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Graduation Rates: A Comparison of First-Time, Full-Time Freshmen Who Entered a Community College
Prepared and Those Who Entered Underprepared for College-Level Work

A dissertation
presented to
the Faculty of the Department of Educational Leadership and Policy Analysis
East Tennessee State University

In partial fulfillment
of the requirements for the degree
Doctor of Education

by
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Keywords: Developmental Studies, Retention, First-Time, Full-Time, Graduation Rates, Persistence,
Underprepared, Community College

ABSTRACT

Graduation Rates: A Comparison of First-Time, Full-Time Freshmen who Entered a Community College Prepared and Those Who Entered Underprepared for College-Level Work

by

Kathy Jo Yates

Each year millions of young people graduate from high school and enroll in colleges and universities across the country, and many of these students are underprepared for the demands and academic rigor of college-level courses. The purpose of this study was to determine whether there were significant differences in graduation rates between students who entered college academically underprepared and those who entered academically prepared to enroll in college-level courses.

The subjects of the study were a selected group of students enrolled at a public, 2-year comprehensive community college located in Northeast Tennessee. The criteria used for selecting the subjects included: (1) Individuals who graduated from high school in the months of December through July in each of the years 2003, 2004, 2005, and 2006 and enrolled as first-time, full-time students during the fall semester immediately following high school graduation; (2) individuals who were classified as full-time students at the community college because they enrolled for a course load of 12 or more semester credit hours; and (3) individuals who had completed the ACT assessment test and were placed in developmental-level courses or college-level courses based on ACT subscores. Students scoring lower than 19 on the ACT in the areas of English, reading, and mathematics were required to take developmental-level courses, whereas students scoring 19 or above were placed in college-level courses.

The subjects of the study were tracked for a 3-year period to determine the relationship between the number of developmental courses into which a student was placed and the 3-year graduation rate. This study also examined the relationship between the number of academic subject content areas in which a student was required to take developmental courses and the 3-year graduation rate.

The analysis indicated that students who entered college prepared for college-level work, based on earned ACT scores, were much more likely to graduate within 3 years as compared to students who entered college underprepared and required to take developmental courses. Further, the study revealed that the number of developmental courses and the number of developmental academic subject content areas students were required to take was inversely related to the 3-year persistence-to-graduation rate.

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DEDICATION

This work is dedicated to my family Jonathan and Cynthia, Sommer and Charles, and Sarahfaye, and to my grandchildren, Nathan and Lia, who serve as my greatest inspiration and joy, and to my sisters who have encouraged and supported me in all my endeavors.

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CHAPTER 1

INTRODUCTION

Background of the Problem

During the fall of each year, hundreds of thousands of students enter the nation's 2- and 4-year colleges. Many of these students are recent high school graduates who are not academically prepared to enroll in college-level courses. Although many factors can influence this inadequate level of preparation and later success in college, a primary cause is the lack of rigor in the high school curriculum (Strong American Schools, 2008). Included in the Strong American Schools report is a statement that effectively sums up the problem: "A hoax is being played on America. The public believes that a high school diploma shows that a student is ready for college-level academics. Parents believe it too. So do students" (p. 3).

As outlined in the report by the Strong American Schools (2008) project, this lack of academic preparation and rigor is a national problem. The state of Tennessee is certainly not exempt. In Tennessee, a serious problem exists with the level of academic preparation demonstrated by recent high school graduates who enter Tennessee Board of Regents (TBR) colleges and universities. In 2007, Governor Bredeson addressed this lack of academic preparation in Tennessee by stating that the state must address the low levels of achievement in Tennessee high schools and the resulting high numbers of high school graduates who are not prepared for college (Doniach, 2007). To combat this problem, the developmental studies program was instituted in TBR institutions. Litigation in 1984 (Geier vs. Alexander) was settled with a number of stipulations that included the provision of developmental education programs in TBR institutions, and the development and implementation of a plan designed to address retention, performance, and progression.

The TBR is comprised of 6 regional universities, 13 community colleges and 26 technology centers. Each university and community college within the TBR system offers some type of developmental studies program. The purpose of the developmental studies program is to assist underprepared students in attaining the academic basic skills necessary to enroll in and successfully complete college-level coursework. Depending on the institution, developmental studies courses are taught using a variety of instructional methods ranging from seat-based lecture and laboratory through on-line, self-regulated courses, to a mixture of these instructional methods. In all instances, developmental studies courses do not count toward fulfilling academic requirements in any associate or baccalaureate degree program offered by TBR institutions.

As a part of the application process, every individual under the age of 21 who applies for admission to a TBR community college must complete the American College Test (ACT) or Scholastic Aptitude Test (SAT). In instances where the student takes the SAT, the institution to which the student applied converts the SAT scores to ACT equivalent scores. ACT scores are designed to provide information about an individual's potential to succeed in college-level studies. At the institution where this study was conducted, a few students, less than 1% annually, applying for admission to the college, take and submit scores earned on the SAT.

According to information provided by ACT, the test measures academic strengths and weaknesses in 4 general subject areas represented by the test scores and in seven specific areas represented by the subscores. A high score in a content area may suggest that a student has a good chance of success in related college courses, majors, and careers, whereas a low score may indicate that a student needs to develop additional skills by taking additional coursework in that specific area (ACT, Inc., 2010). Specifically, to TBR colleges and universities, the ACT subscores in mathematics, writing, and reading are used to place certain recent high school

graduates and students under the age of 21 into developmental studies or into college-level courses (TBR, 2008).

This study was designed to provide information about the relationship between placement into the developmental studies program and the student graduation rates at one of the TBR community colleges. Findings of this study may not be generalizable to other institutions.

Statement of the Problem

The problem of the study is that it is not known if students taking developmental courses are graduating at the same rate as those students who are not required to take developmental courses. This study will serve to determine if students who enter college academically underprepared and are required to take developmental education program courses persist to graduation at the same rate as students who enter college academically prepared for college-level studies. The study will also examine the extent to which the number of developmental courses and the number of academic subject content areas into which a student is placed are related to persistence to graduation.

Research Questions

Several research questions were addressed in this study to determine the relationship between placement of recent high school graduates into the developmental studies program at a Tennessee community college and the 3 -year graduation rate. The 3-year graduation rate was selected because it is the standard used to measure the percentage of a matriculating cohort of students who originally enrolled as full-time students and graduated within 150 % of the expected time. For 2-year institutions, the graduation rates are compiled after 3 years (Students Right to Know, 2009).

The questions included in this study are:

1. Is there a significant difference in the 3-year graduation rate for students required to take one or more developmental-level courses as compared to students not required to take developmental-level courses?
2. Is there a significant difference in the 3-year graduation rate for students required to take a developmental math course as compared to students not required to take a developmental math course?
3. Is there a significant difference in the 3-year graduation rate for students required to take a developmental writing course as compared to students not required to take a developmental writing course?
4. Is there a significant difference in the 3-year graduation rate for students required to take a developmental reading course as compared to students not required to take a developmental reading course?
5. Is there a significant relationship in the population between the number of developmental courses a student was required to take and the percentage of students graduating within 3 years?
6. Is there a significant relationship in the population between the number of academic subject content areas (mathematics, writing, and reading) in which a student was required to take developmental-level courses and the percentage of students graduating within 3 years?

Significance of the Study

The move toward a global economy has resulted in the United States of America being placed in a position unlike any faced previously by this country. Many of the nation's businesses and industries have located their facilities abroad, resulting in a significant loss of manufacturing

and service jobs to other countries. Many of the nation's employers, particularly those whose employees work in highly technological environments, are concerned about and have expressed the difficulty in finding motivated, well-educated and highly skilled workers. According to the United States Department of Labor, 80% of all jobs in high employment sectors require a college degree (Alliance for Excellent Education, 2006). The nation's community colleges can play a major role in training these potential employees.

Increasing the number of individuals, especially recent high school graduates who enroll in institutions of higher education and graduate is essential if this nation is to remain competitive in a global economy. This concern is one of the primary reasons that TBR has established a goal of increasing access to higher education for the residents of the state. Because of the access initiative, an increasingly large number of the state's residents are enrolling in institutions of higher education, and this has resulted in an increase in the numbers of college students who are not academically prepared to successfully complete college-level coursework.

The state of Tennessee has allocated a tremendous amount of money during the past 2 decades to fund the developmental studies program in the state's colleges and universities. In the TBR Policy Brief on Access, it was reported that 60% of students enrolled in the system tested into at least one developmental studies course (TBR, 2005). This report cited that this rate exceeded national estimates of 28% of first-time college students required to take developmental courses. The numbers were more profound at 2-year community colleges where 74% of students required some level of developmental education. The high percentage of students in developmental studies has become a significant cost issue for both the TBR system and students enrolled at its institutions. As reported in its TBR Performance Audit (2008), a total of \$27 million was expended in 2002 and \$25 million was spent in 2007 on developmental studies

courses, with the costs being covered evenly between the TBR system and through tuition paid by students enrolling in the courses. Costs to students ranged from over \$1,300 for two developmental studies courses over a single term to over \$4,100 for a student requiring a full year of developmental studies courses (TBR, 2008).

After funding the program for many years, there is a paucity of available information, and many questions remain about the effectiveness of the program, particularly as it relates to student retention and graduation. Consequently, a study designed to provide information on the association between placement of recent high school graduates into a community college developmental studies program and the graduation rates of these students is timely and needed.

Despite the many years that developmental education programs have been operating in the nation's colleges and universities and the substantial amount of money spent to support the effort, there is little evidence regarding the association between college remediation and student outcomes (Calcagno & Long, 2009). Indeed, much of the recent evidence has been contradictory. This study provides additional information on the topic, with particular emphasis on the persistence-to-graduation rate for students who based upon ACT scores were placed into and required to participate in one community college's developmental studies program.

Limitations of the Study

For the purpose of this study, subjects will be limited to first-time, full-time freshmen in one community college within the Tennessee Board of Regents system. Specific to this study, a recent high school graduate is defined as an individual who graduated from high school and enrolled in college as a first-time student during the semester immediately following graduation. Subjects of the study are those students who:

--graduated from high school in the months of December through July in each of the years 2003, 2004, 2005, and 2006 and then enrolled at the community college in the fall semester immediately following graduation.

--were classified by the college as first-time, full-time freshmen because they registered for 12 or more semester credit hours during their first semester of enrollment at a specific community college, and

--were placed in developmental studies courses or college-level courses based on ACT subscores in mathematics, writing, and reading.

No other factors that may be associated with student persistence to graduation were considered other than placement into developmental studies or college-level courses based on the ACT subscores. This study is specific to this institution and may not be generalizable to other populations.

Definitions of Terms

Essential terms must be defined in order that the study may be more clearly understood.

The following terms are defined and hereinafter used:

1. Developmental Education –courses designed to assist academically underprepared students to acquire basic academic skills necessary to complete successfully the higher level developmental studies courses and college-level courses (Northeast State Community College, 2009).
2. First-time student - student who has never attended college (Northeast State Community College, 2009).
3. Full-time student - student who registers for 12 or more course credit hours per academic term (Northeast State Community College, 2009).

4. Persistence to graduation rate- percentage of the first-time, full-time students who graduate within 3 years of admission into college. This is the approved time-frame for tracking the graduation rate of entering college students, usually figured as 3 years to complete an associate degree program and 6 years to complete a bachelor degree program (SRK, 2009).

Summary

Chapter 1 contains an introduction to the study to include a description of its relevance and purpose, the statement of the problem, research questions, definitions of terms, limitations of the study, and a brief overview of the study. Chapter 2 provides a review of literature related to the topic of student placement into developmental education courses and graduation rates. Chapter 3 is a description of the study design, population, data collection methodology, and procedures for data analysis. Chapter 4 offers an analysis of the data for each research question and information on the research procedures and findings. Chapter 5 contains the summary, conclusions, implications, and recommendations for further research.

CHAPTER 2
REVIEW OF LITERATURE

Introduction

During the early years in our nation, admission to college often depended on social or financial status. Later, this aristocratic or elitist philosophy changed to a meritocratic phase as land-grant colleges were established. During this early phase, college admission was based more on quality and merit (Pew, 1990). The most dramatic transformation thus far occurred when the profile of the American college student changed as a result of the nation's community colleges introducing the concept of universal access (Cross, 1974). This change extended college access to increasing numbers of students, including minority, low-income, and older (nontraditional) students, many of whom were not academically prepared to succeed in college-level courses (Gardiner, 1994).

The move by community colleges toward opening the doors of higher education to all has been caused by many factors. According to Pulley (2008), those factors have included the leveling of the playing field caused by globalization, the change in the world of work and the ways people communicate, and the increase in the numbers of new jobs requiring postsecondary training that reportedly have increased from 50% to above 75%.

*Growth of Collegiate Institutions and Developmental Education Programs
in the United States*

Access to higher education has improved during the past 3 decades. Concurrent with this increase in access has been the growth in the number of collegiate institutions in the United States. McIntosh and Rouse (2009) cited a United States Department of Education report (2007)

which revealed that during the past 3 decades the number of community colleges had grown by 48% while the growth of 4-year colleges has been 41%.

Enrollment in the nation's 2-year colleges has increased significantly when compared to enrollment at 4-year schools. Since the early 1960s, student enrollment in 2-year colleges has increased more than 600%, from less than 1 million in the 1960s to over 6 million in 2005, while growth at 4-year colleges has been less than 200%, from 4 million to 11 million. These percentages translate into an average annual rate of growth of 5.1% at 2-year colleges and a 2.5% growth rate at 4-year colleges (McIntosh & Rouse, 2009).

As the number of colleges and student enrollment has increased, so has the number of institutions providing remediation for academically underprepared students. The United States Department of Education report previously cited by McIntosh and Rouse (2009) stated that during the 2005 year, 75.6% of public 4-year colleges and nearly all public 2-year colleges (99.6%) offered developmental studies courses. When considering both public and private institutions, 80.3% of the 2-year colleges and 67.4% of the 4-year institutions provided remedial services to their students.

Data regarding the number of college students needing and taking developmental courses varies greatly from one report to another. McCuster (1999) cited a 1996 Post-Secondary International Networks report that reported between 50 % and 70% of college students in the United State needed remediation and that the majority of those students were enrolled in community colleges.

The report by the Strong American Schools project (2008) provided data regarding students needing remediation in the nation's 2- and 4-year public colleges in 2004. The report revealed that 43% of all students in 2-year institutions enrolled in at least one remedial course

while 29% of students in 4-year institutions enrolled in a remedial course. The report also revealed that the number of students needing remediation varied greatly from state to state. For example, during the 2006-2007 academic year, 81% of Oklahoma's community college students were enrolled in remedial courses. During the 2004-2005 academic year, 70% of Indiana's college students needed remediation. In Kentucky, 53% of all students entering the state's 2- and 4-year institutions needed remediation during the 2004-2005 year, and in California where 40,000 freshmen are admitted each year into the California State University system, more than 60 % needed remediation in English, math, or both. The State Board of Education Master Plan FY 2008-2012 (2007) reported that for the 2005-2006 year, Tennessee's 2-year institutions reported that 73.9% of students needed remediation and 39.9% of students admitted into 4-year institutions needed remediation.

A Comparison of the 2-year and 4-year College Student

McIntosh and Rouse (2009) reported a substantial difference in the typical 2-year and 4-year college students. The 2-year college student was typically older than the student entering a 4-year college. Roughly half of the 2-year college students are between the ages of 18 and 24, compared to 60% of students attending 4-year colleges. Two-year college students were more likely to be enrolled on a part-time basis (59% versus 26%). More than half of the students enrolled in 2- year colleges are employed, as compared to 37% of 4-year college students. 2-year colleges enroll more non-Hispanic Black students (14%) and Hispanic students (15%) than 4-year colleges (12% and 8%, respectively). When compared to students attending 4-year colleges, 2-year college students are much more likely to be from families of lower socioeconomic status. 2-year college students are also less likely to receive financial aid, and the amount of aid received is lower.

McIntosh and Rouse (2009) also reported that individuals who enrolled as first-time students at 2-year colleges were academically less prepared than students who began their college careers at 4-year colleges. This is reflected by data depicting that students beginning at 2-year colleges have lower ACT and SAT test scores than students beginning at 4-year schools. The report also indicated that 61% of beginning students in 2-year colleges take one or more remedial courses compared to 30% of students in 4-year institutions who take such courses.

Because of these differences and other factors, the retention and completion rates for students entering 2-year institutions are lower than for students entering 4-year colleges or universities. According to McIntosh and Rouse (2009), factors attributed to lower retention and completion rates for community college students may be described in 3 ways: (1) Differences in the characteristics of students attending each type of institution, (2) differences in the cost of attending, including the availability of financial aid, and (3) differences in the institutional environment of the colleges. Data from the National Center for Public Policy and Higher Education Information Center for State Higher Education Policy Making and Analysis (2008) revealed that approximately one half of first-time students at 2-year colleges had returned for the second year, compared to about three quarters of 4-year college students who had returned for the second year. Similar numbers were reported in the state of Tennessee by the National Center for Public Policy and Higher Education (2008) where 57% of first-year community college students returned for the second year of college and 73% of freshmen in 4-year colleges returned for their sophomore year.

Supporting this study is a report from the United States Department of Education (2007) that revealed that the completion rate for 2-year college students was lower than that for 4-year college students. In 2005, approximately 30% of the students enrolling as first time, full-time

freshmen at 2-year colleges and seeking associate degrees had graduated within 3 years, while twice as many students who started at 4-year colleges had earned a degree within 6 years. Ross (2009) reported that in 2007, data showed 45% of Tennessee's university students graduated within 6 years while only 14% of the state's community college students graduated within 3 years.

Selected Studies on Developmental Education

Several studies that address the issue of the impact of developmental education on student success have been completed during the past several years. These studies have focused on student outcome measures such as student completion rates in developmental education courses, persistence, and retention rates, student success in subsequent college-level coursework, number of college credits completed, transfer rates to 4-year colleges, and degree and certificate completion rates.

Boylan and Saxon (2006) reviewed literature on developmental education and organized their findings into 4 areas: (1) Completion of remediation, (2) performance in college-level courses after remediation, (3) student grade point averages after remediation, and 4) retention after remediation. The authors cited a 1996 study conducted by the National Center for Education Statistics (NCES) of student completion rates in remedial courses. The report revealed that 90% of public community colleges and 95% of private community colleges reported that their students had completed their remediation within 1 year or less. The NCES study also found that for students in public community colleges, the success rates for students successfully completing developmental reading was 77%, developmental writing 79%, and developmental mathematics 74%. Although a high number of students completed their

developmental courses within 1 year, it should be remembered that many students did not finish developmental courses because they dropped out of the courses or stopped attending college.

Boylan and Saxon (2006) also reported on several studies that yielded information on the extent to which those students who had completed developmental courses also had successfully completed college-level courses in the same or related subjects. They cited the National Study of Developmental Education 1992 data from the college transcripts of more than 6,000 students at 150 institutions were studied in an effort to determine progress in college-level courses after successful completion of developmental studies courses. This research showed that, typically, students who had completed their developmental studies courses with grades of C or higher were also successful in passing their first college-level courses in the same or in related academic subject areas. For example, the study showed that 79% of those who completed developmental mathematics passed their first college-level math course. For those who passed a developmental English (writing) course, 91% passed their first college-level English course, while 83% who passed a developmental reading course also passed their first college-level English course.

The authors also cited 3 statewide studies conducted in Maryland, Minnesota, and Texas that had findings similar to those reported in the National Study of Developmental Education. Those state studies were fairly consistent in that nearly 80% of the students passed their first college-level courses in mathematics or English if they had completed a developmental course with a grade of C or better prior to enrolling in the college-level courses.

In reviewing several studies of student grade point averages after completion of developmental studies courses, Boylan and Saxon (2006) pointed out that research by Kulik and Kulik (1983, 1991), Shoenecker (1996), the U.S. General Accounting Office (1997), Chen and Cheng, (1999), Maryland Higher Education Commission (1996), and Adelman (1995) revealed

that the GPAs of postdevelopmental studies students indicated that community college students who placed in and participated in developmental studies courses attained higher cumulative GPAs than students who needed remediation but chose not to participate in the remediation program. Additionally, Boylan and Saxon concluded that students who were exempted from placement in developmental courses had higher GPAs than students who took the courses.

The fourth focus of the 1998 report by Boylan and Saxon focused on the retention rates for students who had participated in developmental studies programs. They pointed out that documenting student retention had been a popular, accepted way to evaluate the success of developmental education programs but that most of the studies on the subject of retention had small populations. Of the few studies that have adequate population samples or where there has been a significant literature review, the findings have been consistent. The evidence indicates that students who participated in developmental studies courses had retention rates equal to or often higher than those who did not participate.

Hodges (1998) reported that Chattahoochee Technical Institute (CTI) in Marietta, Georgia used the Assessment of Skills for Successful Entry and Transfer (ASSET) instrument during the 1995 year for mandatory placement of students into developmental or college-level courses. The college officials investigated the records of 1,261 students to determine how well placement into developmental studies helped to prevent high attrition by determining to what extent students were successful in developmental studies courses and subsequent college-level courses. Success in developmental education courses was defined by Roueche and Roueche (1993) as those programs having 50% or higher student retention rates in developmental studies courses. Using this definition, the results indicated that CTI students completed their developmental studies courses at an acceptable rate (61% to 70%), and the students required to

enroll in developmental studies courses prior to taking college-level courses succeeded in college-level courses with similar completion rates.

Fike and Fike (2008) reported on a study of 9,200 first-time college students enrolled during the 2001, 2002, 2003, and 2004 years at an urban community college in Texas. The study reviewed several variables that affected student retention, with retention being defined as students enrolling in the first year fall semester returning in the first year spring semester, and students enrolling in the first year fall semester returning in the second year fall semester. Findings of the study revealed that passing developmental courses, taking internet courses, participating in a student support services program, receiving financial aid, the parents' educational levels, and the number of courses enrolled in and dropped by the student in the first fall semester served as predictors of student persistence.

Goldstein and Perin (2008) conducted a study of 20,000 student records at a large urban community college located in a western state in an effort to identify the relationship between the students' literacy skills and achievement in a college psychology course that had high literacy demands. The study revealed that while a student's literacy skill upon enrollment into college was not a significant factor, the student's literacy skill at the time of enrollment in the psychology course was. As a matter of fact, Goldstein and Perin cited this as the most significant predictor of success in the course. These findings suggested that the student success rate in the psychology course was higher for students who had completed college-level English courses prior to enrolling in the course. An additional finding was that underprepared students who had completed developmental English had performed no differently from college-ready students in the college-level course. The findings also suggested that students who improved

their literacy skills by completing developmental or college-level English courses were able to increase their success in college.

McCuster (1999) referenced a 1996 longitudinal study conducted by the National Center for Educational Statistics that examined the academic records of 2.45 million students in more than 2,500 institutions. Of the students who had earned more than a semester of college credit by 1993, 55% of those who did not take a remedial course, and 47% who took only one remedial course had earned bachelor degrees. In comparison, only 24% of those students who took 3 or more remedial courses had earned bachelor degrees. The data indicated that students needing remedial math did better in their studies than those needing remedial reading, and reading skills deficiencies significantly lowered the odds that students would complete any degree because deficiencies in this area indicate comprehensive literacy problems.

Calcagno, Bailey, Crosta, and Jenkins (2006) examined whether the gaps in the rates of success of older and younger college students could be better understood by studying enrollment pathways and milestones for both groups. The study's findings relative to the impact of developmental education included: (1) Developmental education had a negative impact on degree attainment, more so for younger than older students; (2) developmental courses in reading and writing had the same impact on older and younger students; (3) the key barrier to success for older students was mathematics; (4) passing the first-year college-level composition course more than doubled a student's chances of graduating; and (5) completion of college-level algebra by students who had enrolled in remedial math was positively related to graduation; however, the success rate for older students was about half that of younger students.

Graybeal (2007) investigated the association between first-time, full-time freshman attributes and fall-to-fall retention rates of students at one community college located in

Northeast Tennessee. The 15 attributes included age, first-generation student status, gender, high school classification, race, student application date to the institution relative to the start of the semester, the four ACT test subscores, remedial or developmental course placement, major program of study, financial aid status, first semester grade point average, and end of first semester credit hour enrollment status. Each first-time, full-time freshman's entry term and enrollment status for the subsequent fall semester was ascertained, and this information was used to categorize the students into persister and nonpersister classifications. Results of the study indicated that the variables of age, first-generation student status, gender, and race were not significantly related to fall-to-fall retention, but high school classification, application date, the four ACT subscores, placement into remedial and developmental courses, major program of study, financial aid award, first semester grade point average, and end of semester credit hour enrollment status were significantly related to retention.

Bettinger and Long (2009) compared students with similar characteristics in the state of Ohio who attended colleges that followed different developmental education placement policies and, therefore, different rates of participation in the program. The study focused on 18-20 year-old undergraduate students who entered college in the fall of 1998. Results of the study suggested that students taking developmental education courses in the different colleges benefitted to some degree by the program in that they were more likely to persist in college and to complete bachelor degrees than were students with similar test scores and backgrounds who were not required to participate in a developmental education program.

Calcagno and Long (2008) studied causal effects of developmental education on 100,000 first-time, degree seeking students enrolled in one of Florida's 28 community colleges during the 3-year period from 1997 through 2000. The overall results of the investigation revealed that

while developmental education may promote persistence in college, this increased persistence had little effect on degree completion. On the other hand, Bettinger and Long (2009) found that participation in the developmental education program had been beneficial to the students in that they persisted in college.

The Florida legislature's Office of Program Policy Analysis and Government Accountability (2007) analyzed the performance of students who enrolled as first-time students in the state's community colleges during the period of 2000-2001 to 2004-2005. College readiness assessment test scores, developmental education course grades, college-level course grades, and degree attainment through June 2006 were studied. The investigation revealed that: (1) Students with greater developmental education needs were less successful in completing college preparation programs, (2) students who needed remediation in multiple developmental subjects were unlikely to complete college preparation programs, (3) students who failed to complete developmental education requirements were more likely to leave school or earn career or technical certificates, (4) students who completed developmental education programs passed foundation courses at rates similar to other students, and (5) students who completed developmental education programs earned degrees at similar rates as did nondevelopmental education students, although it took the developmental-level students an average of a year longer to complete the degree.

Martorell and McFarland (2007) examined data for students in Texas who entered the state's 2- and 4-year colleges as first-year students between the years 1991-1992 and 1999-2000. Texas is a state that uses a single placement exam and cutoff score for placing students in developmental education programs. The study compared students who scored just above or below the cutoff. The authors examined short- and long-term success in college. Short-term

outcomes included performance in first-time college-level courses and the number of academic credits attempted by students in their first year. Longer term objectives included the total number of credits a student attempted, the number of years of college completed, the number of students completing degree programs, and the impact on labor market earnings. The Texas study provided little evidence that students assigned to developmental education programs enjoyed sizable benefits from the program in academic outcomes or labor market earnings. This finding was true for students attending both 2- and 4-year colleges. The indication from the data was that developmental education had a minimal or even slightly negative impact on the academic credits attempted, the years of college completed, the attainment of an academic degree, and labor market performance.

The Use of Technology in Developmental Education

Providing developmental education for underprepared students continues to be a challenge for the nation's institutions of higher education, particularly for community colleges where large numbers of students require remediation. Wilson (1992) and McMillan, Parke, and Lanning (1997) reported that many community colleges had investigated the use of technology and computer-aided instruction in an effort to increase efficiency and learning effectiveness. There are numerous benefits to using computer-aided instruction, including privacy, objectivity, timeliness of feedback, individualization of learning, flexibility, convenience, and a nonthreatening environment for students (Wilson, 1992). Examples of developmental education computer-aided instruction systems used in 2-year colleges in the United States and Canada include SYNERGY and INVEST (Keup, 1998). TBR has worked to implement computer-based programs in its developmental programs for the past several years. In Tennessee, Cleveland State Community College was recognized by winning the Bellwether award in 2009 for using

technology in developmental education courses to enhance student learning. Cleveland State's program focused on programs and services that foster support in both teaching and learning.

Cost of Developmental Education Programs

Providing developmental education in the nation's colleges has been expensive. Expenditures in support of developmental education can be classified as direct and indirect. Direct costs have been those spent to provide for intervention and the duplication of effort in using institutions of higher education to provide instruction on academic subjects that should already have been mastered (Levin & Calcagno 2008). Bennett (1994) and McDonald (1998) reported there were also many indirect or hidden costs of developmental education, such as the loss of academic rigor in college-level courses by accommodating more students lacking adequate preparation.

Stienberg (1998) gave examples of this dilution of rigor. He provided information that showed courses once considered remedial had become regular college-level courses, and that courses that were once completed in a single semester now took a full year to complete. Costrell's 1998 study pointed out that large numbers of remedial-level students placed pressures on instructors to reduce course content and raise grades, which also resulted in diluting the quality of instruction for students who did not require remediation.

The total expenditures for funding developmental education programs are unclear because the colleges and the states use different approaches in determining cost. Merisotis and Phipps (2008) reported that developmental education expenditures in higher education were nearly 2 billion dollars per year, representing about 2% of the nation's higher education budget. Pope (2008) cited the Strong American Schools project report that suggested the cost of developmental education as being between \$2.3 and \$2.9 billion annually. These cost estimates

were confirmed by a report from the Bill and Melinda Gates Foundation (2009), which reported that developmental education programs and classes had cost taxpayers more than 2 billion dollars per year, money the foundation contested was mostly wasted because of the large numbers of students who had failed to complete the courses.

All 50 states permitted community colleges to use state funds to provide developmental education, but several states provided no funding designated specifically for such instruction. In 40 states part of the costs for developmental education was paid by the students, and local institutions subsidized developmental programs with their own funds in at least a third of the states (Jenkins & Boswell, 2002). Within the states, the rate of spending for developmental education ranged from a low of \$182,000 in Alaska to a high of \$135 million in California (Capriciroso, 2006).

Many researchers have concluded that the large cost of developmental education was wasteful, but others such as Long (2005) suggested the price of not offering developmental studies programs was even more costly because low educational levels had been associated with high unemployment, dependency on government programs, crime, and incarceration. Because of these differences of opinion, the answer to the question about the feasibility of allotting so many financial resources in support of developmental education remains inconclusive.

Summary

This chapter provided a review of the related literature concerning the increase in the numbers of colleges and universities and institutions providing developmental studies programs, a comparison of 2- and 4-year college students, studies of developmental education programs, the use of technology in developmental education, and the cost developmental education

programs. This review of literature clearly revealed that there is a wide disparity in the perceptions as to the successes and failures inherent in developmental education programs.

CHAPTER 3
RESEARCH METHODOLOGY

Introduction

As substantiated by research, recent high school graduates are often unprepared for college, and based on scores earned on the ACT assessment instrument, these students are required to complete developmental studies courses prior to enrolling in college-level courses. Students may be required to take up to six developmental courses in three academic subject content areas including mathematics, writing, and reading. Unprepared community college students face greater challenges in earning postsecondary degrees, and the likelihood these students will persist to graduation within 3 years is small, indeed.

This study was conducted at a selected comprehensive 2-year public institution under the governance of the Tennessee Board of Regents (TBR). The college was established in 1966 as an area vocational school. It became affiliated with and was placed under TBR's jurisdiction in 1983. The college, located in the upper Northeast corner of Tennessee, has a primary service area that includes the five Tennessee counties of Carter, Johnson, Sullivan, Unicoi, and Washington. This study focused on graduation rates for first time, full-time freshmen who were required to complete developmental studies courses based on scores earned on the ACT test.

Research Design

A quantitative study was conducted to examine the difference between the 3-year persistence-to-graduation rates for students required to take developmental studies courses and those not required to take developmental studies courses. An Ex-Post-Facto design was conducted to explore possible causal relationships among variables that cannot be manipulated by the researcher (McMillian & Shumacher, 2006).

Population

The subjects of the study were a selected group of students enrolled at a public, 2-year comprehensive community college. The college president granted authorization to access and use data collected and maintained by the college relative to the subjects. These data were originally maintained in the college's Student Information System (SIS) and, more recently, in the Banner software system. To secure anonymity of the subjects and any other information about the subjects that might be considered personal and confidential, each student included as a subject of the study was assigned an identification number.

The criteria used for selecting the subjects were: (1) Individuals who graduated from high school in the months of December through July in each of the years 2003, 2004, 2005, and 2006, and enrolled as first time, full-time students at a TBR community college during the fall semester immediately following high school graduation; (2) individuals who were classified as full-time students at the community college because they enrolled for a course load of 12 or more semester credit hours; and (3) individuals who had completed the ACT or SAT assessment tests and were placed in developmental-level or college-level courses based on subscores earned in English, reading, and mathematics. There were 2,326 students who met the criteria and were selected as subjects of the study.

Data Collection Procedures

A computer program was developed to extract data pertinent to the subjects of the study. The program placed the subjects into two groups based on each subject's ACT subscores in mathematics, writing, and reading. Group 1 consisted of students who were required to take one or more developmental studies courses. Group 2 consisted of students who were not required to take developmental studies courses and, therefore, enrolled in college-level courses. After

placing the students into these two groups, the subjects were tracked for a 3-year enrollment period. The groups were compared to each other to determine if differences existed between the groups for each of the hypotheses to be tested.

Research Questions and Null Hypotheses

Several research questions were addressed in this study to determine the relationship between placement of recent high school graduates into the developmental studies program at the community college and the 3-year persistence to graduation rate. These questions and null hypotheses were:

1. Is there a significant difference in the 3-year graduation rate for students required to take one or more developmental-level courses as compared to students not required to take developmental-level courses?

Ho1: There was no significant difference in the 3-year graduation rate for students required to take one or more developmental-level courses as compared to students not required to take developmental-level courses.

2. Is there a significant difference in the 3-year graduation rate for students required to take a developmental math course as compared to students not required to take a developmental math course?

Ho2: There was no significant difference in the 3-year graduation rate for students required to take a developmental math course as compared to students not required to take a developmental math course.

3. Is there a significant difference in the 3-year graduation rate for students required to take a developmental writing course as compared to students not required to take a developmental writing course?

Ho3: There was no significant difference in the 3-year graduation rate for students required to take a developmental writing course as compared to students not required to take a developmental writing course.

4. Is there a significant difference in the 3-year graduation rate for students required to take a developmental reading course as compared to students not required to take a developmental reading course?

Ho4: There was no significant difference in the 3-year graduation rate for students required to take a developmental reading course as compared to students not required to take a developmental reading course.

5. Is there a significant relationship between the number of developmental courses a student was required to take and the 3-year graduation rate?

Ho5: There was no significant relationship between the number of developmental courses a student was required to take and the 3-year graduation rate.

6. Is there a significant relationship between the number of academic subject content areas (mathematics, writing, and reading) in which a student was required to take developmental-level courses and the 3-year graduation rate?

Ho6: There was no significant relationship between the number of academic subject content areas (mathematics, writing, and reading) in which a student was required to take developmental courses and the 3-year graduation rate.

Data Analysis

Descriptive and informational statistical methods were used to analyze the research questions. The data were analyzed using the chi-square test of independence (two-way contingency table) for research questions 1-4. Research questions 5 and 6 were analyzed by

using a one-way analysis of variance (ANOVA). The .05 level of significance was used as the alpha level to test each hypothesis. All data were analyzed using SPSS version 14.0.

Summary

Chapter 1 provides background information and introduced the study, presented the problem and general research questions to be studied, described the significance of the study, stated the study's limitations, and defined the terms used in the study. Chapter 2 provides a review of the literature pertinent to the study. Chapter 3 delineates the research design, population studied, procedures for collecting data, research questions and null hypotheses tested, and the methodology for data analysis. Chapter 4 contains the analysis and interpretations of the data. Chapter 5 contains the summary, conclusions, implications, and recommendations for further study.

CHAPTER 4

RESULTS AND ANALYSIS OF DATA

Introduction

If the United States of America is to remain competitive in a global market, recover economically, and retain the ability to create and sustain a healthy job market, it is imperative that the level of educational attainment be raised and that more residents earn postsecondary degrees. The importance of an educated citizenry and qualified workforce is well documented, as also are the numerous benefits of earning postsecondary degrees. The purpose of this study was to determine whether there was a significant difference in graduation rates for students who entered college academically underprepared as compared to those who entered academically prepared to enroll in and successfully complete college-level courses. The study focused on recent high school graduates who enrolled in a specific community college located in upper Northeast Tennessee in the fall semester immediately following graduation.

The Honorable Phil Bredeson, Governor of Tennessee, stressed the importance of ensuring that high schools increase the rigor of the course work so that students are prepared for college upon graduation and that colleges work harder to ensure that students persist to graduation (personal communication, January, 2010). This study was designed specifically to investigate the relationship between graduation rates for first-time, full-time students who enter college underprepared for college-level course work, based on ACT scores, at a community college located in Northeast Tennessee (personal communication, January, 2010).

Data for this study were housed in the college's student records database in the Student Information System and more recently in the Banner Software System. The population consisted of all 2,326 first-time, full-time freshman students who enrolled in the fall semester immediately following high school graduation during the years 2003, 2004, 2005, and 2006. Students

enrolling in fewer than 12 semester credit hours were excluded from the study. The population set was classified into two categories based upon student ACT scores: those students who were required to take developmental courses and those who were not required to take developmental courses.

Six research questions were developed to direct the study, and 6 corresponding hypotheses were tested. A chi square test was used to determine if there was a difference in the 3- year graduation rate for students required to take developmental courses and students not required to take developmental courses. An ANOVA analysis was used to determine the relationship between the number of developmental courses a student was required to take and the 3-year graduation rate. An ANOVA analysis was also used to determine the relationship between the number of academic subject content areas in which a student was required to take developmental courses and the 3-year graduation rate. The research questions, hypotheses and data as well as data analysis are presented below.

Research Question 1

Is there a significant difference in the 3-year graduation rate for students required to take one or more developmental-level courses as compared to students not required to take developmental-level courses?

Ho1: There was no significant difference in the 3-year graduation rate for students required to take one or more developmental-level courses as compared to students not required to take developmental-level courses.

A two-way contingency table analysis was used to evaluate null hypothesis number 1. The analysis showed there was a significant difference in the 3-year graduation rate for subjects placed in a developmental course and subjects not placed in a developmental course, χ^2 (1,

$N=2,326$) = 87.25, $p < .001$, Cramer's $V = .194$. Therefore, the null hypothesis was rejected. Recent high school graduates entering college academically underprepared for college-level work were significantly less likely to earn an associate degree within 3 years as compared to students entering college academically prepared.

Information presented in Figure 1 provides information on the number and percentage of subjects in the study who graduated or failed to graduate within 3 years after initial enrollment, while information in Figure 2 reveals there were 2,326 students who were the subjects of the study, and 748 of the subjects or 32.2% of the population were not placed in a developmental course. Of these 748 subjects, 248 (33.2%) graduated within 3 years while 500 (66.8%) did not graduate within 3 years. Additionally, 1,578 of the subjects representing 67.8% of the population were placed in a developmental course. Of these 1,578 subjects, 254 (16.1%) graduated within 3 years while 1,324 (83.9%) did not graduate within 3 years.

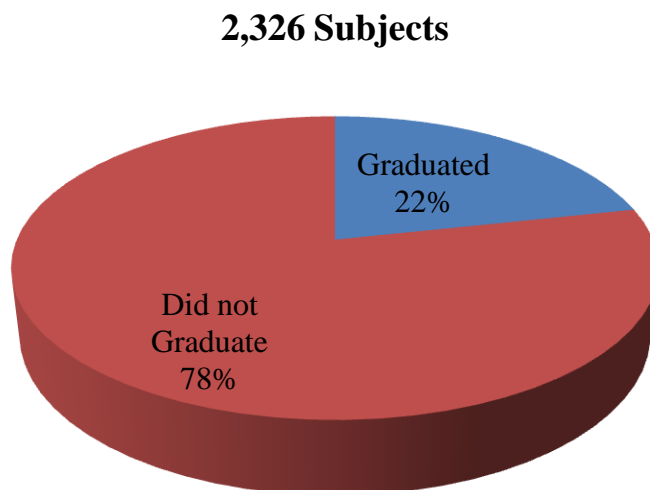


Figure 1

Number and Percentage of Subjects Who Graduated Within 3 Years

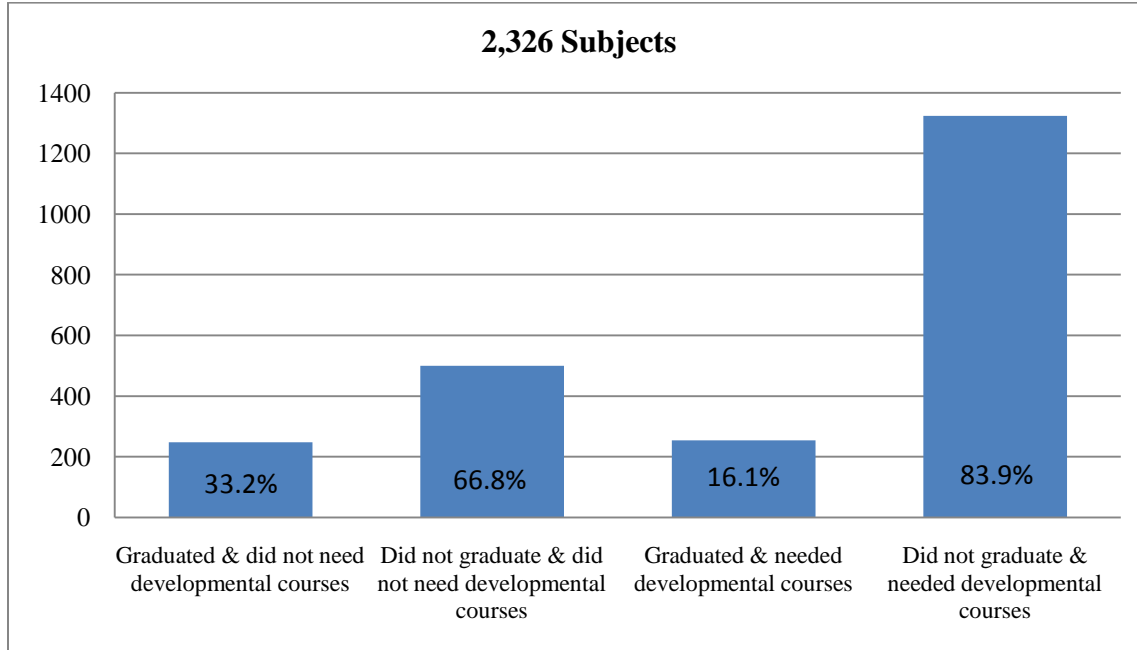


Figure 2

Number of Subjects Required to Take a Developmental Course or a College-level Course and the Graduation Status for Each

Research Question 2

Is there a significant difference in the 3-year graduation rate for students required to take a developmental math course as compared to students not required to take a developmental math course?

Ho2: There was no significant difference in the 3-year graduation rate for students required to take a developmental math course as compared to students not required to take a developmental math course.

A two-way contingency table analysis was used to evaluate null hypothesis number 2. The analysis showed there was a significant difference in the 3-year graduation rate of students placed in a developmental math course and students not placed in a developmental math course, $\chi^2(1, N=2,326) = 78.8, p < .001$ Cramer's $V = .058$. Therefore, the null hypothesis was rejected. Recent high school graduates entering college underprepared to enroll in college-level math courses were significantly less likely to earn an associate degree within 3 years as compared to students entering college academically prepared to enroll in college-level math courses.

Table 1 provides data on the number of subjects required to take a developmental math course or a college-level math course and the graduation rate for each group. Data in Table 1 depict that of the 2,326 subjects, 870 or 37.4% of the population were not required to take a developmental math course. Of these 870 students, 273 (31.4%) graduated within 3 years while 597 (68.6%) did not graduate within 3 years. There were 1,456 subjects or 62.6% of the population placed in a developmental math course. Of these 1,456 students, 229 (15.1%) graduated within 3 years while 1,227 (84.3%) did not graduate within 3 years.

Table 1

Number of Subjects Required to Take a Developmental Math Course and the Graduation Rates

Developmental Math Course(s)	Graduated Within 3 Years			
	No		Yes	
	N	%	N	%
No	597	68.6	273	31.4
Yes	1227	84.3	229	15.7

Research Question 3

Is there a significant difference in the 3-year graduation rate for students required to take a developmental writing course as compared to students not required to take a developmental writing course?

Ho3: There was no significant difference in the 3-year graduation rate for students required to take a developmental writing course as compared to students not required to take a developmental writing course.

A two-way contingency table analysis was used to evaluate null hypothesis number 3. The analysis showed there was a significant difference in the 3-year graduation rate for students placed in a developmental writing course when compared to students not placed in a developmental writing course, $\chi^2 (1, N=2,326) = 65.2, p < .001$, Cramer's $V = .167$. Therefore, the null hypothesis was rejected. Recent high school graduates entering college academically underprepared to enroll in college-level writing-intensive courses were significantly less likely to earn an associate degree within 3 years as compared to students entering college academically prepared to enroll in college-level writing-intensive courses.

Data in Table 2 provide information on the number of subjects required to take a developmental writing course or a course requiring college-level writing skills and the graduation rate for each group. Table 2 reveals that of the 2,326 subjects, 1,613 or 69.3% of the population were not placed in a developmental writing course. Of these 1,613 students, 422 (26.2%) graduated within 3 years while 1,191 (73.8%) did not graduate within 3 years. The other 713 of the subjects or 30.6% of the population were placed in a developmental writing course.

Of these 713 students, 80 (11.2%) graduated within 3 years while 633 (88.8%) did not graduate within 3 years.

Table 2

Number of Subjects Required to Take a Developmental Writing Course and the Graduation Rates

Developmental Writing Course(s)	Graduated Within 3 Years			
	No		Yes	
	N	%	N	%
No	1191	73.8	422	26.2
Yes	633	88.8	80	11.2

Research Question 4

Is there a significant difference in the 3-year graduation rate for students required to take a developmental reading course as compared to students not required to take a developmental reading course?

Ho4: There was no significant difference in the 3-year graduation rate for students required to take a developmental reading course as compared to students not required to take a developmental reading course.

A two-way contingency table analysis was used to evaluate null hypothesis number 4. The analysis revealed there was a significant difference in the 3-year graduation rate for students placed in a developmental reading course and students not placed in a developmental reading course, $\chi^2(1, N=2,326) = 45.79, p < .001$, Cramer's $V = .140$. Therefore, the null hypothesis was rejected. Recent high school graduates entering college academically underprepared to

enroll in college-level reading-intensive courses are significantly less likely to earn an associate degree within 3 years as compared to students entering college academically prepared to enroll in college-level reading-intensive courses.

Table 3 provides information on the number of subjects required to take a developmental reading course or a course requiring college-level reading skills and the graduation rate for each group. The data in Table 3 depict that of the 2,326 subjects, 1,763 or 75.8% of the population were not required to take a developmental reading course. Of these 1,763 subjects, 438 (24.8%) graduated within 3 years while 1,325 (75.2%) did not graduate within 3 years. There were 563 subjects or 24.2% of the population who were placed in a developmental reading course. Of these 563 subjects, 64 or 11.4% graduated within 3 years while 499 (88.6%) did not graduate within 3 years.

Table 3

Number of Subjects Required to Take a Developmental Reading Course and the Graduation Rates

Developmental Reading Course	Graduated Within 3 Years			
	No		Yes	
	N	%	N	%
No	1325	75.2	438	24.8
Yes	499	88.6	64.0	11.4

Research Question 5

Is there a significant relationship between the number of developmental courses a student was required to take and the percentage of students graduating within 3 years?

Ho5: There was no significant relationship between the number of developmental courses a student was required to take and the percentage of students graduating within 3 years.

Table 4 provides information about the relationship between the number of developmental courses in which a student was placed and the 3-year graduation rate. There are six developmental courses in the academic content areas of mathematics, writing, and reading into which a student can be placed.

A one-way analysis of variance was conducted to evaluate the relationship between the number of developmental courses students were required to take and the 3-year graduation rate. For this analysis, only those students who were placed into at least one developmental course in mathematics, writing or reading were included. The grouping variable was the number of developmental courses required measured as (1) one course, (2) two courses, (3) three courses, (4) four courses, and (5) five or six courses. The test variable was the graduation rate measured as the proportion in each category of the grouping variable that graduated. For the purpose of this analysis, the graduation rate variable was a dichotomous variable coded 0 = did not graduate and 1 = graduated. The test variable is the proportion that graduated with an associate degree within 3 years.

The one-way ANOVA showed there was a significant difference in the 3-year graduation rate based on the number of developmental courses students were placed into, $F(4, N=1573) = 7.283, p < .001$. Therefore, the null hypothesis was rejected. The strength of the relationship between the number of courses required and the graduation rate was small ($d=.02$).

Because the overall ANOVA was significant, the Tukey post hoc test was conducted to determine which pairs of means were different. The Tukey procedure showed there was a significant difference in the graduation rate between students who were placed into only one developmental course and those placed into four developmental courses ($p = .004$), and between students who were required to take only one developmental course and those required to take five or six developmental courses ($p < .001$). In each case, the graduation rate was higher for students placed into only one developmental course than for those who were placed into four or more developmental courses. Additionally, there was a significant difference in the 3-year graduation rate for students required to take two developmental courses and those required to take five or six ($p = .004$). Students required to take two developmental courses had a higher graduation rate than those who had to take five or six developmental courses. None of the other pairs of means was significant. Clearly, the fewer the number of developmental courses a recent high school graduate is required to take, the more likely the student is to graduate with an associate degree within 3 years.

Table 4

Graduation Rates by Number of Developmental Courses

Number of Developmental Courses	<i>N</i>	%
One	492	21.3
Two	421	18
Three	290	14.1
Four	186	10.2
Five or Six	189	6.88

Research Question 6

Is there a significant relationship between the number of academic subject content areas (mathematics, writing, and reading) in which a student was required to take developmental-level courses and the percentage of students graduating within 3 years?

Ho6: There was no significant relationship between the number of academic subject content areas (mathematics, writing, and reading) in which a student was required to take developmental courses and the percentage of students graduating within 3 years.

A one-way analysis of variance was conducted to evaluate the relationship between the number of academic subject content areas students were placed into and the 3-year graduation rate. For this analysis, only those students placed into at least one academic subject content area were included. The grouping variable was the number of developmental courses required measured as (1) one academic content area, (2) two academic subject content areas, or (3) three academic subject content areas. The test variable was the graduation rate measured as the

proportion in each category of the grouping variable that graduated. For the purpose of this analysis, the graduation rate variable was a dichotomous variable coded 0 = did not graduate and 1 = graduated. The mean of the test variable is the proportion that graduated.

The one-way ANOVA showed there was a significant difference in the 3-year graduation rate based on the number of academic subject content areas students into which students were placed, $F(4, N=1575) = 16.460, p < .001$. The strength of the relationship between number of courses required and graduation rate was small ($d=.02$).

Because the overall ANOVA was significant, the Tukey post hoc test was conducted to determine which pairs of means were different. The Tukey procedure showed there was a significant difference in the graduation rate between students who were placed into only one academic subject content area and those required to take courses in three academic subject content areas ($p < .001$). Additionally, the graduation rate for students who were placed into developmental courses in three academic subject content areas was significantly lower than for students who were placed into developmental courses in two academic subject content areas. There was no significant difference in the graduation rate of students who were required to take developmental courses in one academic subject content area and those required to take courses in two academic subject content areas.

The data suggest that the more academic subject content areas in which a recent high school graduate is required to take developmental courses, the less likely the student is to graduate within 3 years.

Table 5 provides additional information on the number of subjects in the study who were required to take developmental courses in one or more academic subject content areas by identifying the academic subject content area or areas in which the subjects were placed. The

subjects were placed into three groups. The groups were: (1) Number placed in a developmental course in only one academic subject content area, (mathematics, writing, or reading); (2) number placed in a developmental course in two academic subject content areas (mathematics and reading; mathematics and writing; or reading and writing); and (3) number placed in a developmental course in three academic subject content areas (mathematics, writing, and reading). Each group was tracked to determine the 3-year graduation rate. Table 5 provides information about the relationship between the number of academic subject content areas in which a student was placed and the 3-year graduation rate.

Table 5

Graduation Rates by Number of Developmental Academic Subject Content Areas

Number of Academic Subject Content Areas	<i>N</i>	%
One	799	20.3
Two	404	16.1
Three	375	7.2

Table 6 data revealed that 799 subjects were required to take at least one developmental course in one of the three academic subject content areas of mathematics, writing, or reading. An overwhelming majority of students required to take a developmental course in only one academic subject content area was placed in the area of mathematics. The second largest placement was in the academic subject content area of writing, followed by placement in the area of reading. Of the 799 subjects, 706 were required to take only a developmental math course and 139 (19.7%) of these graduated within 3 years. There were 66 of the 799 subjects required to

take only a developmental course in the academic subject content area of writing and 15 (22.7%) of these graduated within 3 years. Included in the 799 subjects were 27 that were required to take only a developmental course in the academic subject content area of reading and of these, 8 (29.8%) graduated within 3 years.

There were 404 subjects required to take developmental courses in 2 academic subject content areas. The largest number of these subjects was placed in the academic subject content areas of mathematics and writing. The second largest placement was in the academic subject content areas of mathematics and reading, followed by placement in the areas in reading and writing. Of these 404 students, 243 were required to take developmental courses in the academic subject content areas of mathematics and writing, and 36 (14.8%) of these 243 graduated within 3 years. Of the 404 subjects, 132 were required to take developmental courses in the academic subject content areas of mathematics and reading and of these, 27 (20.5%) graduated within 3 years. Twenty-nine of the 404 subjects were required to take developmental courses in the academic subject content areas of reading and writing and of these, 2 (6.9%) graduated within 3 years. There were 375 subjects who were required to take developmental courses in 3 academic subject content areas (mathematics, writing, and reading). Of these 375, 27 (7.2%) graduated within 3 years.

Table 6

Number of Subjects Required to Take Developmental Courses by Academic Content Subject Areas and the Graduation Rates

Academic Subject Content Areas	Graduated Within 3 Years			
	<u>No</u>		<u>Yes</u>	
	N	%	N	%
No Developmental	500	66.8	248	33.2
Math Only	567	80.3	139	19.7
Writing Only	51	77.3	15	22.7
Reading Only	19	70.4	8	29.6
Math and Reading	105	79.5	27	20.5
Math and Writing	207	85.2	36	14.8
Reading and Writing	27	93.1	2	6.9
Math, Writing and Reading	348	92.8	27	7.2

CHAPTER 5

SUMMARY, CONCLUSIONS, IMPLICATIONS FOR PRACTICE, AND RECOMMENDATIONS

Introduction

Chapter 5 is composed of 5 sections. The first section contains an introduction to the chapter. The second section contains a summary of the study's findings. The conclusions drawn from the study are contained in the third section. The fourth section contains the implications of the study, and the recommendations for further study are contained in the fifth section.

Summary of the Findings

A review of pertinent literature was conducted on the effectiveness of developmental education programs in the nation's colleges and universities. The review revealed that an increasingly larger number of recent high school graduates are entering the nation's colleges and universities underprepared for college-level studies. This lack of academic readiness and preparation is a national problem that resonates with lawmakers, business and industry leaders, teachers, and parents alike. To address this problem and the related issues of remediation, retention, and persistence to graduation, colleges and universities throughout the nation have implemented developmental education programs. Community colleges in particular have assumed the primary responsibility for providing comprehensive developmental education programs because of their open-door policy, and as such, a significant number of their students enter college underprepared. As noted by Parsad and Lewis (2003), community colleges are more likely to provide developmental programs of study than other types of collegiate institutions.

These programs are financially expensive, and they are costly in other ways as well. A review of professional literature did not provide conclusive evidence that remediation efforts are effective. Information derived from the literature review deemed relevant to this study was presented in Chapter 2.

The problem of the study is that it is not known if students taking developmental courses are graduating at the same rate as those students who are not required to take developmental courses. This study examined data from a particular community college in Northeast Tennessee and serves to determine if students who enter academically underprepared and are required to take developmental education program courses persist to graduation at the same rate as students who enter college academically prepared for college-level studies. The study also examined the extent to which the number of developmental courses and the number of academic subject content areas into which a student is placed was related to persistence to graduation. The subjects of this study were 2,326 students who had recently graduated from high school and enrolled in a community college as first-time, full-time students. Based on the ACT subscores in mathematics, writing, and reading, these students were placed into 1 of 2 groups; those placed in developmental education courses and those placed in college-level courses. The groups were tracked for a 3-year period. A chi square analysis was conducted to determine if there was a statistically significant difference in the graduation rates of each group. Additionally, an ANOVA analysis was used to determine the relationship between the number of developmental courses and the number of academic subject content areas into which a student was placed and the 3-year graduation rate.

This study found that there was a significant difference in the 3-year graduation rate for students required to take developmental education courses when compared to those placed in

college-level courses. The findings also supported the premise that the number of developmental education courses into which a student was placed and the number of academic subject content areas into which a student had to take courses was related to the 3-year graduation rate.

Research question 1 was addressed to determine if there was a difference in the 3-year graduation rate for students required to take one or more developmental-level courses as compared to students not required to take developmental-level courses. Group 1 was composed of those who were required to take developmental courses while group 2 consisted of those not required to take developmental courses. Each group was tracked to determine the 3-year graduation rate.

A two-way contingency table analysis indicated there was a significant difference in the graduation rate for subjects required to take developmental courses (16.1%) and those not required to take developmental courses (33.2%), $\chi^2(1, N=2,326) = 87.25, p < .001$. The data revealed that first-time, full-time freshmen entering college academically prepared for college level work are more than twice as likely to earn an associate degree within 3 years as compared to students entering college underprepared and required to take developmental courses prior to enrolling in college-level studies.

Similarly, research question 2 focused on determining if there was a difference in the 3-year graduation rate for students required to take a developmental math course as compared to students not required to take a developmental math course. This question was addressed by sorting the students into two groups. Group 1 contained students who were required to take a developmental math course while group 2 consisted of students who were not required to take a developmental math course. Each group was tracked in order to determine the 3-year graduation rate. A two way contingency table analysis indicated there was a significant difference in the

number of students required to take a developmental math course and graduating within 3 years (15.7%) and those not placed in a developmental math course and graduating within 3 years (31.4%), $\chi^2(1, N=2,326) = 78.8, p < .001$. The data revealed that recent high school graduates entering college academically underprepared to enroll in college-level math courses were much less likely to earn an associate degree within 3 years as students entering college underprepared and placed in a developmental math course.

Research question 3 was aimed at determining if there was a difference in the 3-year graduation rate for students required to take a developmental writing course as compared to students not required to take a developmental writing course. Question 3 was addressed by placing the students into two groups. Group 1 contained students who were required to take a developmental writing course while group 2 consisted of students who were not required to take a developmental writing course. Each group was tracked in order to determine the 3-year graduation rate. A two way contingency table analysis indicated there was a significant difference in the percentage of students required to take a developmental writing course and graduating within 3 years (11.2%) and those not placed in a developmental writing course and graduating within 3 years (26.2%), $\chi^2(1, N=2,326) = 65.2, p < .001$. The data indicated that recent high school graduates entering college academically prepared to enroll in college-level writing intensive courses were more than twice as likely to earn an associate degree within 3 years as students entering college underprepared and placed in a developmental writing course.

Research question 4 addressed the premise that there was a difference in the 3-year graduation rate for students required to take a developmental reading course as compared to students not required to take a developmental reading course. This question was addressed by sorting the students into 2 groups. Group 1 consisted of students who were required to take a

developmental reading course, and group 2 contained students who were not required to take a developmental reading course. Each group was tracked to determine the 3-year graduation rate. A two way contingency table analysis indicated there was a significant difference in the percentage of students required to take a developmental reading course and graduating within 3 years (11.4%) and those not placed in a developmental reading course and graduating within 3 years (24.8%), $\chi^2(1, N=2,326) = 45.79, p < .001$. The data revealed that recent high school graduates entering college academically prepared for collegiate-level reading-intensive courses are more than twice as likely to earn an associate degree within 3 years as compared to students entering college underprepared and required to take a developmental reading course.

Research question 5 focused on determining if there was a relationship between the number of developmental courses a student was required to take and the 3-year graduation rate. To address this question, the students were placed into 6 groups. The groups were: (1) The number taking no developmental courses, (2) the number taking one developmental course; (3) the number taking two developmental courses, (4) the number taking three developmental courses, (5) the number taking four developmental courses, and (6) the number taking five or six developmental courses. Each group was tracked in order to determine the 3-year graduation rate.

An ANOVA analysis indicated there was a significant relationship between the number of developmental courses into which a student was placed and the 3-year graduation rate. The data suggest that as the number of developmental courses into which a student is placed increases, the likelihood the student will earn an associate degree within 3 years decreases.

This finding suggests the need for K-12 public school leaders to raise the expectations for and standards of learning for all students. Doing so may result in an increase in the number of high school graduates who enroll in college, a corresponding decrease in the number of students

requiring remediation in college and an increase in the number of students graduating with an associate degree within 3 years. It may also eliminate the social stigma of being academically underprepared as well as result in a significant savings of personal time and financial recourses.

Research question 6 was addressed to determine if there was a relationship between the number of academic subject content areas (mathematics, writing, or reading) in which a student was required to take developmental courses and the 3-year graduation rate. Question 6 was addressed by sorting the students into three groups. The groups were: (1) The number of students placed in a developmental course in only one academic subject content area, (2) the number of students placed in a developmental course in two academic subject content areas, and (3) the number of students placed in a developmental course in three academic subject content areas. Each group was tracked to determine the 3-year graduation rate.

An ANOVA analysis indicated there was a significant relationship between the number of academic subject content areas in which a student was required to take developmental courses and the 3-year graduation rate. The finding suggests that for each additional academic subject content area in which a student is required to take developmental courses, there is a decrease in the probability of earning an associate degree within 3 years.

Again, the finding suggests the need for K-12 public school leaders to ensure that students who graduate from high school are academically prepared to enroll and succeed in college-level studies. Doing so may result in an increase in the number of students who complete high school and go to college, a decrease in the number of students needing remediation in college, and an increase in the number who graduate from a community college with an associate degree within 3 years. It may also eliminate the social stigma of being

academically underprepared as well as result in a significant savings of personal time and financial resources.

As stated elsewhere in the study, developmental education has received extensive study, but these studies have yielded conflicting results. The review of literature supports the contention that as Calcagno and Long (2009) suggested, despite the long history of developmental programs being provided by the nation's institutions of higher education, there is little evidence on the effectiveness of college remediation on college outcomes.

The findings of this study are consistent in several ways with findings in other studies of developmental education. First, the number of students needing remediation is similar to information reported by the Strong American Schools Project (2008) which revealed that a large percentage of students in the nation's colleges and universities have been required to take developmental education courses because they are academically underprepared. This finding was also consistent with data reported by other colleges in Tennessee which revealed that in the 2005-2006 year 73.9% of the state's community college students and 39.9% of the students attending the state's 4-year institutions of higher education needed remediation (TBR, 2005).

Other notable similarities in which the findings of this study are consistent with previous research suggest: (1) Students who were not required to take developmental courses or were required to take only one course were more likely to graduate with a bachelor degree at a much higher rate than students who were required to take three or more developmental courses (McCuster, 1999); (2) although placement into a developmental course may promote persistence in college, this persistence has little effect on degree completion (Calcagno & Long, 2008); (3) students who needed remediation in multiple developmental subjects were unlikely to complete college preparation programs (Florida Office of Program Policy and Government Accountability,

2007); and (4) students required to take developmental courses are more likely to withdraw from institutions of higher education than those not required to take developmental education courses (Bradburn, 2001).

Conclusions

Previous research has focused on an almost limitless array of factors related to the subject, but the question about the effectiveness of developmental education has not yet been definitively answered.

Several conclusions were drawn based on the analysis of the data relevant to this study. These include:

- 1) Students who entered the college in this study and who were academically prepared demonstrated higher persistence to graduation rates than did students who entered academically underprepared.
- 2) This study concludes that students who were subjects of this study who were placed into developmental courses at this particular community college decreased the probability that the student will graduate within 3 years with an associate degree.
- 3) The subjects of this study indicated that an increase in the number of developmental education courses into which a student is placed lowers the probability the student will graduate with an associate degree within 3 years.
- 4) Students in this study who required remediation in one academic content area were more likely to graduate with an associate degree in 3 years than students requiring remediation in two or more academic subject content areas.

Implications of the Study

The findings of this study leads to several recommendations for practice. These recommendations may have particular relevance for lawmakers, business and industry leaders, educators, and the general public. Leaders of local school districts in the state of Tennessee must continue to study, refine existing programs, and develop and implement new programs designed to ensure that high school graduates are academically prepared to a level that enables them to attain jobs or continue on to college ready to succeed in college-level studies.

Leaders of local school districts and the principals, teachers, and guidance counselors working in local high schools can help to increase the numbers of students graduating from high school academically prepared to go to college. The influence these secondary school professionals have on students is enormous. By continually discussing with students the importance of mastering prior to high school graduation the basic mathematics, writing, and reading skills needed to enroll in and succeed in college, these educators can have a greater impact than perhaps any other group.

Leaders of state systems of higher education and the presidents of collegiate institutions within each state must provide leadership to and support of local school system personnel whose mission includes preparing students to enter the job market or to continue their educational pursuits. These collegiate leaders must also continue to search for and implement more effective and efficient ways of providing developmental education programs for the academically underprepared students enrolling in their institutions.

A third implication of the study is addressed to lawmakers at the federal and state levels. Through measures such as establishing laws, rules and regulations, and budgeting processes,

lawmakers can have an enormous impact on improving the educational level of the nation's residents. An example of this is the No Child Left Behind (NCLB) federal legislation signed into law in 2001. The legislation greatly expanded the federal government's role in education by mandating that states and local schools become more accountable for student progress (US Department of Education, 2001). NCLB has become the driving force behind a number of measures designed to raise the academic achievement level of the nation's K-12 students and increase the numbers of academically prepared students who graduated from the K-12 system.

Lawmakers on the state and federal levels must ensure that the high school curriculum is significantly rigorous so that students are academically prepared to enroll in college-level courses immediately upon graduation from high school. Additionally, lawmakers might consider providing incentives for high schools whose graduates demonstrate based upon ACT scores that they are academically prepared for college-level courses. Such an incentive program would serve to recognize and reward high performing schools and serve to motivate school leaders whose students are academically underprepared as evidenced on performance on the ACT to enroll in college-level courses upon graduation from high school.

Because every high school junior in the state of Tennessee is required to take the ACT assessment during the junior year, high school teachers, counselors, and administrators are in a position to use these test results to initiate programs and services to remediate those students who do not demonstrate appropriate academic preparation for college-level courses. Using these ACT scores, educators can work to ensure that students who score less than a 19 in any subject area or less than a 19 composite score have access to tutoring, on-line course work, and other opportunities to raise their academic skills prior to high school graduation.

The findings of this study may have implications for the community college in which the study was conducted as the institution strives to increase retention and graduation rates of its students. Because the institution is committed to increasing the graduation rate, the college is encouraged to review and revise its developmental studies program to ensure that the courses are relevant and that they satisfactorily prepare a developmental education student to succeed in college-level studies.

Faculty and staff at the college should develop a workable plan to ensure that every first-time student enrolling at the institution is informed about the persistence-to- graduation-rate for those students who are academically underprepared and required to take one or more developmental courses. Doing so would let the student know that academic under-preparedness is considered a high-risk factor which can negatively impact college success and graduation. This information might also encourage the student to schedule additional academic advising, counseling, tutoring, and other student support services designed to foster student success.

The study's findings may be useful to other colleges providing developmental education programs. The study also may provide information to educational leaders participating in the TBR Redesign of Developmental Education project.

Recommendations for Further Research

This study was not intended to be an all encompassing research study on the developmental education program offered at a specific community college. Other studies of developmental education programs that have been or may be conducted at other community colleges may have similar findings. Because this study was conducted at a specific community college, the findings of the study may not be generalized to other collegiate institutions or other community colleges that provide developmental education. However, the findings of the study,

all or in part, may have relevance to other community colleges that provide developmental education programs for the underprepared students.

Because the majority of underprepared students attend the nation's community colleges, the 2-year institutions can have a great influence on raising the educational level of the nation's residents. During these difficult economic times and given the continuing and ever increasing competition from other nations, community colleges should lead the way in addressing the academically underprepared student. One important way the community colleges can do this is to continue researching the effectiveness of developmental education programs.

Several recommendations for additional research can be made as a result of this study.

The following are suggested:

- 1) Research to determine the persistence to graduation rate for older (nontraditional) students placed in developmental education programs.
- 2) Research to determine the effectiveness of different technology initiatives which may be used to enhance student learning, particularly as it relates to developmental education.
- 3) Research to determine the various ways technology may be used in the instructional process so that the needs of the students are addressed effectively and student learning is enhanced.
- 4) Research to determine the 6-year persistence to graduation rate for students placed in a community college developmental education program.
- 5) Research to identify high-risk factors which may contribute to the low rate of graduation for students placed in developmental education programs.

- 6) Research to identify how community colleges can become more efficient and effective in providing developmental education programs designed to increase the college graduation rate.
- 7) Research to determine student perceptions about the value of developmental education courses in which they were placed and the relationship between the perceived value and the persistence to graduation rate.
- 8) Research to determine faculty perceptions of the value to students of placement into developmental education courses and how the developmental program might be improved to increase student success and persistence to graduation.
- 9) Research to determine the effect the newly-adopted high school graduation requirements will have on decreasing the number of Tennessee's high school graduates requiring remediation upon college entrance.
- 10) Research in other Tennessee public community colleges to determine the variances in the number of recent high school graduates needing remediation, the number of developmental courses these students are required to take, and the 3-year graduation rate of these students, and
- 11) Research to elucidate the true financial costs of developmental education programs and the cost-to-benefit ratio.

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