By the 1860s, every state had implemented some form of public education, led by the common school movement of Horace Mann in Massachusetts; however, it was not until early in the twentieth century that all states had mandated school attendance (Power, 1991).

Pedersen (2000), Power (1991), and Sherington and Campbell (2006) contended that there were three developments in the last decades of nineteenth century that contributed to the growth of the junior college movement. The common schools, that were by then pervasive, had expanded and extended their curricula to include classical education as well as more practical, specifically vocationally oriented, subjects such as bookkeeping and surveying. Especially in the larger townships and municipalities, these so-called high schools also experimented with offering college-level courses. This expanded curricula coupled with the shift to a more industrialized economy created an increasing demand for public secondary school education (Pedersen, 2000; Power, 1991; Sherington & Campbell, 2006).

Cohen and Brawer (2008), Power (1991) and Sherington and Campbell (2006) described the growth of publicly supported universities in the late nineteenth century that occurred almost simultaneously with the development of secondary schools in the United States. The Morrill Acts of 1862 and 1890 established state supported institutions that helped to codify the concept of public responsibility for higher education. These institutions were intended largely to serve both as agricultural and teacher training
colleges. Thus, their stated educational missions served to establish the intent to provide programs of higher education that were vocational in focus, along with offering the classical curricula of study (Cohen & Brawer, 2008; Power, 1991; Sherington & Campbell, 2006).

In the private institutions of higher education in the late nineteenth and early twentieth centuries, two schools of thought contributed to the development of the junior college model. Led by Henry Tappan, the president of the University of Michigan, many leaders in the higher education community suggested that colleges and universities should not offer lower level preparatory work at the freshman and sophomore levels. These prominent educators of the period promoted the idea that universities should abandon their freshman and sophomore classes and relegate the function of teaching introductory level courses to junior colleges. They maintained that universities should be relieved of the burden of general education in favor of true research and professional development. William Rainey Harper, founding president of the University of Chicago, was a strong proponent of using a junior college modeled on the German “gymnasium” to separate the first two years of preparatory general education subjects from the upper division material and research. In the 1890s, Rainey began separating the University into the Junior College and the Senior College and in 1900, the University of Chicago conferred associate degrees to students (Cohen & Brawer, 2008; Pedersen, 2000; Power, 1991).

Lange (1917), Dean of the School of Education at the University of California and one of the earliest proponents of the junior college, advocated for extending the secondary school experience to grades thirteen and fourteen. He decried the use of the
term “junior college” as a misnomer while describing the importance of two-year institutions in an evolving democracy. Lange contended that their mission was to provide low cost access to higher education as well as to offer vocational programs including more general education than the trade schools. He felt that it was a disservice to send students to larger institutions where the faculty were less interested in teaching than in research and publications.

In the early twentieth century, both private and public junior colleges sprang up across the country. Koos (1928) reported that the number of junior colleges in the United States increased from 38 in 1912 to 325 in 1927 and that they were located in 39 states. Ten years later, he reported that the number of junior colleges had increased to more than 500 and existed in all but four of the 48 states (Koos, 1938).

It was in the 1940s, however, that the groundwork was established for the modern community college. In 1946, President Truman appointed a commission led by George F. Zook to examine “the functions of higher education in our democracy and of the means by which they can best be performed” (President's Commission on Higher Education, 1947, p. v). The Commission’s report coined the phrase “community college” in recognition of the institutions’ close relationship with their local communities. Foremost among the Commission’s recommendations was that the community colleges should provide vocational programs that included general education courses in order to educate students for semiprofessional occupations. The Commission further recommended that community colleges should meet the needs of students with aspirations to transfer to four-year institutions. Additional recommendations from the Truman Commission included that community colleges should provide adult education
programs and community enrichment activities, and should maintain strong connections with local cultural, business, and civic organizations.

In analyzing the Truman Commission report, Bogue (1948), the President of American Association of Junior Colleges, spoke to the divergent roles of the community college as a pathway to employment for students aspiring to a vocational education, as a starting place for students who seek to earn a baccalaureate degree, or as a venue for continuous learning for the citizens of its community. He went on to say,

The greater significance of the community college concept, as of all phases of education, lies in the fact that it opens more and broader intellectual highways for students and adults to choose and advance in to the limits of their native abilities and interests. (p. 289)

The Truman Commission’s recommendations became the foundations for the common missions of community colleges in America today. However, the comprehensive mission that the Truman Commission described for community colleges had its origins in the bifurcated roots of the vocational education proposed by Lange and the desire of those led by Tappan and Harper to unburden the universities of the need to provide general education coursework in the first two years of college (Brint & Karabel, 1989; Cohen & Brawer, 2008; Doherty, 1994).

**Mission of community colleges.** Vaughan (2006) described the shared elements of the mission of community colleges in the following way:

The mission of most community colleges is shaped by these commitments:

- Serving all segments of society through an open-access admissions policy that offers equal and fair treatment to all students;
• Providing a comprehensive educational program;
• Serving the community as a community-based institution of higher education;
• Teaching and learning;
• Fostering lifelong learning. (p. 3)

The more than twelve hundred community colleges across the nation do, in fact, implement these components of the mission to varying degrees and in disparate ways (Bailey & Morest, 2004). Cohen and Brawer (2008) asserted that the mission of community colleges as a community resource for life-long learning is widely acknowledged, and is generally without controversy. Local communities provide funding and support to community colleges with the expectation that the college will serve the needs of their geographic area, referred to as the “service area.” In this capacity, community colleges generally offer non-credit courses and activities intended to enhance the cultural and recreational life of the community. These activities may include lectures, concerts, drama productions, sporting events, as well as courses and training to support both the general and specific training needs of local businesses.

The historical commitment of the community college to provide a set of comprehensive educational opportunities that includes both the first two years of the baccalaureate degree (Eells, 1931; Koos, 1938), and vocational training (Lange, 1917) is both the core of the community college mission and the source of much controversy (Brint & Karabel, 1989; Diener, 1986). Doherty (1994) asserted that the hybrid mission of the community college combines a number of conflicting and contradictory purposes. Some critics of the comprehensive nature of the community college mission have argued that community colleges should focus on either preparation of students for transfer to
baccalaureate institutions or vocational training (Bailey & Morest, 2004). Brint and Karabel (1989) contended that community colleges serve to channel students away from baccalaureate institutions and into vocational programs. In this way, they maintained, community colleges act as agents of social selection that reinforce class distinctions by reducing educational attainment and reinforcing societal inequities.

Parnell (1985), however, maintained that this perspective is an elitist view perpetuated by college and university graduates who believe that the only educational experience worthy of consideration is one that matches their higher education experiences. He argued that the bifurcated system of vocational and transfer programs does, in fact, provide a diversity of opportunity that matches the range of interests, abilities and aspirations of community college students. “To that end, we must learn to ignore, indeed to laugh at, the assumption that a baccalaureate degree is the sole road to excellence, respect, and dignity for all people” (p.10).

Shannon and Smith (2006) asserted that the keystone of all community college operations is open access to higher education. However, the topics of access, equity and a comprehensive educational program are the focus of much of the research and controversy that surround community colleges (Adelman, 2007; Bailey & Morest, 2004; Bettinger & Long, 2009; Boggs, 2004; Brint & Karabel, 1989; Clark, 1960; Cohen & Brawer, 2008; Shannon & Smith, 2006).

Access to higher education is often defined as the opportunity afforded an individual through admission to an institution of higher learning irrespective of the individual’s level of academic preparedness or economic disadvantages (Cohen & Brawer, 2008). From this perspective, the student who is underprepared for college-level
work is admitted and offered the opportunity to improve skills through remedial coursework. Since virtually all community colleges provide some form of remedial education, by some counts, that student has now achieved access to higher education. Questions arise at this point, regarding whether the simple act of providing a student with the opportunity to attend a community college is sufficient. In many cases, underprepared students may need varied kinds of support in order to bridge the gap to attaining success in college (Jenkins, 2003). The ladders of ascent that community colleges seek to provide must include the scaffolding of ancillary services that, together with the remedial courses, come to constitute what can be defined as developmental programs (Bailey, 2009).

**Theoretical Foundation and Research on College Student Success**

Woolfolk (2001) indicated that theories of student development have their roots in the works of Piaget, Erikson, and Lewin. In the middle of the twentieth century, Piaget described stages of cognitive development to explain the evolution of a person’s ability to acquire information, to process the new knowledge, and subsequently to employ that knowledge to solve problems. Erikson also described development as a series of stages through which individuals passed, but emphasized the relationship between culture and the individuals in what he described as a psychosocial theory of development.

**Developmental theories.** Evans et al. (2010) cite the work of Kurt Lewin as foundational to student development theory. Lewin’s equation $B = f(P \times E)$ states that behavior ($B$) is a function ($f$) of the interaction of a person ($P$) and their environment ($E$). In order to understand an individual’s behavior, one must take into consideration that
person’s characteristics, background, and developmental level along with how they are impacted by their interaction with the extant environmental factors.

Vygotsky (1962) expanded the theory of cognitive development to study the ways social and cultural factors influenced the stages of development. He posited that Piaget’s stages of development were not universal because, he believed, children learn within the context of the activities deemed valuable in their culture. Vygotsky theory also spoke to models of assisted learning that provide scaffolding to students who require less and less assistance from the teacher as they progress. He described a zone of proximal development in which a learner is close to solving a problem but may require some assistance from a teacher or a peer to be successful. Vygotsky’s work is influential in the field of developmental education because it provides strategies for enhancing teaching and learning (Woolfolk, 2001).

Vygotsky (1962) also provided a theoretical background for the study of the success of students who are underprepared in reading when he posited that both written and spoken language are cultural tools that support thinking and learning. Since thoughts and concepts are organized and transmitted through language, there is an important relationship between language acquisition and cognitive growth (John-Steiner & Mahn, 1996). Horton (2008) asserted that Vygotsky viewed the development of higher order mental functions as the result of processes whereby a student develops links between words and concepts.

Evans et al. (2010) indicated that psychologist Nevitt Sanford was one of the first investigators to apply the theories of cognitive development and those from social psychology to the development of college students. Personality theory, Sanford (1967)
maintained, would serve to help educators connect student behavior with performance in
the classroom and would indicate which aspects of the college environment might
influence the student. Social theory, he maintained, would serve to inform decisions
about the structure and organization of the social environment.

Sanford (1960) hypothesized that the development of the intellect, character, and
emotions of a college student is integrated with and informed by the various
environments in which the student navigates. Following this logic, information and
experiences acquired in the classroom, must invariably influence the individual’s
evolving personality, character, and intellect. Sanford further theorized that students do
not develop and mature naturally just because they attend college. Learning experiences
that provide knowledge of the world and by extension knowledge of oneself are the
catalyst for change. By responding to these catalysts, students restructure their cognitive
world and expand their personalities. Moreover, Sanford stated that the processes of
student development become actuated in the relationship between the institutional
environment and students’ unique transitions to young adulthood.

Therefore, Sanford (1967) argued that institutions of higher education must not
only develop curricula designed to impart knowledge and cognitive skills, but more
importantly, must develop programs that encourage the development of independent
thinking, creativity, and social responsibility. He declared, “The time has come for us to
control our zeal for imparting knowledge and skills, and to concentrate our efforts on
developing the individual student” (p. 8). Evans et al. (2010) pointed out that this body
of work continues to be influential in the study of student development.
Pascarella and Terenzini (2005) suggested that subsequent theories of college student development were built on the work of Nevitt Sanford and can be grouped into two categories. The first, developmental theories, are those that focus on the nature or processes of change within the individual. In general, developmental theories describe a continuum of student development and may identify stages or phases along the continuum. They contrasted these developmental theories with a second group referred to collectively as college impact models. These models explain how an institution’s characteristics and values combine with students’ experiences at that institution to influence student development. College impact models classify and assess sets of variables that may describe both students’ characteristics and the structure and environment of an institution. While individual variables are important elements of college impact models, these theories are more focused on environmental factors.

**Models of college student development.** Developmental theories focus on the characteristics of change as well as on the progress of growth within the individual student. Two major subcategories form the foundation for the current student development models: psychosocial and cognitive structural theories. Woolfolk (2001) explained that psychosocial theories concern themselves with the content of the development of an individual as that person is defined within their environment, their relationships, and their experiences. The cognitive structural theories, on the other hand, focus on the stages of development that determine how individuals experience events and interact socially.

Evans et al. (2010), explained Erickson’s psychosocial model which described the development of an individual from childhood through adulthood as a series of eight
stages. As a child progresses through the first four stages, the identity is formed and then is cultivated during the remaining stages during adulthood. Consistent with the tenets of psychosocial theory, Erickson viewed the individual within a context of social institutions and other people that may influence her or his progression through the stages. He posited that an individual’s development was sequential and that migration from one stage to the next was the result of a crisis caused by the conflict between an individual and the environment.

Expanding on Erickson’s psychosocial theory, Chickering’s (1969) Seven Vectors of Student Development model described the evolution of young adults in terms of common areas that he labeled vectors because they have both “direction and magnitude” (p. 8). Departing from Erickson’s age-related stage model, Chickering clearly noted that these major areas of development are not stages because they are not necessarily sequential and an individual may move through them in a non-linear way. Subsequently Chickering and Reisser (1993) built on Chickering’s initial premises, but relabeled several of the vectors to include developing competence, managing emotions, moving through autonomy toward interdependence, developing mature interpersonal relationships, developing purpose, establishing identity, and developing integrity.

Chickering (1969) further identified six major sources of influence through which institutions could potentially accelerate or retard student development. He stated these sources of influence as a series of hypotheses confirmed by research. The first of these hypotheses, and the one described as being of primary importance, was that an institution must have clear objectives supported consistently by the programs, policies, and practices throughout the institution. Chickering described institutional size as the second source of
influence. He maintained that an individual’s development at a college derived from the
range of experiences available and that the number and variety of opportunities presented
to an individual is inversely proportional to the size of the institution. Chickering’s third
hypothesis was that curriculum, teaching, and evaluation significantly influence student
development. His contentions included the importance of varied teaching methods and
evaluative practices to produce and support cognitive development as well as the need for
choice and flexibility in curricular choices for students. Chickering’s fourth postulate
proposed that residence halls at an institution have the potential for being a positive
influence in student development if they offer opportunities to students to provide mutual
academic and social support and to develop tolerance for diversity of background and
thought. Chickering’s contention that the frequency and quality of student-faculty
interaction fosters intellectual and social development was the fifth of his hypotheses.
Finally, Chickering posited that the stimuli provided by these first five areas of
institutional influence on student development are either intensified or diminished by the
student culture of an institution. This student culture, Chickering maintained, provides
the framework for the ways in which each student reacts to opportunities for growth and
development that are presented.

Chickering’s (1969) postulate was that important changes occur in the attitudes,
values, and intellectual abilities of all young adults because of their interaction with their
environment and would occur whether or not an individual attended college. However,
he further asserted that the young adults’ experiences in college settings carry the
potential to influence their developmental changes due to the range of academic
coursework and experiences available. Therefore, it is important that colleges have an
understanding of students’ stages of maturity as well as the ways in which a college might support that growth.

In contrast to psychosocial theories such as Chickering’s, cognitive structural theories examine the process of intellectual development and focus on the ways in which people think and reason, and how they ascribe meaning to experiences (Evans et al., 2010). William Perry (1981) defined and mapped what he referred to as a student’s “scheme of development” (p. 78). He described “positions” (p. 78) as static stages on a continuum of development that portray ways in which a person views and ultimately responds to the world. The most primitive stage in this continuum of student positions is “dualism” (p. 79), a dichotomous view of the world in which there are absolutes of right-and-wrong, good-and-bad. The positions evolve as this absolutist stage transitions to the discovery of relativism where an individual comes to recognize the validity of diverse views, especially those supported by evidence. At the furthest end of the continuum is the more highly developed position of “personal commitment” (p. 80) in which the individual commits to ideas, values, behaviors, and other people. Since Perry depicted positions as static states, he defined development as transition from one position to the next. Experiences that challenge students’ thinking may trigger transitions as they develop ways to make meaning of the experiences.

In addition to the more central developmental theory and college impact models, a third theoretical approach is important to the field of student development theory and should be noted. Pascarella and Terenzini (2005) described typological models that categorize individuals according to the ways in which they perceive and react to their environment. These typologies inform the study of student development by providing a
way to organize and consider the individual differences that shape the affective and cognitive growth of students; however, they make no attempt to explain either the nature or the processes of student development. Among the theoretical models in this category are Kolb’s learning styles, Holland’s vocational preferences, Meyers-Briggs’ personality types, and Gardner’s multiple intelligences.

**College impact models.** As described by Evans et al. (2010), college impact theories differ from developmental theories in that they attempt to account for the environmental or sociological origins of change in college students. In general, the impact models concentrate on the origins and process of change and are less specific than the individual development theories. Building on Sanford’s work, the various models within this category focus on conditions that influence a student’s involvement, integration, and validation within the college environment.

Astin (1993) studied the impact of college on students using what he called the “I-E-O Model,” (p. 7) first developed in 1977. In this model, “I,” or inputs, refers to the characteristics of students such as student ability, gender, age, and major when they initially enroll at the college. The outcomes, or “O,” are the results of the college experiences or the students’ characteristics after exposure to “E,” which is the environment of the institution. Outcomes, as described by Astin, may be either the cognitive or the affective development of the student. The environment in this paradigm may include an institution’s programs, policies, faculty, and the availability of a variety of quality interactions with others. Astin’s model attempted to assess the impact of various environmental experiences by determining whether students grow or change differently under varying conditions. Based on the findings of his original study in 1977
and confirmed by his subsequent work, Astin (1993) developed a Theory of Involvement. He found that an undergraduate’s involvement with the college environment augments both the cognitive and affective development of the student. Astin further identified learning, academic performance, and retention as positively associated with academic involvement, along with aspects of involvement with faculty and with student peer groups.

The work of Tinto (1975, 1987) provides another example of the college impact model of student development. His work described the interface between a student and an institution of higher education as a series of processes that may result in varying forms of behavior from persistence to dropout. Tinto depicted colleges as social systems analogous to society at large and used Durkheim’s (1951) theory to compare the process of student dropout to suicide. Tinto also based his descriptions of the processes of social and academic integration on the theoretical work of Van Gennep (1960).

Tinto (1975) indicated that the work of Van Gennep that described the rites of passage of primitive societies was influential because it could be generalized to the movement of individuals through stages of life and, in particular, a society’s rites of passage from child to adult. Tinto described the Van Gennep’s stages of separation, transition, and incorporation as analogous to the stages of a student’s experience in transition to an institution of higher education.

Tinto (1975) also theorized that college students must separate from “communities of the past” (p. 95) by moving from the community of high school and family to the community of the college and that a student’s successful separation is a major determinant in persistence. Tinto applied Van Gennep’s transition phase to the
process of acquiring new habits and behaviors as a student assimilates into the college community. This process may require the acquisition of social and intellectual skills for which the student may not be prepared. Tinto maintained that this transition phase is especially difficult for students who are economically or educationally disadvantaged or those who are members of a racial or ethnic minority in the institution. The final phase of Van Gennep’s work that Tinto applied to college students is that of integration into the community of the institution. The success of this final phase requires the student to become incorporated into the life of the college and is largely dependent on the level of the student’s formal and informal contact with members of the college community.

Tinto’s Theory of Departure asserted that a student who cannot successfully navigate these stages of transition will be at risk to drop out of college.

Tinto (1975) indicated that Durkheim’s work on suicide provided further guidance to the development of the Theory of Departure. Tinto described Durkheim’s “egotistical” (p. 91) suicide as occurring when an individual is unable to integrate into a community. If an individual does not share the values of a society and lacks personal interactions with other members of the group, that individual may withdraw and commit suicide. Tinto compared this egotistical suicide to student departure from an institution. He further posited that the social and intellectual conditions of an institution may or may not support the successful integration of students into the college community.

Understanding the processes of academic and social integration portrayed by Tinto (1987) begins with examining the portrait of entering students who are possessed of a set of attributes that will have an impact on their success in college. These attributes incorporated family and community background such as social status, size of community,
demographics, intellect and knowledge, experiences and values. In addition to their direct impact on students’ propensity to persist, Tinto maintained that these traits also contribute to the formation of a student’s commitment to educational goals.

Tinto (1987) theorized that the student’s commitment to college and to degree completion is the most influential factor in determining persistence. He maintained that regardless of whether one measures a student’s plans in terms of educational or career aspirations, students with higher expectations are those most likely to persist. He asserted that a direct relationship exists between an individual’s level of commitment to degree attainment and persistence in college. When considering the longitudinal process of dropout, Tinto held that goal commitment is subordinate to family background and prior educational experiences.

It is at this point that the college impact, or institutional experiences, component of Tinto’s theory comes into play. An individual’s commitment to the goal of college completion informs experiences within the academic and social structures of a college. Tinto theorized that these academic and social structures have different features at different institutions and often influence each other. Thus, the congruence between these structures and a student’s individual characteristics is a critical determinant in whether a student persists at that college. Tinto (1975) referred to this congruence as “academic integration” and “social integration” (p. 92). Social integration describes a student’s sense of membership in the college community and may take the form of participation in extracurricular activities or in more personal and informal interactions with peers or faculty. Academic integration centers in the classroom and consists of both a sense of membership in the classroom as well as the ability to achieve academic success. Tinto
further described lack of integration as isolation, which hinders commitment and leads to further withdrawal. Student persistence, then, is dependent both on student involvement in the social communities of the institution as well as on academic success. Tinto posited that academic integration, most commonly measured by grades, is the single most important factor in persistence.

Tinto (1987) intended his Theory of Departure to function not only as a model to describe the longitudinal process of student attrition, but also to serve as a theoretical basis for institutional policy to support student persistence. Building on the core precepts that he identified, Tinto laid out a set of six principles that should inform institutional retention programs. These guidelines described the need for institutional policies and practices to ensure that students either enter with or are provided with access to the knowledge and skills necessary for academic success. Furthermore, the Tinto’s principles indicated that it is equally important for institutions to provide students with opportunities to integrate into the social structures of the institution. Tinto cautioned institutions to analyze carefully the character of student retention and to devise student retention systems within their structure and mission.

Bean (1980) presented an alternate theory to describe the reasons for student attrition with a theoretical basis that differed from that of Tinto (1975). While Tinto analogized suicide with dropout from higher education, Bean based his theory on Price’s (1977) work related to workplace turnover. Price outlined six variables reflecting job satisfaction and hypothesized that an increase in job satisfaction effectively decreased turnover in an organization. Bean (1980) analogized student attrition with Price’s job turnover and developed parallel background variables that would describe student
satisfaction with choice of institution or selection of major. Both Bean’s Theory of Attrition and Tinto’s Theory of Integration are similar in that they describe student characteristics as variables that interact with an institution’s characteristics. However, Bean criticized Tinto’s theory as insufficient in that it merely described a correlation between the analytic variables and student attrition, but did not adequately demonstrate a causal relationship. Bean’s work theorized that the combination of student characteristics and attitudinal elements determine the level of student satisfaction with the institution, which if low, causes dropout (Bean, 1980).

Cabrera, Castañeda, Nora, and Hengstler (1992) maintained that one of the commonalities of the theories of Tinto and Bean lies in their adherence to the college impact model to explain student attrition. An additional similarity is that while Bean’s model emphasizes the role of a student’s intent to persist, Tinto’s model addresses the importance of a student’s goal commitment on persistence. Cabrera et al. (1992) also acknowledged that the differences between Tinto and Bean have added depth and perspective to the study of student persistence. Research on Tinto’s model has indicated the effect of academic and social integration on persistence while studies of Bean’s model have demonstrated the role of institutional fit and external factors.

Each of the researchers and theories described has contributed to the general understanding of the elements of student success in college. However, Tinto’s work has been the focus of considerable research generally supporting not only the legitimacy of his model, but also the significance of the central concepts of social and academic integration (Karp, et al., 2011). Moreover, while most of the theories discussed heretofore typically apply to studies of student persistence at four-year institutions,
Tinto’s model has been shown to be more applicable to the less traditional community college student experience (Deil-Amen, 2011). Further, Bensimon (2007) described Tinto’s work as the “dominant paradigm” (p. 449) while Braxton and Hirschy (2005) indicated that Tinto’s model is the most studied and tested in student success literature.

**Action research studies testing Tinto’s theories.** A study by Pascarella and Terenzini (1980) began the process of establishing a framework to test Tinto’s theory of predicting persistence in college by developing an instrument to assess students’ background characteristics, institution/goal commitment, and academic and social integration factors. Student background characteristics that served as determinants of academic and social integration into an institution included sex, race/ethnicity, academic aptitude (as measured by standardized tests), prior academic achievement (as measured by high school outcomes), parental educational levels, and parental annual income. The researchers developed a survey and administered it to 1,905 incoming freshman at a large university in July 1976. The survey measured students’ institutional/goal commitment with questions regarding their academic degree aspirations, their perception of the importance of graduating from college, whether the institution was their first, second or lower choice, and their degree of confidence that their choice of institution was the correct one. A follow up survey in Spring 1977 asked students to assess outcomes with regard to their intellectual development, peer-group interactions, interactions with faculty as well as institutional and goal commitments. The researchers hypothesized that these five outcomes would measure the student’s integration into the institution. The study further incorporated data regarding students’ grade point averages and participation in extracurricular activities as measures of academic and social integration. The analysis of
results revealed that when the student’s background characteristics were combined with
the institutional integration elements, the model identified 81.4% of persisters and 75.8%
of dropouts. These elements, therefore, were validated as effective predictors of student
persistence as theorized by Tinto.

Munro (1981) conducted additional early research on Tinto’s theory using the
National Longitudinal Study of the High School Class of 1972 to study the data on more
than 6,000 students. The study confirmed the direct correlation between college
integration and an individual’s pre-college characteristics, but did not find that it led
directly to attrition. The researcher concluded that academic integration was significantly
more important to student persistence than social integration; however, a student’s
commitment to the goal of college completion emerged as the most influential factor
related to persistence.

Research studies by Pascarella and Chapman (1983a and 1983b, Chapman &
Pascarella, 1983) tested Tinto’s theories on 2,326 freshmen in eleven institutions across a
spectrum of institution types, including two-year colleges. As incoming freshmen, the
students completed a Student Involvement Questionnaire to assess their commitment to
complete college and their participation in college activities. The studies then gathered
persistence data on the respondents and found that student background characteristics
such as socioeconomic status, high school grades, and institutional factors, such as size,
were mainly indirect effects on persistence. The factors of academic and social
integration as predictors for persistence were also investigated and validated in that
freshmen who persisted into their second year were significantly more involved in the
academic and social fabric of the institution.
Pascarella and Chapman (1983a) also studied whether Tinto’s model would hold when applied to less traditional institutions such as large commuter universities and two-year colleges. While the results supported Tinto’s theory, the findings indicated that there were differences in the relative impact of institutional and goal commitment. The researchers found that institutional commitment was the stronger influence in four-year schools; goal commitment had a stronger direct effect in two-year schools. The study also found that while social integration had a significant direct effect on persistence of students at residential institutions, academic integration exerted a stronger influence on persistence in commuter schools such as community colleges.

Fox (1986) conducted research examining the applicability of Tinto’s model on the persistence of academically and economically disadvantaged students using a sample of students at a four-year, urban, commuter university. Despite the fact that the study took place at a four-year institution, it is analogous in many ways to the study of underprepared community college students. As a commuter institution with open enrollment policies, the university in the study enrolled students with many of the same risk factors as community college students. In general, the results demonstrated the applicability of Tinto’s theory to disadvantaged students and showed that academic underpreparedness relates directly to a student’s academic integration and has a direct and negative relationship to persistence. The study further confirmed the work of Pascarella and Chapman (1983a) that academic integration has a much more important relationship to persistence than social integration for commuter students.

Nora and Cabrera (1993) examined 2,453 first-time full-time students who were recent high school graduates. While the college involved was a large urban institution,
the student profile was analogous to that of community colleges in that the students generally did not live on campus (61%) and most had part-time jobs (67%). The research design was longitudinal in nature and employed an initial survey in the students’ first year with a follow up survey in the fall of the following academic year. The findings validated the element of Tinto’s theory that postulates institutional commitment as a direct effect on students' intention to persist as well as to their actual persistence behavior.

**Tinto’s theories and community college students.** Pascarella, Smart, and Ethington (1986) studied the applicability of the Tinto model as it relates to the long-term persistence of two-year college students. In order to understand students’ dropout and persistence behaviors, the longitudinal study mined survey data in the Cooperative Institutional Research Program (CIRP) that followed more than 10,326 students at 487 institutions of various types over a nine-year period starting in 1971. The CIRP surveys sampled students beginning college in 1971 and then again in 1980 in order to garner information about their educational experiences. The researchers extracted data on 825 students at two-year colleges in order to examine the withdrawal/persistence behavior of community college students who may drop out of an institution, drop out of the system of higher education, transfer to another institution, or stop out only to reappear several semesters or years later. While the study found some variances between impacts based on gender, it confirmed that academic integration and social integration had significant positive, directive effects on persistence to degree and to degree completion for both men and women who began their academic career at community colleges.
Bers and Smith (1991) conducted a study of community college students at a midsize suburban community college to test Tinto’s theories of integration and intent as measured by a survey that included Pascarella and Terenzini’s (1980) 30-item scale that operationalized Tinto’s concepts of academic and social integration. The research surveyed all incoming students – not just recent high school graduates or first-time college students - to measure their motivation for enrollment and future educational plans. Researchers also gathered demographic information and student success data including persistence to the subsequent term. The results of the study confirmed Tinto’s theories of academic and social integration and demonstrated that educational objectives and intent to re-enroll significantly influence the persistence of community college students.

A study by Napoli and Wortman (1998) also tested the validity of the Tinto model for community college students. These investigators used institutional data and questionnaires collected at two points in the fall 1994 term to assess educational and institutional commitment, academic and social integration, educational and goal commitment and persistence for 1,011 first-time freshmen students at a large, suburban community college. They found that their social integration and academic integration both directly and indirectly affect persistence. Further, the study indicated that external factors such as family and work responsibilities exert a significant negative influence on the persistence of community college students.

A recent qualitative study by Deil-Amen (2011) further examined the applicability of Tinto’s theories to students at two-year colleges. At seven community colleges and seven private two-year colleges in the Midwest, the researchers employed
surveys, interviews, and observations to gather data on 125 students. Along with demographic information, researchers analyzed students’ levels of goal commitment and academic and social integration. The results corroborated the applicability of the Tinto model and confirmed previous research indicating that academic integration is more influential than social integration for community college students. However, Deil-Amen indicated students described ‘socio-academic’ experiences as foundational to their persistence. As a result, she posited that, for community college students, the concepts of academic and social integration are interwoven in such a way that they are virtually indistinguishable.

**Tinto’s theories and underprepared community college students.** The numbers of students who arrive at community colleges underprepared for college-level work warrant serious consideration. Provasnik and Planty (2008) indicated that approximately 29% of community college students enrolled in remedial coursework in their first year of college. Attewell et al. (2006) mined the U.S. Department of Education’s data on the 1992 cohort of high school graduates (referred to as the NELS:88 cohort) and found that nearly 60% of all those who attended a community college took at least one remedial course at some point during their college career. Additional data from the NELS:88 cohort focused on the number of remedial courses and indicated that 44% of students took between one and three courses, while 14% took more than three remedial courses.

Grimes and David (1999) studied the applicability of the aspects of Tinto’s theories regarding personal dispositions of intention and commitment in relation to underprepared students at community colleges. Of their sample of 500-entering freshman
seeking degrees at a mid-sized community college, they found that in addition to expected differences in the students’ level of preparedness as measured on the college’s standardized placement test, the underprepared students were significantly different from their college-ready peers in several measurements related to intention and commitment. In contrast to the college-ready group, the underprepared students were more likely to be attending college because they could not find a job, or to satisfy the demands of their parents. In addition, the underprepared students also had lower expectations of their own performance, were significantly more likely to anticipate that they would require tutoring, and expected to fail one or more courses. The researchers found that due to these factors, underprepared students were significantly less likely to anticipate completing a bachelor or graduate degree.

Burley, et al. (2001) researched the relationship between persistence and academic integration by examining the dropout patterns of more than 50,000 underprepared students at community colleges in Texas. The students in the study were in college for the first time, were tested in mathematics, writing, and reading via a state standardized test, and subsequently tracked for five semesters (excluding summers). Of the original group tested, 60.4% had at least one deficiency, while 32.2% were deficient in all three areas of mathematics, reading, and writing. The study found that of the students who dropped out after one semester, 80% had started college with a learning deficiency. Further, 68% of the students who had completed only one semester, had deficiencies in all 3 areas, and only 15 % had passing grade point averages. Overall, the study concluded that deficiencies in a student’s preparation for college-level work had a limiting effect on student success as measured by grade point average and persistence.
Fike and Fike (2008) examined four years of data from 9,200 first-time-in-college students enrolled at a large, urban community college in successive fall semesters from 2001 through 2004, in order to assess factors that influence student persistence. In addition to the assessing the standard factors that Pascarella and Terenzini (1980) assessed when researching Tinto’s theory, Fike and Fike also examined factors of enrollment in developmental education were examined among the academic integration variables. Persistence in the study was operationalized as two factors: re-enrollment from the first-time fall semester to the succeeding spring term, as well as re-enrollment from the first-time fall term to the fall semester of the following year. Student completion of remedial coursework was among the predictor variables studied. In the case of developmental mathematics, writing, and reading, the researchers examined whether a student took and successfully completed a remedial course. Of the 22% of the students who took a remedial reading course, 62.5% passed. A larger percentage of students (65.3%) of the students took developmental mathematics however only slightly more than half (50.5%) of those students passed that course. While the researchers found a strong positive correlation for success among students who did not require remediation, they also concluded that successful completion of remedial reading and remedial mathematics were positive predictors of fall-to-spring and fall-to-fall retention. The findings of the study emphasized the important contribution of developmental education to academic integration and student success.

Consequences of underpreparedness. Adelman (2004) found that 67% of underprepared community college students left school at the end of their first year without earning a credential (i.e., a one year certificate), and did not enroll at any college
for a second year. Research by Attewell et al. (2006) indicated that only 28% of students who enroll in remedial courses complete their associate degree within 8.5 years, as compared to a 43% graduation rate for non-developmental students in that period. This research also found that significant numbers of students were not successful in their remedial coursework. For community college students who presented as underprepared in English, approximately 32% failed their developmental writing courses, while nearly 29% did not pass remedial reading.

Hoachlander et al. (2003) examined data from three national longitudinal studies: the 1996/01 Beginning Postsecondary Students Longitudinal Study (BPS), the National Education Longitudinal Study of 1988 (NELS: 88), and the 1999–2000 National Postsecondary Student Aid Study (NPSAS). Consistent results across all three data sets indicated that approximately 89% of the community college enrollees had aspirations and intentions to graduate with a two-year degree and/or to transfer to a four-year institution. However, while slightly more than half (51%) of all students at community colleges had achieved either credential or transfer within 6 years, only 28.4% of the underprepared community college students had achieved an associate degree or higher in that time.

Most colleges follow the practice of allowing students to take college-level courses while concurrently enrolled in remedial courses, a policy that is consistent with the open-access policy of community colleges (Illich, et al., 2004). In a survey of the practices and policies of more than 1,200 community college practices and policies, Shults (2000) found that 99% of institutions allowed students to enroll in college-level courses along with remedial coursework. Lewis and Farris (1996) reported that 54% of community colleges indicated that students took a year or more to complete their
remedial courses. Most students, therefore, complete a substantial number of credit-bearing courses while concurrently enrolled in remedial coursework.

According to Illich, et al. (2004), there are two types of students who enroll in remedial courses. One group is those generally prepared for college-level work, but in need of a course to provide a targeted refresher in a particular content area. These students are only marginally underprepared academically and generally have other skills such as the motivation and study skills needed to support their success in college-level courses. The second type of students may lack the range of academic and affective skills needed to support their success in remedial and college-level courses. Their study focused on 12,375 students at a community college from Fall 1999 – Fall 2001 who enrolled in at least one course. The researchers divided the group into those students who took only college-level courses, those who took only remedial courses, and those who took remedial and college-level courses concurrently in one semester. Their data showed that 30% of the students enrolled in at least one remedial course and 90% of those students concurrently enrolled in college-level courses. The study compared the outcomes for the concurrently enrolled students with those who took only college-level courses and found that the students who passed all of their remedial courses had pass rates in their college-level courses that were similar to those of students who took college-level courses only. However, those concurrently enrolled students who did not successfully complete their remedial courses had significantly lower pass rates in their college-level courses. This was true irrespective of the type of course taken, even when the content of the remedial course was unrelated to that of the college-level course. Their summary findings indicated that students who do not successfully complete remedial
courses taken concurrently with college-level courses do not perform as well as students enrolled in college-level courses alone.

Kolajo (2004) examined ex post facto data on graduates at a community college in Maryland. The study compared the outcomes for graduates who had no deficiency in academic preparation, those who needed remediation in only one academic area, and those who took two or more remedial courses. In the three-year period considered, the 39% of the graduates who were not required to take any remedial course persisted to graduation in the shortest period (eight semesters on average) and had the highest average grade point average at graduation (3.25). Graduates who had been required to take only one remedial course had a similar grade point average of 3.25 but required longer to graduation (10 semesters). The category of students who took two or more developmental courses took the longest time to graduate (11 semesters) and had the lowest overall grade point average at 2.86.

**Academic integration and literacy deficiencies.** As has been previously discussed, a lynchpin of Tinto’s (1993) theory is that academic integration is one of the two strongest predictors of student persistence and that one measure of academic integration is performance in coursework, i.e., grades. Tinto’s discussion of academic integration converges with Vygotsky’s theories on thought and language. Vygotsky (1962) found that cognitive development is dependent on language development: “thought is not merely expressed in words; it comes into existence through them” (p. 125). The essential role of language in cognitive development may explain the effect of inadequate college-level reading skills on academic integration and success.
The Fike and Fike (2008) research discussed earlier that included more than 9,000 students over four years examined more than 15 potential predictors of student persistence including successful completion of remedial mathematics, reading, and writing courses. The study found that successful completion of a developmental reading course had the strongest positive correlation with both fall-to-spring and fall-to-fall student retention. The researchers further found that students who successfully completed a developmental reading course were more likely to persist than those who enrolled in, but did not successfully complete, the developmental reading course. They posited that reading skills have a significant impact on academic integration because the ability to comprehend at a college-level along with successful reading strategies are essential for students to be able to read and understand textbooks.

A five-year study by Pearce, Thompson, and Donaldson (2008) examined the transcripts of 565 students who were required to take a developmental reading course based on a standardized reading test. Student outcomes were assessed through analysis of transcripts to determine each student’s total credit hours, grade point average, persistence/graduation, and post-test scores. The investigators found that of the students who took the developmental reading course, 68.2% passed the retest and 43% of that group were still enrolled at the institution.

Bahr (2008) analyzed the records of more than 200,000 students who began college in 107 California community colleges in 1995. From the initial cohort, he monitored the outcomes over 6 years for almost 70,000 students whose first mathematics course was remedial. After excluding students whose first language was not English, Bahr analyzed the impact of English language deficiencies on students’ ability to achieve
success as measured by enrollment in the first college-level mathematics course. Bahr’s study indicated that deficiencies in English diminish the likelihood of successful remediation in mathematics thereby placing those students who are underprepared in both at severe risk.

Cox, et al. (2003) examined data on students who were underprepared for college-level reading at a four-year open enrollment institution. This institution offered three remedial course options that included a not-for-credit pass/fail remedial course, a remedial course that could be counted toward graduation and which used traditional grading (A-F), and a third remedial reading course that was designed to supplement an economics course. The study found that underprepared students who successfully completed a remedial reading course were more likely to persist toward graduation and would do so with a higher cumulative grade point average than similarly underprepared students who did not take or did not complete such a course.

A study by Pinkerton (2010) compared persistence rates for two groups of entering freshman community college students who had similar levels of academic preparation in reading. The persistence of students whose scores on the COMPASS placement test scores were marginally above the level that would require them to take a developmental reading course were compared to the persistence of students who were required to take the developmental course but were only marginally below that same cut score. Pinkerton posited that the preparation levels of the two groups were statistically comparable since the COMPASS scores for each group fell within the Standard Error of Measurement (SEM). The institution in the study had a policy of reading-level prerequisites in core courses that prevented underprepared students from taking the
college-level courses until they successfully completed the required developmental course. The study defined persistence as successful completion of at least 30 credit hours or graduation. Within the group of students required to take a remedial course, two subpopulations emerged: those who successfully completed the remedial course and those who did not. Of the students placed into remedial reading, those who did not complete the mandatory remedial course were significantly less likely to persist than any of the other students studied. However, the students whose test scores were marginally above the cut score, and therefore were not required to take the course, had lower persistence rates than those who successfully completed the remedial course. The researcher concluded that this may indicate that the remedial reading course had a positive impact on student success.

Chapter Summary

This chapter portrayed the historic commitment of the American community college to open enrollment policies and low cost as the democratization of postsecondary education. Today, access to higher education is available to nearly every high school graduate who wants to attend through enrollment at a community college. However, this community college commitment to access carries with it the need to extend access to success through accumulation of knowledge and skills and degree attainment. In an economy that is increasingly dependent on knowledge workers, student success in this regard is vital both to the students themselves, and to the community at large. However, substantial evidence exists that increasing numbers of students who attend community colleges face a variety of risk factors that carry the potential to diminish the likelihood of a successful academic outcome. To frame the exploration of
the impact of those risk factors, this chapter provided an overview of theories of college student development. In particular, the work of Tinto was underscored as a basis for understanding the reasons that students may not be successful in college. Vygotsky’s (1962) postulate that written and spoken language are crucial as instruments of learning provides a justification for studying the relationship between academic success and reading skills, particularly for those students whose skills are below college-level.

Community colleges both grapple with meeting the needs of underprepared students, and with managing the associated costs of remediation. As enrollments increase, community colleges must focus on development of effective developmental education programs (Bailey, 2009). Amidst all of the data demonstrating the negative consequences of remediation, there is evidence that a positive effect does exist for students who successfully complete remedial coursework (Adelman, 2006). The research detailed in this chapter demonstrated the important role of effective remedial coursework in fostering student success. Chapter 3 will describe the manner in which prior research informed development of the current proposal and will detail the proposed research.
Chapter 3: Research Design Methodology

Introduction

This quantitative study analyzed archival data from the student records database at a mid-sized suburban community college in New York (MSCC) to explore whether a relationship could be determined to exist between students’ scores on a standardized placement test in reading and the success rates of those students. The study further examined whether the successful completion of a remedial reading course could be shown to improve the outcomes of students identified as underprepared in reading. A quasi-experimental design was used to analyze the effect of the remedial reading course. The quasi-experimental design allowed the researcher to study the result of the intervention despite the fact that students could not be randomly assigned to experimental and control groups (Vogt, 2005).

The records of full-time students who matriculated at MSCC for the first time in the fall terms from 2003-2007 were divided into groups according to reading level and voluntary participation in a remedial reading course. Students’ preparation for college-level reading was determined based on their score on the reading section of COMPASS, a standardized placement test published by ACT, Inc. MSCC college policy states that students who score above a locally established threshold (cut score) of 62 are advised, but are not required, to enroll in a remedial reading course. According to ACT, Inc. (2006), there is a standard error of measurement (SEM) indicating that students scoring within a range around any cut score should be assumed to have similar levels of preparation.
Based on that assumption, the subpopulation of first-time full-time students was partitioned into eight groups. Group assignment was determined by whether a student’s COMPASS Reading score fell above or below the cut score and whether the score was within the SEM. The population of students with reading scores below the cut score was divided further according to whether or not they enrolled in and successfully completed a remedial reading course. In this manner, experimental and control groups were established based on reading test scores along with the presence or absence of an intervention. This then allowed the researcher to analyze whether a relationship could be demonstrated to exist between standardized reading test scores and student academic success and whether the intervention of a 15-week remedial reading course taken in the first semester of enrollment improved outcomes for students. The definition of student success included several dependent variables tied to academic performance and persistence. Academic performance was measured by the grades achieved in a reading-intensive course and by each student’s cumulative grade point average (CGPA) at graduation. Persistence was analyzed in terms of first to second semester persistence, persistence for two consecutive semesters, total semesters persisted, and persistence to graduation. In each of the first three cases, persistence was analyzed first from the perspective of consecutive semesters enrolled at the original college and subsequently analyzed including semesters persisted after transfer in addition to the number of semesters enrolled at the original college.

The study drew on models used in a number of prior studies of student success in developmental education. Crews and Aragon (2004) examined whether students who participated in a community college remedial writing course performed differently from
students who did not participate as measured by cumulative grade point average and final grade in a required college-level writing course. Cox, et al. (2003) used graduation and grade point average at graduation as indicators of academic success to determine the effectiveness of a developmental reading program at an open enrollment four year institution. Pinkerton (2010) used a quasi-experimental design, similar to that in the study, to analyze the persistence to completion of 30 credit hours of community college students with similar reading deficiencies. Calcagno and Long (2008) similarly analyzed the success of students just above and below the placement test cutoff in order to determine whether the remediation had an impact on student outcomes. The Calcagno and Long study defined success as passing the first college-level mathematics or composition course, persistence to the second semester, degree completion or transfer to a four-year institution, and credits earned over six years. Goldstein and Perin (2008) examined student outcomes in a content course (Psychology) that had substantial requirements in reading and writing. That study compared the achievement of underprepared students with that of students whose initial skill level in reading and writing was determined to be college-level. Boatman and Long (2011) examined the records of students with varying levels of preparation to determine whether the impact of remedial coursework varied according to a students’ lack of preparedness. Elements of each of these studies have informed the development of this research proposal.

**Research Context**

MSCC is a mid-sized suburban community college located in New York. The college’s primary service area includes a county of approximately 800 square miles with a population of close to 300,000. The racial and ethnic composition of the county is 80.1% white, 9.9% African American, 10.5% Hispanic (U.S. Census Bureau, 2010).
MSCC’s service area also includes an adjacent county of more than 231 square miles with a population of close to 100,000 (U.S. Census Bureau, 2010).

Recent high school graduates who enroll at the college typically come from one of thirteen public school districts along with a small number of private and parochial schools. MSCC offers more than 60 degree and certificate programs including some in vocational fields that lead to immediate employment as well as transfer programs for students who aspire to transfer to a baccalaureate institution. In the period of the study, enrollment at the college increased steadily each year from 7,673 students in Fall 2003 to 8,244 in Fall 2007. While this was a 7.44% increase in the total number of students over that period, the percentage of full-time students increased by 10.79%. The average age of the full-time student population decreased slightly from 20.9 years to 20.5 years. There were also other changes in the demography of the student population at the college during the period of the study. The population of black non-Hispanic students decreased from 10.4% to 8.4%, while the Hispanic population increased from 8.1% to 9.5%, and the white non-Hispanic population declined from 79.1% to 79.7%. The breakdown by gender remained relatively stable with the female student population declining from 54% to 50% during the period of the study. (Community College: Office of Institutional Research, 2011).

All first-time full-time students are required to take COMPASS, the MSCC’s standardized placement tests in reading, writing and mathematics. Depending on the subject matter, students who score below the locally established threshold (cut score), are either advised or required to take remedial courses to prepare them for college-level coursework. In the case of reading, college policy dictates that students may be advised,
but are not required to enroll in a remedial reading course based on their test score.
Further, neither demonstrated proficiency in reading, nor a remedial reading course is a
required prerequisite for any course at the college. This college policy regarding testing
requirements and remedial placement has been unchanged for a number of years and was
static during the period of the proposed study.

The developmental reading course, REA091/100 is recommended for all students
who score 62 or lower on the COMPASS Reading placement test. This remedial course
is comprised of two inextricably connected reading courses taught as one. While students
must take the modules together as one unit, they earn two “equivalent credits” for the
REA091 module but one college credit for the REA100 module of the course. Remedial
courses, in general, do not offer credit towards degree attainment; instead, equivalent
credits are awarded that count toward full-time status for financial aid purposes and
tuition calculation. The official course descriptions of the remedial reading courses from
the college catalog is included in Appendix A.

The reading-intensive course considered by the study was a behavioral science
course that is labeled BHS103 and entitled Social Problems in Today’s World. This
course is part of the college’s common core of courses that all graduates of the college
must successfully complete. It is representative of the reading-intensive courses from the
core group that are often taken by students in the first year and consequently has high
enrollments every term. The official course description of this course from the college
catalog may also be found in Appendix A.

The college uses a standard grading system, with grades of “A”, “B”, “C”, “D”,
“F”, “W” and “I”. In the study, only grades of A, B and C were considered to be
successful outcomes. Despite the fact that a grade of D is considered passing for purposes of credit accumulation toward graduation and prerequisite determination for most courses, it was not considered a successful outcome in the study because it is below the 2.0 grade point threshold required for graduation. This study also considered a grade of W to be an unsuccessful outcome. Grades of W are given to students who withdraw from a course after 30% and before 75% of the term has elapsed. The generally cited reason that a student will seek to withdraw from a course is the anticipation of an unsuccessful outcome. Also, a student who withdraws from a required course is generally obligated to retake the course in order to graduate. Grades of I are assigned when a student is unable to complete a course during a given semester due to extenuating circumstances. According to college policy, incomplete grades are converted to a grade letter grade of A - F within one semester of assignment and, as such, were eliminated from consideration in this study.

**Hypothesis.** The study hypothesized that for first-time full-time students at a community college there was a statistically significant relationship between standardized reading test scores and a multifaceted profile of student success indicators including cumulative grade point average, performance in a reading-intensive course, and persistence. The study further hypothesized that the intervention of a remedial reading course has a statistically significant positive impact on that correlation.

**Research Questions.** The following questions were considered:

1. What percentage of students fell into the following groups:
   - students with reading test scores above both the cut score and the SEM who did not enroll in a remedial reading course;
• students with reading test scores above the cut score but within the SEM who did not enroll in a remedial reading course;

• students with reading test scores below the cut score but within the SEM who did not enroll in a remedial reading course;

• students with reading test scores below the cut score but within the SEM who chose to enroll in a remedial reading course but did not complete the remedial reading course successfully (grade of A, B, or C);

• students with reading test scores below the cut score but within the SEM who chose to enroll in a remedial reading course and successfully completed the remedial reading course (grade of A, B, or C);

• students with reading test scores below both the cut score and the SEM who did not enroll in a remedial reading course;

• students with reading test scores below both the cut score and the SEM who chose to enroll in a remedial reading course but did not complete the remedial reading course successfully (grade of A, B, or C);

• students with reading test scores below both the cut score and the SEM who chose to enroll in a remedial reading course and successfully completed the remedial reading course (grade of A, B, or C).

2. What percentage of students in each group persisted to the second semester?

3. What percentage of students in each group persisted to complete two consecutive semesters?

4. What percentage of students in each group persisted to graduation within 6 semesters at the college?
5. What percentage of students in each group persisted to graduation within 8 semesters at the college?

6. What percentage of students in each group transferred prior to graduation and persist to a total of 6 semesters?

7. What percentage of students in each group transferred before graduation and persist to a total of 8 semesters?

8. What percentage of students in each group were successful as measured by a grade of C (70%) or higher in a reading-intensive course (BHS103) taken in their second semester?

9. What were the mean and median cumulative grade point averages of students in each group who persisted to graduation at the college?

10. Was there a relationship between student persistence and student scores on a standardized reading test?

11. Did the intervention of a remedial reading course affect the relationship between student persistence and standardized reading test scores?

12. Was there a relationship between student academic success and standardized reading test scores?

13. Did the intervention of a remedial reading course affect the relationship between student academic success and standardized reading test scores?
Research Participants

The purposive sample was derived from the total population of first-time full-time students who entered MSCC in the fall terms from 2003-2007. In particular, the reading skill levels of the sample were considered with particular emphasis on students identified as underprepared or marginally prepared in college-level reading. The determination of pre-college preparation was based on the incoming student test scores on the COMPASS standardized test. The limitation to full-time student data was due to the policy at most community colleges, including MSCC, that requires only full-time students to take placement exams (Lewis & Farris, 1996). Additionally, only data on first-time students were included in order to avoid any compromise of the analysis caused by inclusion of students who may have taken college courses at other institutions (Pinkerton, 2010).

Using a quasi-experimental design, the study partitioned the sample into eight data sets as shown in Table 3.1. Group One included students considered prepared for college-level reading because their scores were above both MSCC’s cut score and the SEM. Group 1 was considered a control group for the entire population of students by virtue of their demonstrated college-level reading skills. Group 2 was comprised of students not identified as underprepared by college policy because their test scores were above the locally established cut score. However, since the reading scores of these students did fall within the SEM, they were considered to be marginally prepared for college-level reading. Group 2 was a control group for the underprepared student population in the study because their test scores demonstrated a lack of preparation in reading; however, they were neither required nor advised to take the remedial reading course. Group 3 consisted of students whose test scores fell below the cut score
indicating that they should enroll in a remedial reading course, but chose not to do so. Similar to Group 2, the students in this group were underprepared in reading, but did not receive any intervention in the form of a remedial reading course. Groups 4 and 5 included students who tested into the remedial reading course and subsequently enrolled in it. Group 4 was those students who did not successfully complete the course, while Group 5 consisted of students who enrolled in and successfully completed the remedial reading course with a grade of C or higher. Groups 6, 7, and 8 parallel Groups 3, 4, and 5 except that their scores fell below both the cut score and the SEM. Students in Group 6 did not enroll in a remedial reading course. Students in Groups 7 and 8 enrolled in the remedial reading course; Group 8 students completed the course successfully while the students in Group 7 did not.
Table 3.1

*Summary of Experimental and Control Groups*

<table>
<thead>
<tr>
<th></th>
<th>Cut Score</th>
<th>Within SEM</th>
<th>Remedial Reading</th>
<th>Successful Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Above</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Group 2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Above</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Group 3</td>
<td>Below</td>
<td>Yes</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>Group 4</td>
<td>Below</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Group 5</td>
<td>Below</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Group 6</td>
<td>Below</td>
<td>No</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>Group 7</td>
<td>Below</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Group 8</td>
<td>Below</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<sup>a</sup>The scores of students in Group 1 indicated college-level reading skills and served as a control group for entire student population in analysis of correlation with student success.

<sup>b</sup>The scores of students in Group 2 demonstrated marginal preparation for college-level reading and was considered to be the control group for the population of underprepared students.

Cohorts from each of the following five terms were included in the sample population: Fall 2003, Fall 2004, Fall 2005, Fall 2006, and Fall 2007. Outcomes for each of the eight groups in each annual cohort were tracked for a total of eight semesters including their first semester of enrollment at the college.

**Data Collection Instruments**

Banner, by SunGard Higher Education is the college’s comprehensive student information system that provided information for the study on student academic records, enrollment and registration, as well as demographic data. Banner has been in use at...
MSCC for student records since 2008 but includes data migrated from a series of legacy systems dating back several decades.

The placement test in use at MSCC is the COMPASS test. According to ACT, Inc. (2006), COMPASS was developed as a tool for postsecondary institutions to use in advising and placing students into appropriate level coursework. The untimed, computer adaptive test includes modules to assess skills in reading, writing and mathematics.

The COMPASS Reading Placement test focuses on items that assess reading comprehension. It consists of passages at a first-year college reading level that might include prose fiction or passages related to the humanities, social or natural sciences, or of a more technical nature such as might be found in a technical or vocational course. Each reading passage is followed by a series of comprehension items (ACT, Inc., 2006).

Due to the fact that COMPASS is an adaptive test, each student completes a different set of test questions. For this reason, ACT, Inc. reports that the marginal reliability coefficient is determined as an average of the individual reliabilities of all test-takers. The resulting coefficient can then be compared to those of conventional tests. The reliability estimate for the Standard Version of the COMPASS Reading Skills Tests in use at the college in the study is 0.85 (ACT, Inc., 2006).

ACT, Inc. further reports the conditional standard error of measurement (SEM) of COMPASS as a useful indicator of the accuracy of a student’s test score. The SEM describes the difference between a student’s score and the average score that the student could be expected to achieve over an infinite number of administrations of the test under identical conditions. Since the traditional SEM tends to be more precise at some points
along the scale of scores and less accurate at others, the conditional SEM is estimated at various points across the score scale (ACT, Inc., 2006).

The list of conditional SEM for the standard length COMPASS Reading Skills placement test may be found in Table 3.2. The range of possible scores on this test is zero to 100. The cut score in use at the college, and has been in place and unchanged during the entire period of the study, is a 62. Therefore, a student who scores a 63 or higher on the Reading Skills placement test is exempt from the remedial reading course while a student who scores 62 or lower is advised, but not required, to take a remedial reading course. On the COMPASS Reading Skills test, the conditional SEM is indicated to be 8.3 for a score of 60 and a 7.8 for a score of 65. Since according to ACT, Inc. (2006), the conditional SEM is interpreted in the same manner as a confidence interval, applying the SEM to the score of 62, one could estimate that 95% of the time, a score will fall between 54 and 70. Therefore, students within that range may be considered to have statistically similar levels of preparation for college-level work in reading (Pinkerton, 2010).
Table 3.2

*Conditional Standard Errors of Measurement for the Reading Skills Placement Test*

<table>
<thead>
<tr>
<th>Score</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>6.8</td>
</tr>
<tr>
<td>30</td>
<td>7.9</td>
</tr>
<tr>
<td>35</td>
<td>8.5</td>
</tr>
<tr>
<td>40</td>
<td>8.9</td>
</tr>
<tr>
<td>45</td>
<td>9</td>
</tr>
<tr>
<td>50</td>
<td>8.7</td>
</tr>
<tr>
<td>55</td>
<td>8.6</td>
</tr>
<tr>
<td>60</td>
<td>8.3</td>
</tr>
<tr>
<td>65</td>
<td>7.8</td>
</tr>
<tr>
<td>70</td>
<td>7.5</td>
</tr>
<tr>
<td>75</td>
<td>6.9</td>
</tr>
<tr>
<td>80</td>
<td>6.2</td>
</tr>
<tr>
<td>85</td>
<td>5.5</td>
</tr>
<tr>
<td>90</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Description of Variables

In considering the success of underprepared students, the study examined dependent variables designed to measure student success including persistence and academic performance.

**Independent variables.** Two independent variables (IV) were considered for the study. COMPASS Reading test scores were analyzed to determine whether they could be considered to be predictors of student success. An additional independent variable was successful completion of a developmental reading course. The course examined, REA091, is designed for students with reading skills that are shown to be below college-level by a standardized placement test. Table 3.3 depicts the manner in which the independent variables were constructed in the study.

Table 3.3

<table>
<thead>
<tr>
<th>Continuous Independent Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPASS Reading score</td>
<td>Scores on this test range from zero – 100.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dichotomous Independent Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success_REA091/100_FirstSem</td>
<td>1 if successful completion (grade of A, B or C) of remedial reading course taken in first semester; otherwise 0</td>
</tr>
</tbody>
</table>

**Control variables.** Table 3.4 describes the control variables that were used in the analysis. Initially, the determinants for inclusion in the subpopulation such as full-time
status, first-time in college were established. Within that subpopulation, additional
control variables related to standardized test scores and successful completion of the
remedial reading course determined inclusion in one of the eight control or experimental
groups as appropriate.

Table 3.4

Summary Description of Control Variables

<table>
<thead>
<tr>
<th>Dichotomous Control Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FirstTime</td>
<td>1 if new to college (never enrolled elsewhere); otherwise 0</td>
</tr>
<tr>
<td>FullTime</td>
<td>1 if full-time (12 or more credit hours); otherwise 0</td>
</tr>
<tr>
<td>Above_CutScore</td>
<td>1 if score is greater than 62 on COMPASS Reading test; otherwise 0</td>
</tr>
<tr>
<td>Within SEM</td>
<td>1 if score is greater than or equal to 54 and less than 70 on COMPASS Reading test; otherwise 0</td>
</tr>
<tr>
<td>RemedialCourse_Enrollment</td>
<td>1 if successful completion (grade of A, B or C) of remedial reading course (REA091) taken in first semester; otherwise 0</td>
</tr>
<tr>
<td>RemedialCourse_Success</td>
<td>1 if successful completion (grade of A, B or C) of remedial reading course (REA091) taken in first semester; otherwise 0</td>
</tr>
</tbody>
</table>

Dependent variables. Eleven dependent variables (DV) were defined for the study to construct the definition of success for students. Eight of the dependent variables
described student persistence; that is, whether the student re-enrolled in the second semester, persisted into the second academic year and/or completed a degree. The remaining variables describe academic success as measured by grades or grade point averages. Short-term academic success was measured by a grade of C or higher in a reading-intensive course taken in the second semester of enrollment. Long term academic success was assessed as cumulative grade point average at graduation. Table 3.5 provides summary descriptions of both the dichotomous and continuous dependent variables to be analyzed.
### Table 3.5

**Summary Description of Dependent Variables**

<table>
<thead>
<tr>
<th>Dichotomous Dependent Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ReadingIntensiveCourse_Enrolled</td>
<td>1 if enrolled in reading-intensive course second semester (BHS103); otherwise 0</td>
</tr>
<tr>
<td>ReadingIntensiveCourse_Success</td>
<td>1 if earned a grade of A, B or C in reading-intensive course (BHS103) taken in second semester; otherwise 0</td>
</tr>
<tr>
<td>Persist2ndSem</td>
<td>1 if student enrolled full-time in second semester; otherwise 0</td>
</tr>
<tr>
<td>Persist2ndSem_withTransfer</td>
<td>1 if student enrolled full-time in second semester or transferred for second semester; otherwise 0</td>
</tr>
<tr>
<td>Persist_AcadYr</td>
<td>1 if student persisted for 2 consecutive semesters; otherwise 0</td>
</tr>
<tr>
<td>Persist_AcadYr_withTransfer</td>
<td>1 if student persisted for 2 consecutive semesters or after first year; otherwise 0</td>
</tr>
<tr>
<td>Graduated</td>
<td>1 if student completed degree within the period of the study; otherwise 0</td>
</tr>
<tr>
<td>Graduated_6</td>
<td>1 if student completed degree (i.e., graduation) within 6 semesters; otherwise 0</td>
</tr>
<tr>
<td>Graduated_8</td>
<td>1 if student completed degree within 8 semesters; otherwise 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Continuous Dependent Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remedial_Course_Grade</td>
<td>Quasi-scale variable from 0.00 – 4.00</td>
</tr>
<tr>
<td>ReadingIntensiveCourse_Grade</td>
<td>Quasi-scale variable from 0.00 – 4.00</td>
</tr>
<tr>
<td>TotalSemestersPersisted</td>
<td>Total Semesters Persisted, including Transfer</td>
</tr>
<tr>
<td>CGPA</td>
<td>Student’s cumulative grade point average at graduation</td>
</tr>
</tbody>
</table>

### Data Analysis

Student data was mined from the MSCC Banner database and analyzed using SPSS software version 17.0. Confidentiality of student information was achieved through a data download of unique student records accomplished using Banner-generated personal identification numbers (PIDMs) rather than student names or other identifiable...
information. Through the use of student data identified only through PIDMs, the researcher ensured the anonymity of the students in the study.

Descriptive statistics of the experimental and control groups were subjected to the appropriate descriptive analyses (central tendency and dispersion) based on the type of data represented. Scale level variables including reading test scores, remedial reading course (REA091) grades, reading-intensive course (BHS103) grades, total semesters persisted and cumulative grade point average at graduation were all subjected to the appropriate tests determine the normality of the distributions of the various data elements.

Analyses suitable to the distributions of the data elements were conducted to determine whether correlations exist between reading test scores and the scale values of total semesters of persistence, remedial reading course grade, reading-intensive course grade, and cumulative grade point average at graduation. Further correlational analysis was conducted between reading test scores and the dichotomous variable describing whether a student graduated.

Regression analyses were conducted to determine whether reading test scores could be shown to be predictive of persistence. A linear regression was conducted on reading test scores and persistence. A binary logistic regression was conducted on reading test scores and the dichotomous variable describing whether or not a student graduated from MSCC. Two linear regression models were constructed to analyze first the remedial reading course grade as the independent variable with persistence (in semesters) as the dependent variable and subsequently using the reading test score along with the remedial reading course grade as second independent variable.
Further regression analysis was conducted to determine the relationship between reading test scores and academic success. Linear regressions were conducted using reading test scores and reading-intensive course grade as well as reading test scores and cumulative grade point average at graduation. As in the case of persistence, two further linear regression models were constructed using the remedial reading course grade, as the sole independent variable, with cumulative grade point average at graduation as the dependent variable with an second model adding the reading test score alongside remedial reading course grade as a second independent variable.

**Chapter Summary**

Central among the tenets of Tinto’s (1993) Theory of Student Departure is the concept of the academic integration of a student. Student characteristics, including educational background and preparation, are crucial determinants of a student’s ability to achieve academic success in the classroom. This academic achievement demonstrates the intellectual congruence with an institution that is central to Tinto’s definition of academic integration which is seen as a predictor of success in college. Vygotsky (1962) postulated that the relationship between thought and word is an interactive dynamic of cognitive development and is driven by an individual’s engagement in the process of extracting and attributing meaning to a word.

An alignment between Vygotsky’s description of the nature of cognitive development and Tinto’s concept of academic integration provides a basis for the study of remedial reading as a tool to prepare students for success in college emerges. Based on this rationale, the chapter described research to investigate whether students’ reading abilities can be shown to have a relationship with student success. Further, the study will
consider whether the intervention of a remedial reading course affects the success of community college students.
Chapter 4: Results

Introduction and Problem Statement

The study presented here was an analysis of archival data from the student records database at a community college. Its focus was on whether a relationship could be determined to exist between scores on a standardized placement test in reading and the academic success and persistence of students. The study further examined whether a relationship existed between the successful completion of a remedial reading course and an improvement in the academic performance and persistence of students identified as underprepared in reading. A quasi-experimental design was used to examine the educational outcomes of students with similar reading abilities based on the premise that test scores close to a cutoff score are within the standard error of measurement (SEM) of the test and therefore represent equivalent reading abilities. The quasi-experimental nature of the study therefore examined whether the intervention of a remedial reading course affected the outcomes for those students who successfully completed the course.

Research Questions and Participant Demographics

The hypothesis that guided the research was that for first-time full-time students at a community college, there was a statistically significant relationship between standardized reading test scores and a multifaceted profile of student success indicators including cumulative grade point average, performance in a reading-intensive course, and persistence. The study further hypothesized that the intervention of a remedial reading course had a statistically significant positive impact on that correlation.
The following research questions were considered:

1. What percentage of students fell into the following groups:
   - students with reading test scores above both the cut score and the SEM who did not enroll in a remedial reading course;
   - students with reading test scores above the cut score but within the SEM who did not enroll in a remedial reading course;
   - students with reading test scores below the cut score but within the SEM who did not enroll in a remedial reading course;
   - students with reading test scores below the cut score but within the SEM who chose to enroll in a remedial reading course but did not complete the remedial reading course successfully (grade of A, B, or C);
   - students with reading test scores below the cut score but within the SEM who chose to enroll in a remedial reading course and successfully completed the remedial reading course (grade of A, B, or C);
   - students with reading test scores below both the cut score and the SEM who did not enroll in a remedial reading course;
   - students with reading test scores below both the cut score and the SEM who chose to enroll in a remedial reading course but did not complete the remedial reading course successfully (grade of A, B, or C);
   - students with reading test scores below both the cut score and the SEM who chose to enroll in a remedial reading course and successfully completed the remedial reading course (grade of A, B, or C).

2. What percentage of students in each group persisted to the second semester?
3. What percentage of students in each group persisted to complete two consecutive semesters?

4. What percentage of students in each group persisted to graduation within six semesters at the college?

5. What percentage of students in each group persisted to graduation within eight semesters at the college?

6. What percentage of students in each group transferred prior to graduation and persisted to a total of 6 semesters?

7. What percentage of students in each group transferred before graduation and persisted to a total of 8 semesters?

8. What percentage of students in each group were successful as measured by a grade of C (70%) or higher in a reading-intensive course (BHS103) taken in their second semester?

9. What were the mean and median cumulative grade point averages of students in each group who persisted to graduation at the college?

10. Was there a relationship between student persistence and student scores on a standardized reading test?

11. Did the intervention of a remedial reading course affect the relationship between student persistence and standardized reading test scores?

12. Was there a relationship between student academic success and standardized reading test scores?

13. Did the intervention of a remedial reading course affect the relationship between student academic success and standardized reading test scores?
Data Analysis and Findings

Table 4.1 provides enrollment figures for the college over the five-year period under consideration. Total enrollment represents college enrollment including both full and part time students. The first-time full-time population (FT/FT) includes those students who never attended college prior to enrolling and were registered for at least 12 credits in the fall term. Since college policy requires that only full-time students take the COMPASS placement test upon enrollment, the study refined the sample by considering only full-time students. Limiting the study to first-time students also avoided confounding the results by eliminating any students who had previously taken college courses. Approximately 20% of first-time full-time students did not have reading scores and so were excluded from the study. In all likelihood, these students did not take the placement test at the time of enrollment either because they had taken college courses while still in high school, or because they required special accommodations and, therefore, took an alternate test.

Table 4.1

*Enrollments Fall 2003 – Fall 2007*

<table>
<thead>
<tr>
<th>Term</th>
<th>Fall 2003</th>
<th>Fall 2004</th>
<th>Fall 2005</th>
<th>Fall 2006</th>
<th>Fall 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Enrollment</td>
<td>7755</td>
<td>7848</td>
<td>8009</td>
<td>7889</td>
<td>8153</td>
</tr>
<tr>
<td>FT/FT Students</td>
<td>1276</td>
<td>1311</td>
<td>1300</td>
<td>1307</td>
<td>1364</td>
</tr>
<tr>
<td>FT/FT Students w/ reading scores</td>
<td>1021</td>
<td>1133</td>
<td>1134</td>
<td>1153</td>
<td>1166</td>
</tr>
</tbody>
</table>

*Note:* Based on 3rd Week enrollment data

Table 4.2 displays an analysis of reading score results for the entire sample disaggregated by year of enrollment. It demonstrates that, while the first-time full-time
student enrollment increased each year, the reading level of incoming students remained quite consistent through the years of the study.

Table 4.2

*Reading Score Trends First-time Full-time Students Fall Terms 2003-2007*

<table>
<thead>
<tr>
<th>Year</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2003</td>
<td>1021</td>
<td>82.62</td>
<td>12.800</td>
<td>85.00</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>1133</td>
<td>83.49</td>
<td>12.422</td>
<td>86.00</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>1134</td>
<td>83.12</td>
<td>12.726</td>
<td>85.00</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>1153</td>
<td>82.77</td>
<td>12.494</td>
<td>86.00</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>1166</td>
<td>82.23</td>
<td>12.938</td>
<td>85.00</td>
</tr>
</tbody>
</table>

**Analysis of group membership.** The sample of 5,607 first-time full-time students with reading scores was disaggregated based on reading score on the COMPASS Reading test, voluntary participation in a remedial reading course, and the subsequent grade in that course. College policy states that students who score below a locally established threshold (cut score) of 62 are advised, but are not required, to enroll in a remedial reading course. According to ACT, Inc. (2006), there is a standard error of measurement (SEM) indicating that students scoring within a range around any cut score should be assumed to have similar levels of preparation. Based on a cut score of 62, the SEM would be eight points; thus, the reading levels of all students with test scores between 70 and 54 would be considered to be equivalent. Only students with reading scores below 62 would be advised to take a remedial reading course.

Based on those assumptions, the sample of first-time full-time students was partitioned into eight groups. Initial assignment was determined by whether a student’s
COMPASS reading score fell above or below the cut score and whether or not the score was within the SEM. Students in Groups 1 and 2 both scored above the cut score; however, the scores of the students in Group 2 fell within the SEM. The group of students with reading scores below the cut score was subdivided further according to enrollment in and/or successful completion of a remedial reading course. The test scores of students in Groups 3, 4, and 5 were below the cut score but within the SEM, while the students in remaining three groups were below both the cut score and the SEM. Further, students in Groups 3 and 6 chose not to enroll in the remedial reading course. Although students in Groups 4, 5, 7, and 8 all enrolled in the remedial reading course, only the students in Groups 5 and 8 were able to complete the course successfully. Table 4.3 describes the criteria for partitioning the students into groups.

Table 4.3

*Summary Description of Criteria for Group Assignment*

<table>
<thead>
<tr>
<th>Group</th>
<th>Description of characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COMPASS Score above 70</td>
</tr>
<tr>
<td>2</td>
<td>COMPASS Score between 63 and 70</td>
</tr>
<tr>
<td>3</td>
<td>COMPASS Score between 54 and 62; chose not to take remedial reading course</td>
</tr>
<tr>
<td>4</td>
<td>COMPASS Score between 54 and 62; unsuccessful outcome in remedial</td>
</tr>
<tr>
<td>5</td>
<td>COMPASS Score between 54 and 62; successful completion of remedial</td>
</tr>
<tr>
<td>6</td>
<td>COMPASS Score below 54; chose not to take remedial reading course</td>
</tr>
<tr>
<td>7</td>
<td>COMPASS Score below 54; unsuccessful outcome in remedial reading course</td>
</tr>
<tr>
<td>8</td>
<td>COMPASS Score below 54; successful completion of remedial reading course</td>
</tr>
</tbody>
</table>
Figure 4.1 provides a visual representation of the size of each subpopulation of the sample disaggregated by enrollment year. Group 1, consistently the largest group, included students who presented as being the best prepared for college-level reading, based on their reading test scores. This group served as the control group for the entire sample in the analysis of student success. The second largest group each year was Group 2, which included students also identified as college-ready in reading based on the COMPASS test; however, their scores were lower than Group 1 and within the SEM. Although Group 2 students demonstrated reading levels equivalent to those of students in Groups 3, 4, and 5, they were not advised to enroll in a remedial reading course. Conversely, while the test scores of students in Groups 3, 4, and 5 may be considered to have reading skills equivalent to those in Group 2, they would have been advised to take a remedial reading course. The combined population of Groups 3, 4, and 5 was approximately half that of Group 2 during each year of the study. Students in Groups 6, 7, and 8 had the lowest test scores in the study, falling below both the cut score and the SEM. This was the smallest subset of the sample with a combined size each year that was slightly smaller than that of Groups 3, 4, and 5.
Figure 4.1 Comparison of Reading Test Scores by Year.

<table>
<thead>
<tr>
<th>Reading Score Category</th>
<th>Fall 2003</th>
<th>Fall 2004</th>
<th>Fall 2005</th>
<th>Fall 2006</th>
<th>Fall 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading Score below 54 (Groups 6, 7, 8)</td>
<td>3.13%</td>
<td>2.82%</td>
<td>3.00%</td>
<td>2.86%</td>
<td>3.52%</td>
</tr>
<tr>
<td>Reading Score between 54 and 62 (Groups 3, 4, 5)</td>
<td>4.31%</td>
<td>3.44%</td>
<td>3.97%</td>
<td>4.86%</td>
<td>4.55%</td>
</tr>
<tr>
<td>Reading Score between 63 and 70 (Group 2)</td>
<td>8.72%</td>
<td>6.97%</td>
<td>6.26%</td>
<td>8.24%</td>
<td>7.63%</td>
</tr>
<tr>
<td>Reading Score &gt; 70 (Group 1)</td>
<td>83.84%</td>
<td>86.76%</td>
<td>86.77%</td>
<td>84.04%</td>
<td>84.31%</td>
</tr>
</tbody>
</table>
Data was gathered for 5,607 students who began at the college in Fall 2003, Fall 2004, Fall 2005, Fall 2006, and Fall 2007. For the sample, the mean test score on the COMPASS Reading test was 82.84 with a standard deviation of 12.679; the median test score was 85.00. Table 4.4 presents the sample of the 5,607 students in the study disaggregated by group membership.

Table 4.4

Frequencies of Group Membership

<table>
<thead>
<tr>
<th>Group</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4775</td>
<td>85.2</td>
<td>85.2</td>
</tr>
<tr>
<td>2</td>
<td>423</td>
<td>7.5</td>
<td>92.7</td>
</tr>
<tr>
<td>3</td>
<td>139</td>
<td>2.5</td>
<td>95.2</td>
</tr>
<tr>
<td>4</td>
<td>32</td>
<td>.6</td>
<td>95.8</td>
</tr>
<tr>
<td>5</td>
<td>66</td>
<td>1.2</td>
<td>96.9</td>
</tr>
<tr>
<td>6</td>
<td>65</td>
<td>1.2</td>
<td>98.1</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>.7</td>
<td>98.8</td>
</tr>
<tr>
<td>8</td>
<td>67</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>5,607</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Student success. The study defined student success so as to include several dependent variables associated with academic performance and persistence. Academic performance was measured by the grades achieved in a reading-intensive course taken in a student’s second semester of enrollment and by each student’s cumulative grade point average (CGPA) at graduation. Persistence was analyzed at three thresholds: persistence
to second semester, persistence for two consecutive semesters, and persistence to
graduation in six or in eight semesters. Each of these persistence measures was further
analyzed to take into account the possibility that a student might have transferred out of
the college and persisted at the transfer institution. This secondary analysis considered
persistence after transfer to be a successful outcome. Additional statistical analysis used a
single conglomerate measure of the total number of semesters persisted including the
number of semesters persisted at the college and the number of semesters persisted after
transfer.

**Persistence to second semester.** The total population of first-time full-time
students with reading scores persisted to the second semester at a rate of 81.67%. Table
4.5 provides a disaggregated view by group. Students in Groups 5 and 8 had the highest
intra-group persistence rates indicating that those who took and successfully completed
the remedial reading course were the most likely to persist to the second semester.
Conversely, the groups with the lowest persistence rates were those who took the reading
course but failed or did not successfully complete the course. For example, students in
Group 4 persisted to the second semester at a rate of slightly over 59%, while students in
Group 8 who had reading scores lower than those of Group 4 but successfully completed
the reading course, persisted at a rate over 91%.
Table 4.5

*Persistence to Second Semester by Group*

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th># Persisted</th>
<th>% Group</th>
<th>% Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>4775</td>
<td>3895</td>
<td>81.57</td>
<td>69.47</td>
</tr>
<tr>
<td>Group 2</td>
<td>423</td>
<td>339</td>
<td>80.14</td>
<td>6.05</td>
</tr>
<tr>
<td>Group 3</td>
<td>139</td>
<td>121</td>
<td>87.05</td>
<td>2.16</td>
</tr>
<tr>
<td>Group 4</td>
<td>32</td>
<td>19</td>
<td>59.38</td>
<td>0.34</td>
</tr>
<tr>
<td>Group 5</td>
<td>66</td>
<td>65</td>
<td>98.48</td>
<td>1.16</td>
</tr>
<tr>
<td>Group 6</td>
<td>65</td>
<td>58</td>
<td>89.23</td>
<td>1.03</td>
</tr>
<tr>
<td>Group 7</td>
<td>40</td>
<td>21</td>
<td>52.50</td>
<td>0.37</td>
</tr>
<tr>
<td>Group 8</td>
<td>67</td>
<td>61</td>
<td>91.04</td>
<td>1.09</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5,607</td>
<td>4579</td>
<td><strong>81.67</strong></td>
<td><strong>81.67</strong></td>
</tr>
</tbody>
</table>

When persistence to the second semester included transfer, overall persistence of the sample increases by slightly more than 2% to 83.70%. Table 4.6, showing the persistence disaggregated by group, indicates that the success rates of students in Groups 1, 2, 3, and 7 were slightly improved. However, the increased percentages represented small numbers of students, especially in the case of Group 7.
<table>
<thead>
<tr>
<th>Group</th>
<th>Size</th>
<th>Persisted</th>
<th>% Group Persistence</th>
<th>% Sample Persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>4775</td>
<td>4003</td>
<td>83.83</td>
<td>71.39</td>
</tr>
<tr>
<td>Group 2</td>
<td>423</td>
<td>342</td>
<td>80.85</td>
<td>6.10</td>
</tr>
<tr>
<td>Group 3</td>
<td>139</td>
<td>123</td>
<td>88.49</td>
<td>2.19</td>
</tr>
<tr>
<td>Group 4</td>
<td>32</td>
<td>19</td>
<td>59.38</td>
<td>0.34</td>
</tr>
<tr>
<td>Group 5</td>
<td>66</td>
<td>65</td>
<td>98.48</td>
<td>1.16</td>
</tr>
<tr>
<td>Group 6</td>
<td>65</td>
<td>58</td>
<td>89.23</td>
<td>1.03</td>
</tr>
<tr>
<td>Group 7</td>
<td>40</td>
<td>22</td>
<td>55.00</td>
<td>0.39</td>
</tr>
<tr>
<td>Group 8</td>
<td>67</td>
<td>61</td>
<td>91.04</td>
<td>1.09</td>
</tr>
<tr>
<td>Total</td>
<td>5,607</td>
<td>4693</td>
<td>83.70</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.2 provides a comparison of the two persistence rates of each group, and demonstrates the minimal increase in persistence after one semester when transfer is included. There was a slight increase in the persistence of most groups. However, the groups with the initial highest persistence, Groups 5 and 8, did not increase at all.
Figure 4.2. Increase in Persistence to Second Semester Including Transfer.
Persistence for two consecutive semesters. When persistence for two semesters (one academic year) is examined, overall persistence dropped to slightly over 64%. The data again indicate that those students who successfully completed a remedial reading course tended to persist at a higher rate. Consistent with earlier results, Table 4.7 shows that the students with the lowest intra-group persistence rates were students in Groups 4 and 7 who enrolled in but did not successfully complete the remedial reading course.

Table 4.7

Persistence for Two Consecutive Semesters

<table>
<thead>
<tr>
<th>Group Size</th>
<th># Persisted</th>
<th>% Group persistence</th>
<th>% Sample persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>4775</td>
<td>3072</td>
<td>64.34</td>
</tr>
<tr>
<td>Group 2</td>
<td>423</td>
<td>261</td>
<td>61.70</td>
</tr>
<tr>
<td>Group 3</td>
<td>139</td>
<td>95</td>
<td>68.35</td>
</tr>
<tr>
<td>Group 4</td>
<td>32</td>
<td>9</td>
<td>28.13</td>
</tr>
<tr>
<td>Group 5</td>
<td>66</td>
<td>49</td>
<td>74.24</td>
</tr>
<tr>
<td>Group 6</td>
<td>65</td>
<td>45</td>
<td>69.23</td>
</tr>
<tr>
<td>Group 7</td>
<td>40</td>
<td>14</td>
<td>35.00</td>
</tr>
<tr>
<td>Group 8</td>
<td>67</td>
<td>49</td>
<td>73.13</td>
</tr>
<tr>
<td>Total</td>
<td>5,607</td>
<td>3594</td>
<td>64.10</td>
</tr>
</tbody>
</table>

When the definition of persistence is expanded to include transfer, an increase in success rates is seen. As Table 4.8 indicates, a substantial increase in persistence (5.03%) is seen in Group 1, indicating that many of these students transferred after one year at the
college. That increase in persistence is closely matched by higher persistence rates in Groups 3 and 6 (5.03% and 6.15%, respectively), those students who were advised to take the remedial reading course but chose not to do so.

Table 4.8

_Persistence for Two Consecutive Semesters Including Transfer_

<table>
<thead>
<tr>
<th>Group size</th>
<th># Persisted</th>
<th>% Group persistence</th>
<th>% Sample persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>4775</td>
<td>3384</td>
<td>70.87</td>
</tr>
<tr>
<td>Group 2</td>
<td>423</td>
<td>274</td>
<td>64.78</td>
</tr>
<tr>
<td>Group 3</td>
<td>139</td>
<td>102</td>
<td>73.38</td>
</tr>
<tr>
<td>Group 4</td>
<td>32</td>
<td>10</td>
<td>31.25</td>
</tr>
<tr>
<td>Group 5</td>
<td>66</td>
<td>50</td>
<td>75.76</td>
</tr>
<tr>
<td>Group 6</td>
<td>65</td>
<td>49</td>
<td>75.38</td>
</tr>
<tr>
<td>Group 7</td>
<td>40</td>
<td>15</td>
<td>37.50</td>
</tr>
<tr>
<td>Group 8</td>
<td>67</td>
<td>50</td>
<td>74.63</td>
</tr>
<tr>
<td>Total</td>
<td>5,607</td>
<td>3934</td>
<td>70.16</td>
</tr>
</tbody>
</table>

Figure 4.3 provides a comparison of the two persistence rates of each group, and demonstrates the increases in persistence after two semesters when transfer is included. While the impact of transfer is not as great on students in Groups 5 and 8, the ongoing success of students in those two groups is also evident in this figure.

Figure 4.4 describes the impact of the additional semester on persistence that includes transfer. For most groups, persistence increases after the second semester when
transfer is included, however there is no apparent pattern in the relationship between the impact of transfer on persistence among those groups relative to their profile of their intra-group persistence rates.
Figure 4.3. Increase in Two Semester Persistence Rates when Transfer is Included.
Figure 4.4. Delta Increase in Persistence Comparing One-Semester and Two-Semester Persistence with Transfer.
**Persistence to graduation in six or fewer semesters.** Of the original sample of 5,607 first-time, full-time students, 1,362 persisted at the college and graduated in six or fewer semesters. Table 4.9 provides a summary of the graduates by group. The data indicates that the group with the highest reading scores had both the highest overall and the highest intra-group graduation rate for the six-semester period. The groups of students least likely to persist were those in Groups 4 and 7, those students who did not successfully complete the remedial reading course.

Table 4.9

**Persistence to Graduation within Six Semesters**

<table>
<thead>
<tr>
<th>Group</th>
<th>Group size</th>
<th># Persisted</th>
<th>% Group persistence</th>
<th>% Sample persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>4775</td>
<td>1223</td>
<td>25.61</td>
<td>21.81</td>
</tr>
<tr>
<td>Group 2</td>
<td>423</td>
<td>75</td>
<td>17.73</td>
<td>1.34</td>
</tr>
<tr>
<td>Group 3</td>
<td>139</td>
<td>34</td>
<td>24.46</td>
<td>0.61</td>
</tr>
<tr>
<td>Group 4</td>
<td>32</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Group 5</td>
<td>66</td>
<td>9</td>
<td>13.64</td>
<td>0.16</td>
</tr>
<tr>
<td>Group 6</td>
<td>65</td>
<td>15</td>
<td>23.08</td>
<td>0.27</td>
</tr>
<tr>
<td>Group 7</td>
<td>40</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Group 8</td>
<td>67</td>
<td>6</td>
<td>8.96</td>
<td>0.11</td>
</tr>
<tr>
<td>Total</td>
<td>5,607</td>
<td>1362</td>
<td>24.29</td>
<td></td>
</tr>
</tbody>
</table>

**Persistence to graduation in eight or fewer semesters.** Persistence to graduation within eight or fewer semesters appears to enhance the likelihood of
graduation for those students who enrolled in the required remedial coursework upon
enrollment. Table 4.10 depicts graduation rates by group.

**Table 4.10**

*Persistence to Graduation within Eight Semesters*

<table>
<thead>
<tr>
<th>Group</th>
<th>Group Size</th>
<th># Graduated</th>
<th>% Group Persistence</th>
<th>% Total Sample Persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>4775</td>
<td>1521</td>
<td>31.85</td>
<td>27.13</td>
</tr>
<tr>
<td>Group 2</td>
<td>423</td>
<td>100</td>
<td>23.64</td>
<td>1.78</td>
</tr>
<tr>
<td>Group 3</td>
<td>139</td>
<td>44</td>
<td>31.65</td>
<td>0.78</td>
</tr>
<tr>
<td>Group 4</td>
<td>32</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Group 5</td>
<td>66</td>
<td>17</td>
<td>25.76</td>
<td>0.30</td>
</tr>
<tr>
<td>Group 6</td>
<td>65</td>
<td>19</td>
<td>29.23</td>
<td>0.34</td>
</tr>
<tr>
<td>Group 7</td>
<td>40</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Group 8</td>
<td>67</td>
<td>12</td>
<td>17.91</td>
<td>0.21</td>
</tr>
<tr>
<td>Total</td>
<td>5,607</td>
<td>1713</td>
<td>30.55</td>
<td></td>
</tr>
</tbody>
</table>

When examining the graduation rates, it is important to consider that remedial
coursework is taken *in addition to* a student’s program requirements. By definition then,
students who are required to take remedial courses will require more time to complete a
program of study. Yet, a comparison of six semester and eight semester graduation rates
indicates that the additional time to graduation had similar effects on all groups. Figure
4.5 provides a representation of the improvement in persistence rates that result when the
period considered increases from six to eight semesters.
**Figure 4.5. Increase in Graduation Rates Eight Semesters Compared to Six Semesters.**

<table>
<thead>
<tr>
<th>Group</th>
<th>Eight or Fewer</th>
<th>Six or Fewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>31.85%</td>
<td>25.61%</td>
</tr>
<tr>
<td>Group 2</td>
<td>23.64%</td>
<td>17.73%</td>
</tr>
<tr>
<td>Group 3</td>
<td>31.65%</td>
<td>24.46%</td>
</tr>
<tr>
<td>Group 4</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Group 5</td>
<td>25.76%</td>
<td>13.64%</td>
</tr>
<tr>
<td>Group 6</td>
<td>29.23%</td>
<td>23.08%</td>
</tr>
<tr>
<td>Group 7</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Group 8</td>
<td>17.91%</td>
<td>8.96%</td>
</tr>
</tbody>
</table>
Transfer and persistence to six semesters. An examination of the data related
to transfer prior to graduating with an Associate’s degree reveals that the students with
the highest scores on the COMPASS Reading test are most likely to persist. It continues
to be true that the students who are most at risk are those in Groups 4 and 7, that is those
who did not successfully complete the remedial reading course. The reader is cautioned
to note the small number of students in each of the remedial groups. Table 4.11 provides
an overview of student success rates when persistence at the original institution and after
transfer, are considered for six semesters.

Table 4.11

Transfer and Persistence to Six Semesters

<table>
<thead>
<tr>
<th>Group</th>
<th>Group Size</th>
<th># Transferred</th>
<th>% Group</th>
<th>% Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>4775</td>
<td>1122</td>
<td>23.50</td>
<td>20.01</td>
</tr>
<tr>
<td>Group 2</td>
<td>423</td>
<td>83</td>
<td>19.62</td>
<td>1.48</td>
</tr>
<tr>
<td>Group 3</td>
<td>139</td>
<td>18</td>
<td>12.95</td>
<td>0.32</td>
</tr>
<tr>
<td>Group 4</td>
<td>32</td>
<td>3</td>
<td>9.38</td>
<td>0.05</td>
</tr>
<tr>
<td>Group 5</td>
<td>66</td>
<td>12</td>
<td>18.18</td>
<td>0.21</td>
</tr>
<tr>
<td>Group 6</td>
<td>65</td>
<td>10</td>
<td>15.38</td>
<td>0.18</td>
</tr>
<tr>
<td>Group 7</td>
<td>40</td>
<td>4</td>
<td>10.00</td>
<td>0.07</td>
</tr>
<tr>
<td>Group 8</td>
<td>67</td>
<td>8</td>
<td>11.94</td>
<td>0.14</td>
</tr>
<tr>
<td>Total</td>
<td>5,607</td>
<td>1260</td>
<td>22.47</td>
<td></td>
</tr>
</tbody>
</table>

Transfer and persistence to eight semesters. When persistence was measured
for eight semesters, the observed rates began to decline. The data collected in this case
included transfer at any point in the student’s career. It is, therefore, possible that a student attended the original college for several semesters prior to transferring without graduating. The increased time to eight semesters allowed in this analysis could then represent persistence for a total number of semesters greater than would be needed to achieve a baccalaureate degree. In this case, the definition of persistence would no longer be aligned with a definition of student success. Table 4.12 details the persistence rates including transfer for eight semesters.

Table 4.12

Transfer and Persistence to Eight Semesters

<table>
<thead>
<tr>
<th>Group</th>
<th>Size</th>
<th>Transferred</th>
<th>% Group</th>
<th>% Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>4775</td>
<td>991</td>
<td>20.75</td>
<td>17.67</td>
</tr>
<tr>
<td>Group 2</td>
<td>423</td>
<td>74</td>
<td>17.49</td>
<td>1.32</td>
</tr>
<tr>
<td>Group 3</td>
<td>139</td>
<td>17</td>
<td>12.23</td>
<td>0.30</td>
</tr>
<tr>
<td>Group 4</td>
<td>32</td>
<td>3</td>
<td>9.38</td>
<td>0.05</td>
</tr>
<tr>
<td>Group 5</td>
<td>66</td>
<td>12</td>
<td>18.18</td>
<td>0.21</td>
</tr>
<tr>
<td>Group 6</td>
<td>65</td>
<td>8</td>
<td>12.31</td>
<td>0.14</td>
</tr>
<tr>
<td>Group 7</td>
<td>40</td>
<td>3</td>
<td>7.50</td>
<td>0.05</td>
</tr>
<tr>
<td>Group 8</td>
<td>67</td>
<td>8</td>
<td>11.94</td>
<td>0.14</td>
</tr>
<tr>
<td>Total</td>
<td>5,607</td>
<td>1116</td>
<td>19.90</td>
<td></td>
</tr>
</tbody>
</table>

Success in reading-intensive course. An examination of the outcomes for students who enrolled in a reading-intensive course (BHS103) in their second semester reveals that students with highest reading scores (Group 1) were more likely to
successfully complete BHS103, where success was defined as a grade of C or higher.

Table 4.13 provides data on student success disaggregated by group. Further analysis using the outcomes in this course as one indicator of student success was conducted and will be discussed in the corresponding section of this chapter.

Table 4.13

| Success Rates of Students Enrolling in Reading-intensive Course in Second Semester |
|----------------------------------|----------------------------------|
| Original group size | Enrollees | % Group enrolled | Successful enrollees | % Successful enrollees |
| Group 1 | 4775 | 1341 | 28.08 | 915 | 68.23 |
| Group 2 | 423 | 110 | 26.00 | 57 | 51.82 |
| Group 3 | 139 | 45 | 32.37 | 25 | 55.56 |
| Group 4 | 32 | 10 | 31.25 | 1 | 10.00 |
| Group 5 | 66 | 31 | 46.97 | 14 | 45.16 |
| Group 6 | 65 | 24 | 36.92 | 11 | 45.83 |
| Group 7 | 40 | 8 | 20.00 | 1 | 12.50 |
| Group 8 | 67 | 29 | 43.28 | 14 | 48.28 |
| Total | 5,607 | 1,598 | 28.50 | 1038 | 64.96 |

Cumulative grade point averages of graduates. Data gathered on cumulative grade point average (CGPA) for graduates included all first-time full-time students who graduated over the period of the study. Therefore, data within all groups includes first-time students who began at the college in fall terms from 2003-2007 and graduated from the college in any semester up to and including Spring 2011. This means that the CGPA
may include students who graduated in as many as 16 semesters; however, the total number of semesters was consistent across groups, i.e. will decrease for all groups in more recent semesters.

The data in Table 4.14 seems to indicate that students with higher reading test scores tended to achieve better results. The mean and median CGPA of students in Group 1 is higher than those of the other groups. It is important to note that there is a small number of students in each of the other groups. Table 4.14 provides data for CGPA for all groups.

Table 4.14

*Cumulative Grade Point Averages of Graduates by Group*

<table>
<thead>
<tr>
<th>Graduates</th>
<th>% Original</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>Mode</th>
<th>Variance</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>1631</td>
<td>34.16</td>
<td>3.00</td>
<td>2.98</td>
<td>2.82</td>
<td>0.21</td>
<td>1.99</td>
</tr>
<tr>
<td>Group 2</td>
<td>112</td>
<td>26.48</td>
<td>2.72</td>
<td>2.68</td>
<td>2.16</td>
<td>0.16</td>
<td>1.74</td>
</tr>
<tr>
<td>Group 3</td>
<td>52</td>
<td>37.41</td>
<td>2.71</td>
<td>2.77</td>
<td>2.13</td>
<td>0.14</td>
<td>1.50</td>
</tr>
<tr>
<td>Group 4</td>
<td>0</td>
<td>0.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Group 5</td>
<td>19</td>
<td>28.79</td>
<td>2.67</td>
<td>2.51</td>
<td>2.02</td>
<td>0.22</td>
<td>1.58</td>
</tr>
<tr>
<td>Group 6</td>
<td>20</td>
<td>30.77</td>
<td>2.69</td>
<td>2.77</td>
<td>2.28</td>
<td>0.18</td>
<td>1.47</td>
</tr>
<tr>
<td>Group 7</td>
<td>0</td>
<td>0.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Group 8</td>
<td>15</td>
<td>22.39</td>
<td>2.67</td>
<td>2.51</td>
<td>2.02</td>
<td>0.22</td>
<td>1.58</td>
</tr>
</tbody>
</table>

*Relationship between standardized reading test scores and persistence.*

Student reading skills for this study were measured by ACT’s COMPASS test. The
range of possible scores on this test is zero to 100 with a locally established threshold to determine college-level reading. At MSCC, the cut score is 62, which means that a student with a score below 62 will be recommended, but not required, to take a remedial reading course. For the students in the study, the mean reading test score was 82.84 (SD = 12.679, n = 5,607), with a minimum value of 19 and a maximum value of 99. Figure 4.6 provides a graphical representation of the tabulated frequencies of COMPASS Reading test scores for the sample of 5,607 students.

Figure 4.6. Histogram of Reading Test Scores.

For the purposes of this question examining the relationship between standardized reading test scores and persistence, the definition of persistence was re-enrollment from term to term either at the college in the study or at the target school after transfer.
Therefore, persistence is measured by the total number of semesters that a student was enrolled in college. For the sample population, the mean persistence was 6.7 semesters ($SD = 3.92$, $n = 5,607$), with a minimum value of one and a maximum value of 28. The maximum value was removed from analysis, because it was an extreme outlier, thus leaving 21 as the adjusted maximum value. Figure 4.7 provides a graphical representation of the distribution of semesters of persistence for the 5,607 students in the study.

![Histogram of Persistence (in semesters)](image)

**Figure 4.7.** Histogram of Persistence (in semesters).

According to a Kolmogorov-Smirnov test of normality, both reading test scores and semesters of persistence were statistically significantly non-normal ($p < .05$). This can be confirmed by visual inspection of the histograms in Figures 4.6 and 4.7. A
nonparametric correlation, Spearman’s *rho*, was performed to determine whether a relationship existed between the reading test scores and student persistence. Spearman’s *rho* was highly significant and small at .10 (*p* < .001, *n* = 5,606), indicating that there is not a very strong correlation. When a subset of students who scored 70 or lower on the COMPASS Reading test were used for the same analysis as above, Spearman’s *rho* was not statistically significant (*p* > .05, *n* = 831).

A linear regression was conducted to determine whether reading test scores could be shown to predict persistence. A natural log transformation was applied to the dependent variable (persistence) in order to address a violation of the assumption of the regression, namely that residuals be distributed normally. The linear regression on the entire sample using the transformed dependent variable confirmed the findings of the Spearman’s *rho* correlations, yielding high significance and a negligible adjusted *r*² of .01 (*F* = 51.55, *df* = 1, *p* < .001, *n* = 5,606). Figure 4.8 provides a graphical representation of the relationship between the two variables after the transformation of the dependent variable.
In order to confirm these findings, an alternate definition of persistence was tested. In this case, persistence was defined as graduation from the college, a dichotomous variable. A preliminary Spearman’s rho analysis again revealed a correlation coefficient that was highly significant and small at .07 ($p < .001, n = 5,600$). A binary logistic regression on the same two variables revealed high significance and a negligible pseudo (Nagelkerke) $r^2$ of .01 and odds ratio of 1.014 ($\chi^2 = 34.42, df = 1, p < .001, n = 5,600$). The boxplot in Figure 4.9 depicts the similarity in reading scores between those who graduated and those who did not as well as the non-normal distribution of reading test scores in each case.
Impact of the intervention of a remedial reading course on the relationship between standardized reading test scores and persistence. The intervention variable was conceptualized in two ways: one as a dichotomous measure of success, using a grade of C or higher as indicating success (passing); and the other as a quasi-scale measure of the actual course grade. In testing for a relationship where the dichotomous conceptualization of the remedial reading course measure is involved, a subset of students who scored 70 or below on the COMPASS Reading test was used.

First, a Mann-Whitney $u$ test was not significant when comparing the number of semesters of persistence of those students who completed the remedial course successfully and those who did not. Similarly, a chi-square analysis (using a Fisher’s
Exact test) was not significant for the relationship between successful completion of the remedial reading course and graduation with an Associate’s degree ($\chi^2 = 1.59, p > .05, n = 832$).

Using the entire sample, a nonparametric correlation analysis was performed to determine whether a correlation existed between the remedial course grade and persistence (in semesters). In this case, Spearman’s $\rho$ was strong at .53 and highly significant ($p < .001, n = 213$).

Again on the entire sample, two linear regressions were performed. The first examined whether the remedial reading course grade alone predicts persistence. In this case, the reading course grade was the only independent variable with persistence in semesters as the dependent variable. The first analysis confirmed the Spearman’s $\rho$ outcome in that remedial reading course grade showed a moderate (adjusted $r^2 = .24$) and significant influence on persistence ($F = 67.62, df = 1, p < .001, n = 213$). The second regression used reading test score as a second independent variable along with the remedial reading course grade, and persistence in semesters as the dependent variable. The second analysis showed a negligible change, with adjusted $r^2$ still at .24 ($F = 34.24, df = 1, p < .001, n = 213$). The scatterplot in Figure 4.10 demonstrates the relationship between semesters of persistence (including transfer) and the quasi-scale value of grade in the remedial reading course.
For students in Groups 2, 3, 4, and 5 only, a Mann-Whitney $u$ test was conducted to test for a difference in number of semesters of persistence for those students who successfully completed the remedial reading course and those who did not. The test was not statistically significant ($u = 17,176, p > .05, n = 659$).

Once more using the entire sample, two logistic regressions were performed. The first examined whether the remedial reading course grade alone predicts persistence in terms of graduation from the college. That first analysis revealed the remedial reading course grade to have a moderately strong (pseudo (Nagelkerke) $r^2 = .33, e^B = 3.62$) and significant influence on persistence ($\chi^2 = 45.77, df = 1, p < .001, n = 214$). The second logistic regression model, which included the COMPASS Reading test score as a second
predictor, showed a negligible change, with pseudo $r^2$ continuing to round to .33 and a roughly equivalent odds ratio of 3.64. ($\chi^2 = 45.83, df = 2, p < .001, n = 214$).

**Relationship between standardized reading test scores and academic success.**

For the purposes of the study, student academic success was construed in two ways. Short-term success was defined as performance in a reading-intensive course taken in the semester subsequent to enrollment in the remedial reading course. Longer-term success was defined as the student’s cumulative grade point average at graduation. Based on the results of the two aforementioned analyses, two additional analyses were conducted to determine whether relationships could be shown to exist between the COMPASS Reading test scores outcomes in the remedial reading course.

The grades of all students who took the reading-intensive course in their second semester of enrollment were collected in order to implement the short-term success analysis. It is important to note that the reading-intensive course, BHS103, is a graduation requirement for all students. Therefore, students who chose not to take the reading-intensive course in their second semester of enrollment could also have taken the course in their first semester of enrollment, while students in a remedial reading course in their first semester could have concurrently taken BHS103. The outcomes in the study include only those of students who took the remedial reading course in their first semester of enrollment and the reading-intensive course in the subsequent semester. In that specific set of circumstances, the study investigates whether a relationship exists between the reading test scores and outcomes in the second semester of enrollment, and whether outcomes in the remedial reading course can be shown to affect that relationship.
Initially, a nonparametric correlation was conducted to detect whether a relationship could be determined to exist between the students’ reading test scores and grades in the reading-intensive course. The results of the Spearman’s \( \rho \) indicated a correlation that was moderate and highly significant at .21 (\( p < .001, n = 1,598 \)). A linear regression was then performed which confirmed the findings of the preliminary correlation, yielding high significance and a negligible adjusted \( r^2 \) of .04 (\( F = 71.30, df = 1, p < .001, n = 1,598 \)). Figure 4.11 demonstrates the correlation between COMPASS Reading test scores and the BHS103 course grades.

Figure 4.11. Scatterplot of Reading Test Score and Reading-Intensive Course Grade.

The second definition of academic success employed in the study examines the longer-term factor of cumulative grade point average (CGPA) at graduation. Due to the
nonparametric nature of the data, a Spearman’s *rho* correlation test was again conducted to detect whether a relationship exists between reading test score and CGPA. In this case, Spearman’s *rho* was moderate and highly significant at .35 (*p* < .001, *n* = 1,849). A linear regression was subsequently performed on the same two variables that confirmed the findings of the preliminary correlation, yielding high significance and a small $r^2$ of .12 (*F* = 241.57, *df* = 1, *p* < .001, *n* = 1,849). The scatterplot in Figure 4.12 provides a graphic representation of the relationship between COMPASS Reading test scores and cumulative grade point average at graduation.

![Figure 4.12](image.png)

*Figure 4.12. Scatterplot of Reading Test Score and CGPA at Graduation.*

**Effect of the intervention of a remedial reading course on the relationship between standardized reading test scores and academic success.** Again, the two
conceptualizations of the remedial reading course were utilized here. When the dichotomous variable, successful completion of the remedial reading course, was used, analysis was always conducted on the subset of students who scored 70 or below on the COMPASS Reading test.

A Mann-Whitney $u$ test was performed to test for a difference in outcomes in the reading-intensive course grades for those students who successfully completed the remedial reading course and those who did not. The test was not statistically significant ($u = 5,881, p > .05, n = 257$). Figure 4.13 provides a boxplot to depict the grade outcomes for the group of students who completed the remedial reading course and those who did not.
Once again a Mann-Whitney $u$ test was conducted for students in Groups 2, 3, 4, and 5 only to test for a difference on reading-intensive course grade (BHS103) for those students who successfully completed the remedial reading course and those who did not. The test was not statistically significant ($u = 2,432, p > .05, n = 196$).

Next, an independent samples $t$ test was performed to test for a difference between those who successfully completed the remedial reading course on cumulative GPA. The $t$ test was not statistically significant ($t = 1.71, df = 216, p > .05$). The boxplot of Figure 4.14 provides a representation of the CGPA outcomes for the two groups of students.
For students in Groups 2, 3, 4, and 5 only, an independent samples $t$ test was conducted to test for a difference between those who successfully completed the remedial reading course and those who did not on graduation cumulative GPA. The test was not statistically significant ($t = .46, df = 181, p > .05$).

For students in Groups 2, 3, 4, and 5 only, a chi-square test was conducted to test for a relationship between successful completion of the remedial reading course and graduation with an Associate’s degree. The test was not statistically significant ($\chi^2 = .02, df = 1, p > .05, n = 660$).
Two tests of the relationship between standardized reading test scores and academic success, moderated by successful completion of the remedial reading course were conducted using the subset of students who scored 70 or below on the COMPASS Reading test. A two-block linear regression, with the reading-intensive course grade as the dependent, was conducted. The first block utilized successful completion of the remedial reading course (dummy-coded) as the sole predictor variable; the second block included COMPASS Reading test score as a second predictor. Both tests were not statistically significant (blocks one and two, respectively: $F = .01, df = 1, p > .05, n = 257$ and $F = 1.3, df = 2, p > .05, n = 257$).

Two more tests were conducted on the relationship between standardized reading test scores and academic success, moderated by successful completion of the remedial reading course. Using the subset of students who achieved a score of 70 or below on the COMPASS Reading test, a two-block linear regression, with cumulative GPA at graduation as the dependent, was conducted. The first block utilized the dichotomous and dummy-coded variable, successful completion of the remedial reading course, as the sole predictor variable; the second block included COMPASS test score as a second predictor. Both tests were not statistically significant (blocks one and two, respectively: $F = 2.93, df = 1, p > .05, n = 218$ and $F = 2.20, df = 2, p > .05, n = 218$).

To test whether a relationship exists between remedial reading course grade and reading-intensive course grade, a nonparametric correlation was conducted. Spearman’s $\rho$ was strong at .53 and significant ($p < .001, n = 79$).

Two linear regression models were constructed using reading-intensive course grade as the dependent variable. In the first block, the remedial reading course grade was
used as the sole predictor; in the second block, COMPASS test score was used as a second predictor variable. Both blocks were not statistically significant (blocks one and two, respectively: $F = 0.01$, $df = 1$, $p > .05$, $n = 257$ and $F = 1.33$, $df = 2$, $p > .05$, $n = 257$).

To test whether a relationship exists between remedial reading course grade and cumulative grade point average at graduation, a nonparametric correlation was conducted. Spearman’s $\rho$ was strong and significant at .48 ($p < .01$, $n = 35$).

Two linear regression models were constructed. In the first case, the remedial reading course grade was used as the sole independent variable with CGPA as the dependent variable. In the second test, the reading test score was used as a second independent variable.

In the first case, the correlation was confirmed by the linear regression showing a moderate (adjusted $r^2 = .23$) and significant influence on graduation GPA ($F = 10.89$, $df = 1$, $p < .01$, $n = 35$). When the reading test score was added to the analysis, there was a negligible change, with adjusted $r^2$ increasing to .24 ($F = 6.26$, $df = 1$, $p < .01$, $n = 35$). Figure 4.15 depicts the correlation between student grades in the remedial course and GPA at graduation.
Summary of Results

The findings of the analyses of the data indicate that there is a weak but significant relationship between standardized reading test scores and academic success. This is true when examining the relationship between reading test scores and total semester of persistence as well as between reading test scores and grades in the reading-intensive course.

However, a strong and significant relationship was demonstrated between reading course grades and persistence as well as between reading course grades and CGPA at graduation. The reader should be cautioned here that the subset of the sample that took

Figure 4.15. Scatterplot Remedial Reading Course Grade and Graduation CGPA.
the remedial reading course and graduated was small ($n = 35$). A detailed summary and discussion of the findings are presented in Chapter 5.
Chapter 5: Discussion

Introduction

This chapter addresses three areas: An overview of the research problem and research methods used in the study, a summary of the results and their relevance to the questions being investigated, and finally, recommendations for further research and implications for policy and practice in the field of postsecondary developmental education.

Currently, there are more than 1,200 community colleges in the United States serving over 11 million students (American Association of Community Colleges, 2011). The mission of the community college is to provide students with access to post-secondary education through a policy of open admissions and low tuition cost (Shannon & Smith, 2006). In fulfilling their mission, community colleges provide an opportunity to academically underprepared students who need to improve their skills through developmental (or remedial) work.

While national attention has focused on the role of community colleges in educating the workforce, concerns mount regarding the growing number of students whose basic skills in reading, writing, and mathematics are insufficient to support success at the college-level. At the same time, community colleges contend with limited resources as they endeavor to provide the needed opportunities to assist their underprepared students. In order to support student success while containing costs, the effectiveness of developmental offerings must be examined.
This study examined reading skills (as measured by a standardized test) as one facet of developmental education. Using a quasi-experimental paradigm, a quantitative study was designed to explore whether relationships exist between scores on a standardized reading test and student success indicators of persistence, graduation, cumulative grade point average at graduation and performance in a reading-intensive course. The study further examined whether the successful completion of a developmental reading course could be determined to impact student success.

The hypothesis that guided the research was that for first-time full-time students at a community college there was a statistically significant relationship between standardized reading test scores and a multifaceted profile of student success indicators including cumulative grade point average, performance in a reading-intensive course, and persistence. The study further hypothesized that the intervention of a remedial reading course has a statistically significant positive impact on that correlation.

In order for community colleges to realize their mission of providing access to education, strategies and policies that support the success of underprepared students are crucial. Development of these strategies and policies is best accomplished when informed by data that provide evidence regarding the impact of such strategies and policies on the academic outcomes of underprepared students. The findings of this study may likely inform discussions about the factors that influence student persistence and the efficacy of remedial reading courses.

Implications of Findings

MSCC requires all entering full-time students to take a battery of standardized tests in reading, writing, and mathematics. The results of those tests are used to
determine the degree of preparation for college-level coursework. In the case of the COMPASS Reading test, MSCC uses a locally determined threshold (cut score) of 62 to identify underprepared students. During the period of the study, more than 90% of the sample population entered the college with test scores above the cut score, and more than 85% of the students tested above both the cut score and the standard error of measurement (SEM) of the cut score, that is they scored above a 70 on the COMPASS Reading test. The mean test score for the sample population was 82.84 (S.D. 12.679) with a median test score of 85.00. Using this benchmark, an substantial percentage of the test scores indicated reading skills at or above college-level. All of the analyses were conducted within the framework of a quasi-experimental design that disaggregated the student population into eight groups based on students’ scores on a standardized reading test, enrollment in a remedial reading course, and whether they successfully completed that course.

The study examined student success from two perspectives: persistence and academic success. Thresholds of success for persistence included re-enrollment at the college in the second (spring) semester, and re-enrollment at the college in the second academic year (persistence for two consecutive semesters). Since community college students transfer in substantial numbers, student success was also defined as transfer from the original college followed by persistence at the target school. Therefore, the measures of persistence to the second semester and for the second consecutive semester were each analyzed a second time including transfer and persistence. Additional measures including total semesters of persistence and persistence to graduation in six or eight semesters, were also considered.
Academic success was the second element of student success that was examined. Based on the premise that students who successfully completed a remedial reading course would be well-prepared to take a reading-intensive course in the subsequent semester, grades in a 100-level social science course taken in the second semester of enrollment were considered to be one measure of academic success. The second measure of academic success employed in the study was cumulative grade point average at graduation. Findings from these measures of persistence and academic success are discussed in the subsequent sections.

**Persistence to the second semester.** In analyzing student persistence to the second semester, it is clear that students with higher reading scores do not necessarily persist at a higher rate. While the mean intra-group persistence rate for the sample was 79.92%, students with the highest reading scores of the sample (Group 1) persisted at a rate of 81.57%. Similarly, when persistence to second semester including transfer is analyzed, students in the group with the highest reading scores persisted at a rate of 83.83%, only marginally outperforming the mean intra-group persistence rate of 80.79%. In contrast, the students with the highest intra-group rate of persistence to the second semester were those in Groups 5 and 8. Students in these two groups successfully completed the remedial reading course after scoring below the cut score on the COMPASS test with those in Group 5 scoring within the SEM and Group 8 students scoring below both the SEM and the cut score. Students in Group 5 persisted at a rate of more than 98%, while students in Group 8 persisted at a rate of 91.04%. Unlike students with higher reading scores who displayed a tendency to transfer even after only one semester, including transfer in the definition of persistence had no impact on students in
these two groups. The students with the lowest persistence rates, regardless of whether or not transfer was included, were those who enrolled in but did not successfully complete the remedial reading course. The most unexpected outcome was the fact that students whose performance fell below the cut score and who chose not to take the remedial reading course, persisted to the second semester at rates higher than those of students performing above the cut score. Furthermore, while the students in Groups 3 and 6 did not perform as well as students with remedial course success, they significantly outperformed the students in Groups 4 and 7 who enrolled in but did not successfully complete the remedial reading course.

**Persistence to the second year.** When analyzing persistence for two consecutive semesters that is, for students continuing into the second academic year, the same patterns emerge. Students who successfully completed the remedial reading course had the highest persistence rates; students who were unsuccessful in the remedial reading course had the lowest persistence rates. Students performing below the cut score on the COMPASS Reading test, and who chose not to take the remedial reading course performed at least as well as students whose performance was above the cut score.

In contrast to the findings of this study, Pinkerton (2010) found that students who successfully completed a remedial reading course had a higher success rate than students with similar levels of preparation who had not been required to take a remedial reading course. The difference in the results may be attributable to several factors. Pinkerton’s sample included students who were both full and part time, who were defined as “Academic”, that is who were pursuing an Associate’s degree or beyond, and who were required (rather than advised) to take a remedial reading course based on COMPASS
reading score. However, Pinkerton’s definition of success was fairly closely aligned with
two definitions in this study in that she defined success as earning 30 credit hours
(roughly equivalent to one academic year) or graduation within 10 terms (this study used
8 terms.). Nonetheless, several of the findings of this study substantiate Pinkerton’s
conclusions. For example, in this study students who had successfully completed the
remedial reading course persisted to the second semester at rates over 90%, which were
the highest rates of any in the sample, substantially exceeding the mean intra-group
persistence rate of 79.90%. Similarly, those same students with success in remedial
reading persisted to the second year at rates over 70%. Once again, these were the
highest rates of the sample and exceeded the mean intra-group persistence rate of
59.26%. Finally, Pinkerton also found that students who did not successfully complete
the remedial reading course were the least likely to persist. These findings support
Pinkerton’s conclusion concerning the increased likelihood of persistence for students
with success in remedial reading, at least in the short-term analysis of this factor.

However, the chi squared test performed on the students in Groups 2,3,4, and 5 in
this study found that there was no significant relationship between success in the
remedial reading course and graduation. These results align with the conclusions of
Calcagno and Long (2008) who found that there was limited evidence that assignment to
remedial reading improved students’ persistence to the second year when compared to
similarly prepared students who did not take remedial reading.

**Persistence as total semesters enrolled including transfer.** An additional
measure of the relationship between persistence and standardized reading test scores was
the examination of total semesters enrolled in college including enrollment at the original
college as well as after transfer. Using data from the National Clearinghouse, this measure considered enrollment at any two- or four-year institution to be a positive indication of persistence in college.

This analysis of the association of student persistence and reading test scores did indicate that a relationship existed. However, a linear regression found that that reading test scores could not be shown to predict persistence, either for the entire sample or for students with COMPASS reading scores below 70.

Regressions that examined success in the remedial reading course as a moderating variable on the relationship between standardized reading test scores and total semesters of persistence, found that success in the remedial reading course did not impact the weak relationship. Given the earlier data on the one- and two-semester persistence of the students by group, this finding suggests that the remedial reading course exerts only a short-term positive effect on persistence.

**Persistence to graduation.** The data on persistence to graduation was limited to outcomes for students at the community college where they initially enrolled. When analyzing these data, the long-term negative impact of an unsuccessful outcome in the remedial reading course becomes apparent. None of the students in Groups 4 and 7 persisted to graduation in either six or eight semesters. While some of the students in Groups 5 and 8 did persist to graduation within six semesters, the numbers and percentages (13.64% and 8.96%, respectively) were low. However, these graduation rates did increase to 25.76% for Group 5 and 17.19% for Group 8 when the time considered was extended to eight semesters, which can be taken to confirm the negative relationship between remedial coursework on time to graduation. In both analyses of
persistence to graduation (i.e., six and eight semesters), students with equivalent reading test scores who chose not to take the remedial reading course outperformed students who successfully completed the course. These results contradict the findings of Cox, et al. (2003) who found that underprepared students successfully completing a remedial reading course were more likely to persist toward graduation than similarly underprepared students who did not take or who did not complete such a course. It should be pointed out that the Cox study was conducted at a four-year open enrollment institution, rather than a community college and the structure of remedial reading offerings differed in significant ways from the structure of offerings at MSCC.

While regression analyses showed that the remedial reading course grade had a moderate and significant relationship with total semesters persisted and graduation, this relationship cannot necessarily be construed in a completely positive way. Of the original sample, 3.66% of students enrolled in the remedial reading course and 64.88% of those students successfully completed the course, earning grades of C or better. Of the students who successfully completed the course, 21.80% graduated within eight semesters. However, it is important to note that they were outperformed by those students with equivalent standardized reading test scores who chose not to take the course. The graduation rate for this group within eight semesters was 30.88%. While this low graduation rate is cause for concern, of greater concern is the fact that it was demonstrated that students who do not successfully complete the remedial reading course do not persist or graduate. If they do successfully complete the remedial reading course, they are more likely than this latter group to persist and graduate, but not as likely to do
so as students within equivalent standardized reading test scores who chose not to take the course.

These findings also corroborate those of Calcagno and Long (2008), who concluded “the results suggest that remediation might promote early persistence in college, but it does not necessarily help students on the margin of passing the placement cutoff make long-term progress toward earning a degree.” (p. iii). However, it should be noted that the Calcagno and Long (2008) examined only whether or not students were enrolled in the remedial reading course, rather than course success or course grades. Therefore, the study extends the work of Calcagno and Long (2008) study by disaggregating the sample population of students into quasi-experimental groups based on their success in the remedial course. The study also examines outcomes for students who were allowed to choose whether or not they would take the remedial course while in the Calcagno and Long study, students were required to take remedial reading if they tested below the cut score. Nevertheless, the findings of this study corroborate those of Calcagno and Long (2008).

**Success in remedial reading and reading-intensive course.** The analysis of standardized reading test scores and academic success reveals a complex relationship. Of the original sample of 5,607 students, approximately 7% of the students were below the cut score in reading, with close to 50% of those students choosing to enroll in the remedial reading course. Of the students who enrolled in the remedial reading course, 64.88% were successful. However, correlation and regression analyses indicate that there is no significant relationship between standardized reading test scores and remedial reading course success.
Nearly 30% of the students in the original sample enrolled in the reading-intensive course (BHS103) in their second semester. Students in Group 1 achieved a success rate of more than 68% while, with the exception of students in Groups 4 and 7, the students in groups below the cut score passed the reading-intensive course at rates from 45% to 55% respectively. Students who did not successfully complete the remedial reading course (Groups 4 and 7) passed the reading-intensive course at a rate of only 11%. These prima facie examinations of the data are not confirmed by the regression analyses, which indicated a highly significant but weak relationship between standardized reading test scores and students’ grades in BHS103.

The complexity of the relationship between the three factors of standardized reading test scores, grades in the remedial reading course, and grades in the reading-intensive course is emphasized by results of a linear regression indicating that the remedial course grade had a statistically significant and strong relationship with the grade in BHS103.

**Cumulative grade point average at graduation.** An examination of the graduation rates reveals that 32.98% of the original sample graduated within the period of the study. Of that sample, it must be reiterated that it has already been determined that this subpopulation excluded students who were unsuccessful in the remedial reading course, as none of them persisted to graduation. For those groups of students who graduated, the mean cumulative grade point average ranged from 2.67 for students in Group 8, to 3.0 for students in Group 1. Once again, linear regression analysis revealed a moderate and highly significant relationship between COMPASS Reading test scores and the cumulative grade point average (CGPA) at graduation. Again, it must be noted that
none of the students who were unsuccessful in the remedial reading course persisted to graduation; therefore, this course grade influence on CGPA at graduation is restricted to an influence on the successful students.

**Limitations**

The students who enroll at community colleges include those who have just graduated from high school as well as those who may be returning to school after some time. Further, community college students may be enrolled full-or part-time. The delimitation of this study to first-time, full-time students is therefore also a limitation of the study in that it considers a population of approximately 20% of the total number of students at the college.

Community colleges also enroll students from a range of diverse groups with respect to demographics, socio-economic status, family background, and educational experiences. Although, according to Tinto (1987), these are all attributes that may determine a student’s academic and social integration into an institution and may be factors in student success, this study did not control for any of these factors. This issue will be addressed further when discussing threats to the internal validity of the study.

The data gathered on standardized reading test scores included only the students’ most recent test. During the period of the study, the college did not retain scores from multiple testing attempts. While re-tests were only allowed under very restricted circumstances, it is possible that a small sub-population of students had improved their course placement through re-testing.

Further, the study only examined the remedial reading course results of students who took the course in their first semester of enrollment. It is possible that some of the
students who were first-time, full-time students in a fall semester chose to take the remedial reading course in a subsequent term. For the purposes of this study, these students would have been considered to be in one of the groups who chose not to take the course because they did not take it during their first term of enrollment. Further, it is also possible that some of the students, who were unsuccessful in taking the remedial reading course, chose to retake the course in a subsequent term.

In analyzing the BHS103 results, the study only considered students who enrolled in the course in their second semester of enrollment. The basis for this selection was to determine whether there was any evidence that students who had previously succeeded in the remedial reading course were any more successful in this reading-intensive course than their peers with similar test scores who had not taken the remedial reading course. It is possible that a number of students in all groups had taken BHS103 unsuccessfully in their first semester and were, in fact, retaking the course in the second semester.

Relative to enrollment, a number of limitations must be acknowledged. For the persistence analysis, the study examined semesters of continuous enrollment at the college and after transfer. It is not uncommon for students at a community college to “stop out” for a semester or more. While in the larger picture, this stop-out behavior that includes re-enrollment at a later date could be considered to be persistence, any interruption in enrollment subsequent to the initial registration at the college was not considered in this study. The study also considered enrollment, whether full- or part-time, to be persistence. Therefore, a student who continued part-time at the college or after transfer was included among the persisters.
Finally, for the purposes of analyzing student persistence after transfer, the study used data from the National Student Clearinghouse Student Tracker to determine whether students were continuously enrolled at college. It must be noted that, while the Clearinghouse contains records from 92% of all colleges in the United States, it is possible that some enrollments were not captured if the student attended a college not included in the Clearinghouse database.

Threats to internal validity of the study include questions of whether the reading test scores should be considered in isolation as explaining the persistence and academic success of the students. Further, one must question whether the remedial course itself should be deemed to be the only explanation for any differences in student outcomes. The content of the remedial reading course is another important factor that should not be disregarded relative to whether such a course can, in fact, adequately improve reading skills in a 15 week semester. In addition, the content of the reading course should be considered to determine whether it provides any other important skills such as study skills that may also contribute to student success. Finally, the question of the validity of choosing the reading-intensive course should be considered. Since reading test scores have been demonstrated not to predict success in this course, one might question whether other skills, academic or affective, might be more powerful factors contributing to student outcomes.

The issue of the self-selection process whereby students are given a choice regarding whether or not to take the remedial reading course must also be taken into account. This factor could be particularly germane when considering the degree to which motivation and engagement are elements of student success. In addition, the study does
not consider the possible impact of multiple deficiencies in academic preparation on student success. It is possible, perhaps even likely, that some of these students were enrolled in another remedial course. According to Bahr (2007), “multiple skill deficiencies may exhibit a negative multiplicative interaction effect” (p. 696).

**Recommendations**

The issue of developmental education, especially in the community college, is as complex as the profiles of the community college student. Solutions designed to provide support for the success of underprepared students must be subjected to scrutiny, analysis, and continuous improvement. Policymakers must question the assumptions that inform testing, placement, and educational policies. Administrators must challenge the theories that inform the design and implementation of developmental courses and programs. Practitioners must examine course content and classroom practices to ensure that they achieve their intended outcome. All of this must be done in an atmosphere of intellectual curiosity, academic inquiry, and data-driven decision making that exists within the framework of an imperative to support student success. As a result of the research and the outcomes of this study, a number of unanswered questions remain that should be addressed by further research. In addition, the analysis of the results obtained in this investigation has also led to some conclusions that recommend consideration of changes to policy and professional practice.

**Recommendations for future research.** Standardized reading test scores were shown by this study to predict academic success as measured by students’ cumulative grade point average at graduation. However, for the population of students used in this study, COMPASS Reading test results showed no predictive value with regard to
academic success in a remedial reading course, or in a reading-intensive course taken in a student’s second semester. This researcher recommends further study to explore several corollaries to these results. In the case of the short-term academic success metric, the relationship between reading test scores and other courses should be explored. A standard definition of the criteria for a reading-intensive course would inform such research. Perhaps more importantly, research could develop or determine criteria to provide a standard definition of a reading-intensive course. Since student outcomes for the reading-intensive course were examined in the second semester of enrollment only, research should be conducted to determine whether a relationship can be shown to exist if the analysis is expanded to include enrollments in any semester. Further research is also needed to determine the robustness of the results related to the positive relationship between standardized test scores in reading and CGPA at graduation. Clearly, one salient element of this analysis was predicated on the fact that students included in the analysis had persisted to graduation. Yet other results of the study did not support a relationship between persistence and reading test scores. Further research could examine whether a relationship exists between reading test scores and CGPA at other thresholds of a students’ academic career. The researcher would further recommend the possibility of a study to examine the potential for a relationship between standardized reading test scores and the CGPA of students when they drop out of a college.

Results of this study indicated that the grade in the remedial reading course could be shown to predict persistence to graduation, CGPA at graduation, and BHS103 course grade. These results raise a number of questions. Since reading test scores were not shown to predict success in the remedial reading course or in the reading-intensive
course? Can this relationship with remedial reading be extended to other courses, and can it be shown through further study to have a causal relationship with grades in these or other courses? Since the study examined the relationship between the remedial reading course as a predictor of future success, additional study should examine whether a student’s grade in another course taken in the first semester might have the same predictive value.

Further research is also recommended to addresses a number of questions related to other factors that might influence any of these results. For example, is there a difference in outcomes for students who have an intention to major in a program that leads to an Associate’s degree rather than just a vague aspiration to attend college? By extension, is there a difference in outcomes for students who aspire to a Baccalaureate degree? Should these outcomes be analyzed through the lens of various demographic and socioeconomic factors? The results of this study as well as further studies in any of these named areas would inform the work of policymakers and practitioners.

**Implications for policy.** Community college policymakers must examine the effectiveness of their institution’s polices relative to developmental education and student success. Most community colleges require some, but not all, new registrants to take a placement test in reading, writing, and mathematics. If, as this study has found, COMPASS Reading test scores do not have a positive relationship with student success as measured by grades in reading-intensive courses, perhaps policies should not require that all students take the placement test upon enrollment. Further, if outcomes in a remedial reading course negatively predict student persistence and graduation rates,
perhaps policymakers should reconsider remedial course placement policies or work with practitioners to develop alternate strategies to support student success.

Students’ scores on the COMPASS Reading test were not shown to have a positive relationship with either total semesters of persistence nor graduation. If, as Tinto (1987) postulates, persistence is related to such as attributes as motivation, engagement, study skills, and other behaviors and attitudes, policymakers should consider requiring the use of standardized tests to inform interventions to address deficiencies in this areas. Clearly, costs would be associated with both the additional tests as well as any interventions, but consideration should be given to whether such costs would be justified by any attendant gains in student retention.

Recent studies about the use of placement tests have focused on the efficacy of standardized placement tests in predicting student success. Scott-Clayton (2012) examined whether a standardized placement test predicted student success in the first college-level course in the related subject and recommended the use of multiple measures, including high school performance, to place students. Likewise, Belfield and Crosta (2012) found that high school grade point average has a strong relationship with college grade point average and should be used to determine student placement in college-level courses. Policymakers should examine the possibility of policy changes that would include multiple measures for placement.

**Implications for practice.** Several of the conclusions of this study suggest the need for an examination of best practices in remedial courses. Regarding the impact of the remedial reading course, the study found that the test scores have no relationship with either semesters of persistence or whether a student graduated and that the intervention of
a remedial course does not change that result. Further, the study found that while reading test scores do predict academic success with regard to CGPA at graduation, once again success in a remedial reading course does not change those relationships. These results indicate the need to question whether enrolling in a remedial reading course can indeed improve students’ reading skills in a fifteen-week semester and to examine whether the content of remedial reading courses achieves its intended goal.

Furthermore, diverse strategies for improving students’ ability to read and understand college-level content within particular disciplines should be considered as an alternative to remedial reading courses. Cox, et al. (2003) recommended the strategy of offering paired courses that combine both the content of a course designed to develop reading skills with the content of an introductory level content area course. Recent research has indicated that strategies that empower students to develop basic skills in the context of content areas may be more successful than discrete remedial courses. For example, Perin, Bork, Peverly, Mason, & Vaselewski (2011) found that a “contextualized intervention” in which basic skills were acquired through instruction embedded in a content area showed encouraging results for underprepared students. Similarly, Jenkins, Speroni, Belfield, Jaggars, & Edgecombe (2010) found positive results for a model that “mainstreamed” underprepared students into the entry level English course while providing them with contextualized support in the form of a companion course that provides supplementary class time and additional practice. These and other strategies may contribute to student success in ways that the traditional reading course do not.
Conclusion

For more than one hundred years, community colleges have been committed to providing access to higher education (Cohen & Brawer, 2008). According to the American Association of Community Colleges, (2011) there are approximately 1,200 community colleges in the United States that serve in excess of 7.4 million credit students, representing 44% of all undergraduates. Students who may be either academically and/or economically disadvantaged gain access to higher education through the policies of community colleges that allow for open admissions and low costs (Bragg, 2001). This “democratization” of postsecondary education requires that community colleges extend more than just an opportunity to enroll, but also that they provide students with a viable opportunity for success. In an economy that is increasingly dependent on knowledge workers, the success of the community college student is vital both to the students themselves and to the community at large.

Community college students, however, often lack the fundamental knowledge and skills necessary to succeed in college-level work. Approximately 30% of community college students take a developmental course in their first year of college (Provasnik & Planty, 2008). Attewell, Lavin, Domina, and Levey (2006) examined data from the U.S. Department of Education and reported that nearly 60% of all community college students took at least one remedial course at some point during their college career. Bailey (2009) reported that these data likely understate the problem and indicated that it was reasonable to assume that the population of underprepared students at the community college level is closer to two-thirds.
As enrollments increase in community colleges nationwide, the numbers of underprepared students also increase (Calcagno & Long, 2008). Parsad and Lewis (2003) reported that 98% of public two-year institutions offer remedial courses and are much more likely to do so than other institutions of higher education. The U.S. Department of Education (2003) noted that the curricula of community colleges include 42% more remedial courses than public four-year colleges and 88% more than private four-year schools. Further, students in community colleges need more remedial coursework than their peers at other institutions as evidenced by the fact that 63% of underprepared community college students spend a year or more in remedial coursework. Only 38% of students in public four-year institutions and 16% in private four-year schools require that level of remediation.

While some studies have cast doubt on the effectiveness of remedial coursework, others, such as Adelman (2006) observed that an increasing quantity of research supports the conclusion that remediation positively contributes to student success. Shannon and Smith (2006) also asserted that remedial education is a key element to realize the mission of access to higher education for the economically and educationally underprepared. Romano (2011) concluded that community colleges do in fact provide opportunities for higher education, that the democratization effect of community colleges is positive and increases educational attainment in the U.S.

Theory can provide frameworks for understanding why a wide variety of strategies might be effective in developmental education, depending on the characteristics of the students and of the institution (Brothen & Wambach, 2004, p. 20). This study posited a convergence of the theories of Vygotsky (1962) and Tinto (1975, 1987) to
inform a hypothesis that the standardized reading test scores of community college students would correlate with student success.

According to Vygotsky (1962), learners actively construct knowledge through language. He asserted that learners use their experiences to assign meaning to ideas and items. In the context of this study, it is important to note that Vygotsky believed both written and oral language were essential to cognitive development as the media that are used to translate ideas and experiences into meaning (Vanderburg, 2006).

The theoretical model of Vincent Tinto (1975, 1987) focused on the attributes of individual students that contribute to their integration into an institution. He described both social and academic integration as processes that determine whether or not a student will drop out of an institution of higher education. Tinto’s Theory of Departure (1987, 1993) addresses a broad range of student attributes as well as institutional characteristics that impact student integration; this study focused on two elements of Tinto’s theories.

According to Tinto (1987), students arrive at college with a range of attributes include academic abilities and past educational experiences. He suggested that a student’s academic ability, as measured by high school grades and standardized tests, are among the predictors of college persistence. He also believed that high school grades were more predictive as they closely demonstrated the student’s ability within an educational setting.

Tinto’s (1987, 1993) concept of student integration included elements of both social and academic integration to college. He described academic integration as a predictor of student success that centers in the classroom and involves student interaction with faculty and staff. He concluded that academic integration may be determined by
student success in the classroom and posited that academic performance, as measured by grades, is the single most important factor in persistence.

In the context of Vygotksy’s theories of the role of language in knowledge acquisition and Tinto’s theories of the related roles of students’ abilities upon arrival at college and academic integration as measured by classroom success, the study examined the relationships between reading test scores and student success. The study was conducted at a moderately sized community college in a suburban setting. A purposeful sample was derived from the total population of first-time full-time students entering the community college in the fall terms from 2003-2007. A composite of academic outcomes to describe success for a sample of students identified as underprepared or marginally prepared in college-level reading based on incoming student test scores on the COMPASS standardized test were examined.

The study investigated outcomes for students above and below the cut score, but further disaggregated the sample according to test scores, continuous enrollment, and success in a remedial reading course. The design was quasi-experimental in that it examined students with scores above the cut score but within the SEM as counterfactuals for students also within the SEM but below the cut score, but who received remediation. While the study examined results for the entire sample of students at all levels of reading, it focused mainly on the analysis of underprepared students.

The definition of student success in the study included both persistence and academic success. The definitions of persistence included short and longer term persistence including transfer as well as persistence to graduation. Academic success
was defined by students’ grades in a reading-intensive course, graduation with an
Associate’s degree and cumulative grade point average at graduation.

The outcomes obtained have shown that reading skills as measured by the
COMPASS test scores do not predict student success on several measures. In the case of
total semesters of persistence, the correlational analysis indicated a weak relationship
while the linear regression yielded a negligible value indicating that less than 1% of the
variation in persistence levels could be accounted for by reading test scores. Further
analysis restricted to the subpopulation of students with test scores less than 70 yielded
the same outcome. When the intervention of the remedial reading course was analyzed
as a moderating variable, no impact was detected on the very small relationship between
persistence and reading test scores. These findings do not appear to support Tinto’s
theory of student ability as a predictor of student persistence.

COMPASS reading test scores were also shown not to predict whether a student
would graduate. Using a dichotomous variable to indicate whether a student graduated,
an analysis with test scores indicated a significant but small correlation. A logistic
regression confirmed the weak relationship indicating that less than 1% of the graduation
outcomes could be accounted for by the COMPASS test score. Once again, these
findings do not confirm Tinto’s theory.

Similarly, the test scores were not shown to predict either student success in a
remedial reading course or in a reading-intensive course taken in the student’s second
semester. While correlation analyses indicated significant relationships in both cases,
regressions indicated that less than 4% of the course outcomes were predicted by test
scores.
There are a number of explanations for the apparent contradiction between these results and Tinto’s (1987, 1993) theory. One possibility is that the COMPASS Reading test scores do not accurately measure students’ reading ability. A second, counterintuitive explanation is one that contradicts the views of both Tinto (1987, 1993) and Vygotsky (1962), namely that reading skills per se are not important to the acquisition of knowledge and by extension are not important to success in the classroom.

Other analyses seem to contradict the earlier findings that suggest a weak relationship between reading skills and student success and seem to confirm the theories of Vygotsky (1962) and Tinto (1987, 1993). COMPASS Reading test scores were shown to have a moderate and highly significant relationship with students’ cumulative grade point averages at graduation. Course grades in the remedial reading course were also shown to predict CGPA at graduation. Furthermore, success in the remedial reading course was shown to have a significant relationship with success in the reading-intensive course taken in the subsequent semester. In the context of the aforementioned theorists, one might conclude that these results confirm the importance of reading skills as factors contributing to academic success.

This study endeavored to analyze the relationship between reading skills and academic success, by using a standardized test to measure reading skills. There are debates about the use of standardized tests to measure students’ readiness of college-level work (Belfield & Crosta, 2012; Scott-Clayton, 2012). However, as Brothen and Wambach (2004) posited, “the issue of mandatory testing and placement may not be as clear-cut as those who support or oppose it might believe” (p. 18). Further, the study analyzed whether a remedial reading course had an impact on student success. However,
as Cox, et al. (2003) indicated, “A single developmental course aimed at improving a critically important academic skill like reading comprehension, therefore, may simply be insufficient to remedy most students' skill deficiencies” (p. 174). In fact, the factors that contribute to student success may be so numerous and their inter-relationships so complex that it may not be possible to determine the strength of any one element in isolation.

In the 21st century, America’s ability to educate its people “will increasingly determine its economic competitiveness as the country shifts from an industrial to an information economy” (Carnevale and Desrochers, 2004, p. 39). People with at least some years of college study hold almost 60% of jobs in the United States (Carnevale & Desrochers, 2004). Over the last twenty years, the percentage of workers in the U.S. with only a high school education has steadily declined, while the percentage of workers whose highest degree is an associate’s degree has risen (Sommers, 2009). According to Kane & Rouse (1999), workers with an associate’s degree earn 15 to 27 percent more in annual earnings than those with a high school diploma. The Bureau of Labor Statistics (BLS) predicts that employment occupations for which the education or training needed is an associate’s degree will increases by 19.1 percent between 2008-2018 (Lacey & Wright, 2009). A growing number of policymakers and business leaders look to occupational education at the community college as a key site for building a modern workforce.

Now is the time to build a firmer, stronger foundation for growth that will not only withstand future economic storms, but one that helps us thrive and compete in a global economy. It’s time to reform our community colleges so that they
provide Americans of all ages a chance to learn the skills and knowledge
necessary to compete for the jobs of the future. (Obama, 2009)

Community colleges strive to provide Andrew Carnegie’s “ladders of ascent” and
a higher standard of living to students who choose to avail themselves of the opportunity. However, for students whose basic skills are insufficient to support success at the college
level, those ladders may be too difficult to climb without the support structure of
developmental educational programs. The response to President Obama’s challenge to
reform community colleges must include a commitment to examine the factors that
contribute to student success, to study the effectiveness of developmental education
strategies, and to use that information to provide ladders of ascent to all students who
aspire to achievement in college.
References


Appendix A

Course Descriptions

REA091 – Strategies for College Reading: Integrated language activities are designed to serve as a complementary component of the instruction given in REA100. NOTE: REA091 is a credit equivalent course. Equivalent credits do not satisfy degree requirements and are not calculated in a student’s grade point average, but they do incur tuition charges and they do count towards full-time/part-time status. 2.00 Credit hours 2.00 Lecture hours

BHS103 – Social Problems in Today’s World: This course is an examination of current social problems that confront the individual, the United States and the international community. Concepts of the behavioral sciences are introduced. The course presents a broad range of social problems, with particular focus on the complex relationships between contemporary issues. Students are presented the current research data that explains both the causes and possible resolutions to important social issues. 3.00 Credit hours 3.00 Lecture hours