

An Evaluation of a Policy Intervention to Increase Academic Achievement in a Technical High
School: Does Model Matter?

Kim Infinger

A dissertation
submitted in partial fulfillment of the
requirements for the degree of

Doctor of Education

University of Washington

2015

Reading Committee:

Joe L. Lott, II, Chair

Andrew Gordon

Richard Knuth

Steven Olswang

Program Authorized to Offer Degree:

College of Education

©Copyright 2015

Kim Infinger

University of Washington

Abstract

An Evaluation of a Policy Intervention to Increase Academic Achievement in a Technical High School: Does Model Matter?

Kim Infinger

Chair of the Supervisory Committee:

Associate Professor Joe Lott

College of Education, Education Leadership and Policy Studies

Lake Washington Technical Academy (LWTA) is a dual enrollment high school located on the campus of a technical college with a focus on serving at-risk youth who have either dropped out or left their previous high school for a number of reasons. Students endeavor to earn a high school diploma and significant college credits that can lead to an associate degree or a certificate. This study describes the demographic and academic characteristics of students who first enrolled at LWTA from Fall 2006 through April 2011 in order to evaluate the potential impact of a policy change which occurred in the Fall of 2009. Beginning Fall 2009, LWTA established a policy that students who entered the program with a high school GPA below 2.0 were at greater risk for academic failure and would need additional support to be successful. LWTA implemented the Gateway to College program as an intervention for this group of students and retained its original model for students determined to be at lower academic risk upon entry. This dissertation utilizes

Tinto and Pusser's (2006) model of institutional action as a theoretical framework to articulate the theory of change that is proposed to increase academic achievement of the at-risk students post Fall 2009. This study examined differences in three measures of academic achievement (cumulative first year GPA, attainment of a high school diploma, and attainment of a college credential) between groups of students, referred to as policy cohorts. The study also examined variables that could be useful in predicting these differences. Regression analysis indicated the most important variables in predicting first year GPA were being in an at-risk policy cohort and age at entry. Variables that contributed to the prediction of attainment of a high school diploma were race, COMPASS math score, number of credits earned at entry, and first year cumulative GPA. The strongest predictors of attainment of a college credential were being in the at-risk policy cohort, age at entry, and first year cumulative GPA. This study has important implications for dual enrollment programs and interventions designed for at-risk and dropout youth.

TABLE OF CONTENTS

DEDICATION	vi
ACKNOWLEDGEMENTS	vii
CHAPTER 1: INTRODUCTION	1
Background	2
Social and Economic Impact of Low Levels of Educational Attainment.....	4
Dual Enrollment as a Strategy for Closing Attainment Gaps	6
Problem Statement	7
Purpose.....	10
Research Questions	11
Need for the Study	12
Location of the Proposed Study	13
History of Lake Washington Technical Academy	13
Significance of the Proposed Study	16
Philosophical Approach	20
Limitations	23
Delimitations.....	23
Definitions and Abbreviations	24
Summary	27
CHAPTER 2: LITERATURE REVIEW	29
Options to Improve Secondary and Postsecondary Outcomes	41
Theories of Student Persistence and Attrition in Postsecondary Education	48
Summary	83
CHAPTER 3: METHODOLOGY	85

Research Design.....	85
Study Population.....	86
Research Questions and Hypotheses	88
Variable Selection.....	92
Dependent Variables.....	93
Independent Variables	96
Data Sources	99
Data Collection	99
Summary.....	103
CHAPTER 4: RESULTS.....	104
Characteristics of Sample	104
Institutional Variable (Policy cohort)	104
Demographic Variables	105
Pre-entry Academic Variables	107
Research Questions.....	110
Summary of Results	131
CHAPTER 5: CONCLUSION	133
Overview of the Study	134
Discussion of the Results	135
Implications for Practice	144
Limitations	150
Recommendations for Future Research	151
Conclusion	154

REFERENCES	155
APPENDIX A.....	199
APPENDIX B.....	200

LIST OF TABLES

Table Number	Page
1. Characteristics of Policy Cohorts at LWTA	10
2. Variables Coding	98
3. Frequency and Percentage by Policy Cohort	105
4. Frequency and Percentage by Gender.....	105
5. Frequency and Percentage by Age.....	106
6. Mean and Standard Deviation by Age	106
7. Frequency and Percentage by Race	107
8. Frequency and Percentage by Term of Entry	107
9. COMPASS Scores by Policy Cohorts	108
10. High School Credits Earned Prior to Entry.....	108
11. High School GPA on Entry.....	109
12. Correlation Matrix for Predictor Variables.....	109
13. Chi-square Analysis of Policy Cohorts and Gender	111
14. Chi-square Analysis of Policy Cohorts and Race	112
15. Chi-square Analysis of At-Risk Cohorts and Term of Entry.....	113
16. Summary of Multiple Linear Regression for CGPA	120
17. Chi-square Analysis of Policy Cohorts and High School Diploma Attainment.....	121
18. Summary of Logistic Regression for High School Diploma Attainment	126
19. Chi-square Analysis of Policy Cohorts and College Credential Attainment.....	127
20. Summary of Logistic Regression for College Credential Attainment	131

LIST OF FIGURES

Figure Number	Page
Figure 1. Theoretical model of institutional action.....	55
Figure 2. Theoretical construct of career opportunity.	80

DEDICATION

I dedicate this dissertation to my husband, Ross who has tolerated my continued pursuit of higher education for nearly half of our 37 years together. You supported my many “dissercations” when I needed time alone to focus on writing, and put up with the massive piles of books and papers. You have always supported and encouraged me in my many adventures and this was no exception. Thank you for standing by me throughout this greatest of academic pursuits. And, to my children, all grown now, you have supported my journey as a mother, a student, and a professional. I love you all and recognize the family time lost so I could complete this work. I hope that I have made you proud enough to forgive me for being absent. I also want to thank my grandson who, although too young to read this dedication, is one of the greatest joys of my life. I can’t wait to have more time to play with you.

ACKNOWLEDGEMENTS

First I would like to acknowledge the opportunity Lake Washington Institute of Technology afforded me to do this research. It takes a great deal of energy to sustain such a long and laborious process and there were many individuals who lifted me up along the way. Thank you Dr. Devorah Shamah and Dr. Joe King who read drafts and offered me words of encouragement in a way only someone who knows this path intimately can do. I am also deeply indebted to my team at LWTA. Michelle, Sara, Barb, Krystal, Dana, Galina, Jeannie, Christie, and Kate you are the finest educators and support staff I know. Working with you has enriched my life. I know my frequent absences to work on this project increased the load on all of you. Sara, you stepped up and took on additional duties time after time during my absences. I was always confident our program was in good hands. Michelle, you urged me to set goals, helped me focus on what was important, and were a constant source of encouragement. Your steady stream of kindness in the form of texts, notes, cards and words (such as “you is smart, you is kind, you is important”) is something I will never forget. You often seemed more confident in my abilities than I was and for all that, I sincerely thank you. Thank you to Glynna Lee, Lauren Crain, and Christie Silva for their research assistance and to Margaret Peterson and Dr. Christopher Bradley who acted as guides by my side and helped make statistics seem fun (at times). Special appreciation goes to my two bosses during the tenure of this journey, Dennis Long and Dr. Kevin McCarthy. You could not have been more supportive, caring, and tolerant of the external demands on my time. Both of you gave me the flexibility needed to finish this endeavor.

I would also like to recognize the members of my dissertation committee for their dedication and support throughout this entire process. Their time, insight, and knowledge have

been instrumental in the completion of this dissertation. Dr. Steve Olswang served as my chair for the first few years before making sure I was in the capable hands of Dr. Joe Lott. I especially appreciate Dr. Olswang's "small brick in the wall of knowledge" lecture which enabled me to maintain perspective. Thank you Dr. Lott for serving as the committee chairperson for the past several years, and for your timely feedback, expertise in secondary data analysis, dedication to scholarship, and overall guidance on this project. Thank you to Dr. Rich Knuth for your faith in me and for rigorous review of early drafts of my work. I would also like to thank Dr. Andy Gordon for sparking my interest in program evaluation. Each of you encouraged me, challenged me, and most of all made me believe it was possible.

Finally, I would like to thank three individuals whom I will never meet, but who unknowingly provided words of wisdom and inspiration, which I drew upon frequently during this journey. First, was Christopher Robin who said to his dear friend Pooh Bear, "You are braver than you believe, stronger than you seem, and smarter than you think." Second is Eleanor Roosevelt who wrote, "You must do the thing you think you cannot do." That is exactly what I did. And to the Zach Brown Band for the song "Quiet Your Mind" which sustained me through the times where I was plagued with doubt and a strong urge to quit. Their song reminded me of the importance of just enjoying the ride. Finally, I would like to say thank you to the many high school students at LWTA who had the courage to try a different pathway to achieve their educational goals.

CHAPTER 1: INTRODUCTION

“The best thing workers who want job security in the U.S. economy can do for themselves is to get an education: earn a high school diploma, and go on to college.”

(Carnevale, Smith, & Strohl, 2010, p. 95)

Researchers, economists, and educators concur that educational attainment is the single most important antecedent to earning a family-sustaining wage and is a key factor in the nation’s ability to remain competitive in an increasingly complex and global economy. However, the security and opportunity that usually follow educational attainment are elusive for millions of Americans who do not graduate from high school or complete any college. Despite decades of educational reform at the K-12 level and volumes of research on postsecondary retention, U.S. students continue to drop out of both high school and postsecondary education at alarming levels. As a result, educational attainment rates are not keeping up with the demand for highly skilled workers, with significant social and economic implications.

The Bureau of Labor Statistics (2013), in its employment projections for the 2010-2020 decade, estimated that there will be 54 million job openings during that time period. Of these, slightly more than 20% will require a bachelor degree or higher, while another 50% will require a high school diploma and at least some postsecondary education. Access to jobs with wages that facilitate entry into the middle class depends increasingly on obtaining at least some postsecondary education (Buddin, 2012; Carnevale, Smith, & Strohl, 2010). In his 2012 State of the Union address, President Barack Obama called on the nation’s two-year public community and technical colleges to address the shortage of highly skilled workers needed to grow the U.S. economy, particularly in the high-wage areas of advanced manufacturing, transportation, healthcare, and the “STEM” fields of science, technology, engineering, and math (Office of the

Press Secretary, 2012). The President has challenged community colleges to graduate an additional five million Americans by 2020 (Baime, 2011).

Dual enrollment, long seen as a strategy for increasing postsecondary enrollment and success for accelerated students, has emerged more recently as a powerful tool to increase attainment of high school and postsecondary credentials by underrepresented, struggling, and dropout students (Steinberg & Almeida, 2007). Dual-enrollment programs (where students earn both college and high school credit) designed for at-risk youth are uniquely poised to contribute to attainment of both a high school diploma and a two-year degree or certificate focused on high-wage and high-demand jobs. One such program is Lake Washington Technical Academy (LWTA), a technical high school where students are dually enrolled in high school and in a technical college, Lake Washington Institute of Technology (LWIT). This program is the subject of this study. As such, it is necessary to consider issues from both the high school and the college perspectives.

Background

High school Attainment Rates

More than 30 years ago, the 1983 report *A Nation at Risk: The Imperative for Educational Reform* sounded the alarm about low levels of educational attainment in the United States. The report expressed concern that “there is something seriously remiss in our educational system” and warned about a potential “dimming of personal expectations and the fear of losing a shared vision for America” (U.S. Department of Education, 1983, pp. 11-12). The report launched a sustained critique of public schools and eventually led to reforms designed to create higher academic standards and improve accountability. The passage of the No Child Left Behind Act of 2001 (NCLB) brought important improvements intended to reduce achievement

gaps and increase graduation rates; nevertheless, significant disparities, particularly along racial lines, still persist.

A 2014 report by the U.S. Department of Education provides data on public high school graduation rates. One measure, the averaged freshman graduation rate (AFGR), is an estimate of the proportion of public high school freshmen who graduate on time with a regular diploma four years after starting ninth grade. Although the AFGR increased from 71.7% in 2001 to 81% in 2012, 25 states remained well below the national average (Stetser & Stillwell, 2014). While the 2014 report shows encouraging gains, there are still disparities in graduation rates for subgroups of students, particularly the economically disadvantaged, African Americans, Hispanics, students with disabilities, and students with limited English proficiency. African American students, for example, had an AFGR of 68%, which was 17% lower than the rate for White students (Stetser & Stillwell, 2014). Further, within individual states, graduation rates can vary widely from school to school. According to one estimate, almost 1.5 million students still attend “dropout factory” (p. 9) high schools where the graduation rate is 60% or below (Balfanz, et al., 2014).

Postsecondary Attainment Rates

Educational attainment is a concern not only for high school-age students but also for community college and university students. Dropout rates at the postsecondary level often exceed those of high school students (Shapiro, Dunder, Yuan, Harrell, & Wakhungu, 2014). According to the Organization for Economic Cooperation and Development (OECD), the United States has the highest college dropout rate among the 18 countries that the OECD tracks (Symonds, Schwartz, & Ferguson, 2011). As with high school diploma attainment rates, there are also remarkable disparities in college degree attainment by gender, race, income level, and first generation status.

Social and Economic Impact of Low Levels of Educational Attainment

Economists often calculate the benefits of educational attainment in terms of private return (benefits to the individual) and social return (benefits to society). Private return is diminished for those without a high school diploma or postsecondary credential, as they tend to experience lower earnings, lower levels of job stability, higher rates of unemployment, and higher rates of institutionalization (e.g., in prison, mental health facilities, and juvenile settings) than those who do have a high school diploma or postsecondary degree (Chapman, Laird, Ifill, & KewalRamani, 2011). The lifetime earnings of a person with an associate's degree are approximately 88% higher than those of a person without a high school diploma (Carnevale, Smith, & Strohl, 2010; Kirsch, Braun, Yamamoto, & Sum, 2007). Additionally, in an analysis of job duration, Yates (2005) found significant differences in employment stability based on level of education attainment. Yates examined the work histories of individuals through age 35, using the National Longitudinal Survey of Youth 1979 (NLSY79) dataset and a 2002 follow-up with over 3,000 respondents. Yates reported that only 36% of high school dropouts had obtained stable employment (defined as holding a job for five years or longer) by age 35, in sharp contrast to those with at least some college education, among whom nearly 86% had obtained stable employment by age 30. In 2012 the unemployment rate of those age 25 and older with less than a high school diploma was 12.4%, compared to a rate of 8.3% for those with a high school diploma and no college education, and 7.1% for those with at least some college (Bureau of Labor Statistics, 2013).

Social costs associated with dropping out of school include loss of tax revenue and increased need for social services (Goldschmidt & Wang, 1999; Rumberger, 2004). Numerous researchers have found disparities in health status by level of educational attainment

(Rosenbaum, 2012). At the same time, Hoffman, Vargas, Venezia, and Miller (2007) reported that only 67% of high school dropouts had employer-provided healthcare coverage, compared to 77 % of high school graduates and 95% of college graduates. Another social implication for low levels of educational attainment is a decline in civic participation (Flanagan & Levine, 2010).

A report by the White House Council for Community Solutions (Belfield, Levin, & Rosen, 2012) used economic modeling to estimate the social costs for the population age 16 to 24 who were out of school and had no high school diploma. The authors stated that the total economic burden on society for each such youth exceeds \$1 million over his or her lifetime in terms of (a) loss of goods and services that these individuals could produce if fully employed, (b) decreased contribution to tax revenues, and (c) increased need for public services and government support. Over one decade, the total cost to the nation of these youth dropouts was estimated to be in excess of \$3 trillion. Lochner and Moretti (2004) found that a one-percentage point increase in the high school completion rate for males alone would save approximately \$1.4 billion per year in the reduced cost of crime. Using Lochner and Moretti's methodology, the Alliance for Excellent Education (DeBaun & Roc, 2013) updated the estimates using 2009 crime statistics, finding that an increase of five percentage points in the national high school graduation rate for male students would save more than \$19 billion annually.

The social and economic impacts of low levels of educational attainment are unmistakable and often debilitating. Some have suggested that the consequences for students, families, and communities are so profound as to be tantamount to a public health crisis (Archambault, Janosz, Morizot, & Pagani, 2009). For high school-age students who have dropped out, reconnecting with education and training may be the best antidote to the long list of

negative private and social impacts facing them (Belfield, Levin & Rosen, 2012; Bridgeland & Milano, 2012; Symonds, et al., 2011).

Dual Enrollment as a Strategy for Closing Attainment Gaps

One relatively recent strategy to improve graduation rates and postsecondary attainment levels for at-risk youth is the creation of dual-enrollment programs aimed at low-income, first-generation, minority, and low-performing youth (Barnett & Stamm, 2010). Though there are variations, dual enrollment typically refers to a program design in which high school students earn both high school and college credits for courses taken at a postsecondary institution (Marken, Gray, & Lewis, 2013). Various terms have been employed to describe dual-enrollment designs, including dual credit, concurrent enrollment, Running Start (Washington), College Now (New York), and Postsecondary Enrollment Options (Minnesota). The models can vary with regard to their target populations, admission requirements, locations, methods of earning credit, funding, and related state mandates (Karp, Bailey, Hughes, & Fermin, 2004).

Benefits attributed to allowing students to enroll in secondary and postsecondary courses simultaneously include easing the transition to college, accelerating degree completion, elevating educational aspirations, raising expectations, promoting collaboration between secondary and postsecondary schools, and reducing costs to the student (; Hughes, 2010; Hughes, Rodriguez, Edwards, & Belfield, 2012; Karp, Calcagno, Hughes, Jeong, & Bailey, 2007; Smith, 2007). It is estimated that one million students entering college with one semester's worth of credits earned while still in high school could reduce the total cost of college to students and taxpayers by more than \$9.5 billion (Vedder et al., 2010).

Although dual-enrollment programs have historically concentrated on high-achieving students, studies of short and long term outcomes for low-achieving students who participated in

dual enrollment programs in Florida and New York have been positive. Results include an increase in earning a high school diploma, persistence in postsecondary schooling and an increase in postsecondary GPA (Allen & Dadger, 2012; Karp, et al., 2007). Hoffman, Vargas, & Santos (2008) emphasize the importance of dual enrollment programs in creating a point of entry to postsecondary education for those students who might otherwise be considered non-college bound.

In order to increase the level of educational attainment at both the secondary and postsecondary level, cross-system collaborations such as dual-enrollment programs designed to reengage struggling youth are needed (Weeter & Martin, 2011). Sometimes referred to as “second chance” programs, these options can be critical for young people whose educational pathways have been disrupted for a variety of reasons and who will need not only a high school diploma but also some form of postsecondary education to access jobs with wages that, at a minimum, facilitate entry into the middle class.

Problem Statement

Traditionally, students finish high school before entering their next phase of education; however, dual-enrollment models create nontraditional pathways for high school students to simultaneously earn a high school diploma and complete postsecondary credits. One such program, Lake Washington Technical Academy (LWTA), a dual enrollment high school located on the campus of a technical college, is the subject of this study.

Concerned by the number of students who were either dropping out without completing any credential, or not achieving the GPA of at least 2.0 on a 4.0 scale required to remain in good academic standing, LWTA implemented a policy change in 2009 to address this concern. There were two components to the policy change. First, was to identify students as being at high or

lower academic risk based on the high school GPA they had achieved prior to entry in LWTA. The term *at-risk* is used in the literature to refer to a wide variety of environmental and individual factors that increase youths' likelihood of adverse outcomes such as not completing high school on time or dropping out altogether (Herrera, DuBois, & Grossman, 2013). One readily available and visible manifestation of being at-risk is high school GPA. A study of 24,894 Chicago Public high school students conducted by Allensworth & Easton (2007) found that students with less than a C (2.0) average were more likely to drop-out. Neild, Stoner-Eby, & Furstenberg (2008) studied Philadelphia high school students and found an odds increase of 2.4% in drop-out for every one percent increase in course failures. In another study Hickman, Bartholomew, Mathwig and Heinrich (2008) examined academic performance differences between high school dropouts and high school graduates and found the GPA of dropouts to be statistically significantly lower as early as the ninth grade year. Because academic performance may be one of the first indicators in schools that students may be at-risk for eventually becoming off-track for graduation or dropping out altogether, LWTA chose to define students who had an incoming high school grade-point average (HSGPA) below 2.0 as being academically *at-risk*.

The second component of the 2009 policy change was to provide a higher level of support for students who were identified as being at-risk through an intervention model called Gateway to College. Prior to this policy change students attending LWTA were directly enrolled in college classes regardless of risk factors or previous academic history. This original model is referred to as the direct entry (Direct) model. LWTA theorized that students entering the program with a history of poor academic achievement (as indicated by their incoming HSGPA) may need a higher level of support to be successful than students who were identified as being at lower risk. The Gateway to College National Network (GTCNN) provided startup funds,

professional development training, and a model framework for a new dual enrollment program, Gateway to College at Lake Washington Institute of Technology. This new program (identified as GTCL to distinguish from Gateway to College models at other colleges) was geared specifically towards at-risk youth. Effective in Fall 2009, LWTA implemented a policy that established academic risk status as the criterion for bifurcating the type of program (and thereby the level of support) a student would receive. Students deemed at-risk (defined as having a previous high school GPA below a 2.0) would no longer be served in the Direct model but rather would be served in the GTCL model. Students with incoming HSGPAs at or above 2.0 continued to be served in the Direct model. The implementation of the 2009 policy decision created three cohorts of students (also referred to as policy cohorts); 1) at-risk students served prior to 2009 in the Direct model (AR-Direct), 2) at-risk students served in the GTC model at LWTA (AR-GTCL), and 3) lower-risk students served in the Direct model both before and after the 2009 implementation of GTCL (LR-Direct). For purposes of this study, the three groups of students are hereinafter referred to as AR-Direct, AR-GTCL, and LR-Direct respectively. It should be noted that since all students who attended LWTA left their previous high school setting for a variety of reasons, even those considered lower risk may still have several risk factors that could affect academic achievement. Consider for example an 11th grade student who had been performing adequately in high school, maintaining a 2.5 GPA, but was expelled for possession of marijuana on school grounds. That student would be considered to be at lower academic risk (based on HSGPA) but would nevertheless possess some risk factors that could impact educational attainment. The main differences between the three policy cohorts are described in Table 1.

Table 1

Characteristics of Policy Cohorts at LWTA

Student identifier	At-risk	Period of initial enrollment	Primary model features
AR-Direct	Yes	September 2006-April 2009	Students take 3 day college success class in the weeks prior to enrollment then enroll directly in college classes with minimal support and no extensive career exploration.
AR-GTCL	Yes	September 2009-April 2011	Students spend first term in a learning community model with intensive support, college success course, and career exploration course. Additional support provided through a mandatory transition class in the student's second term.
LR-Direct	No	September 2009-April 2011	Students take 3 day college success class in the weeks prior to enrollment then enroll directly in college classes with minimal support and no extensive career exploration.

Purpose

The purpose of this study was to evaluate the impact and test the assumptions of a 2009 policy decision and program intervention. There are four goals associated with this study. The first was to articulate a theory of change to explain how the GTCL program intervention was expected to impact the academic achievement of at-risk students. This is accomplished in Chapter 2. The second goal was to quantitatively test the policy assumption that students with an incoming HSGPA at or above a 2.0 have higher levels of academic achievement (and therefore can accurately be considered to be at lower risk) than those with incoming HSGPA below 2.0 (consider to be at-risk) by examining how these students performed. The third goal was to

quantitatively examine the differences in academic achievement between the two groups of at-risk students. The final goal was to determine which pre-admission and post-admission variables are useful in predicting academic achievement among at-risk and lower risk students.

Research Questions

The decision by an institution of higher education to operate a dual enrollment technical high school such as LWTA presents compelling challenges. Consideration must be given to the institution's mission, the impact on regularly matriculating students and college faculty, and the appropriate use of public funds. The institution must also consider the students' likelihood of success and what institutional actions can be taken to positively impact student success. Empirical data are needed to assist administrators in making decisions regarding the refinement or continuation of such programs. This study intends to provide useful data by answering the following research questions:

1. Are there statistically significant differences between policy cohorts when examined by gender, age, race, term of entry, COMPASS test scores, number of incoming credits from their previous high school(s), and incoming HSGPA?
2. Are there differences in academic achievement between policy cohorts as measured by cumulative GPA (CGPA) after three terms?
3. To what extent do institutional, demographic, and pre-admission academic factors predict CGPA?
4. Are there differences in academic achievement between policy cohorts as measured by attainment of a high school diploma?
5. To what extent do institutional, demographic, pre-admission academic factors, and post-admission academic factors predict attainment of a high school diploma?

6. Are there differences in academic achievement by policy cohort as measured by attainment of a college credential?
7. To what extent do institutional, demographic, pre-admission academic factors, and post-admission academic factors predict attainment of a college credential?

Need for the Study

This study has both theoretical and practical implications. It is intended to contribute to research knowledge about dual enrollment programs, particularly those designed to improve outcomes for at-risk high school students. In addition, it should help to shape future actions and inform decisions regarding continuance or modification of the GTC program at LWIT. Scarce educational resources necessitate an examination of institutional efforts. According to one evaluation researcher, “As not everything can be done, there must be a basis for deciding which things are worth doing” (Patton, 1997, p. 11). Community and technical colleges face increasing pressure from state legislatures seeking to link funding to student outcomes (Jenkins & Rodriguez, 2013). In the wake of the recent recession, many higher-education systems have experienced increased student enrollment, steep cuts in state funding, and sharp declines in per-student revenues. As state budgets shrink, administrators must have information about the effectiveness of all programs. The GTCL model incurs greater operational expense than the Direct model in place prior to 2009 due to its learning community structure, lower student-to-staff ratios, a case management approach to student support, and required network membership fees. This study should lead to a better understanding of the impact of the GTC model on student outcomes. Furthermore, it can help other educators, college leaders, and policymakers determine whether it is worthwhile to invest resources in the further development and continued operation of LWTA or other similar technical high school programs. It is also posited that some

practices used in the GTC model may also be scalable to provide supportive services to other at-risk groups within the broader college community at LWIT.

Location of the Proposed Study

Lake Washington Institute of Technology (LWIT) is a public two-year technical college serving approximately 5,000 students each quarter. One of Washington state's 32 open-door admission community and technical two-year institutions of higher education, LWIT has two campuses, located in Kirkland and Redmond. The main campus is in Kirkland, a mid-sized suburb approximately 20 miles east of Seattle. Programs of study include career and technical degrees and certificates, academic transfer degrees, applied baccalaureates, basic skills, and continuing education, though the primary aim is to provide technical training preparing students for high-wage careers in service, design, and health-related majors among others. In addition, LWIT operates an accredited technical high school, Lake Washington Technical Academy (LWTA). Approval to conduct this study was obtained from LWIT's President (see Appendix A).

History of Lake Washington Technical Academy

Originally established in 1990 by the Lake Washington School District (LWSD) under the name Otteson High School, the school was designed to allow students to complete high school while also taking classes at what was then called Lake Washington Vocational Technical Institute also operated by LWSD (*Lake Washington School District History of our Schools*, 2005). In 1991, with the passage of the Washington Community and Technical College Act, all of the state's vocational-technical institutes converted to degree granting technical colleges and control shifted from public school districts to the newly established state Community and Technical College (CTC) system. The CTC system would be distinct from both the public

secondary schools and four-year institutions. Along with the change in jurisdiction from the K12 system to the CTC system, there was also a name change from Lake Washington Vocational Technical Institute to Lake Washington Technical College. As a former vocational-technical institute, Lake Washington Technical College retained the statutory authority to operate a technical high school, award high school and college credit and to issue high school diplomas, and as such, represents one of the state's earliest models of dual enrollment (Johnson, Hickman, & Hulst, 2009). K-12 per-pupil funding flows directly to technical colleges that operate technical high schools. These funds are used to cover the cost of tuition, fees, books, and institutional overhead. In 2006, the name Otteson High School was changed to Lake Washington Technical Academy (LWTA). In 2011, there was a name change of the parent organization and Lake Washington Technical College became Lake Washington Institute of Technology (LWIT).

LWTA students attend college classes at LWIT alongside regularly matriculated college students, participate in college activities, and form relationships with college students and college faculty. Students can pursue all the career pathways available to any college student at LWIT. Rather than concentrating solely on high school graduation, LWTA has dual goals for its high school students: to earn a high school diploma and also to obtain a technical postsecondary degree or credential consistent with the workforce mission of LWIT.

LWTA students follow the college's quarterly calendar. New students are admitted each quarter (fall, winter, and spring). Students may be referred by counselors, teachers, or other school staff, or they may have learned about the program on their own or from a friend. All students must meet specified eligibility requirements for admission, including minimum reading, writing, and mathematics scores on the Computerized Adaptive Placement Assessment and

Support Systems (COMPASS) test, an untimed computerized college placement and assessment test administered by American College Testing (ACT). While the COMPASS is typically used by postsecondary institutions in making course placement decisions, LWTA uses the COMPASS as an admissions test. Students must obtain COMPASS scores consistent with approximately 9th grade ability in reading, writing, and math. Students who test below the required levels are typically referred back to their previous high school or to another program where they can build these foundational skills. In addition, students must be at least 16 years old by September 1 of the school year to be eligible; they must not be over age 20 by the start of the school year but can maintain enrollment for the entire school year during which they reach age 21. Students are also required to attend a general information session prior to enrollment.

As previously stated, in the Fall of 2009, LTWA implemented a new policy for incoming students. The policy created two paths for entering the program based on a student's previous high school academic history (HSGPA). Students considered to be at-risk were required to enroll in the GTCL model, while students considered lower academic risk based on HSGPA continued to enroll in the Direct model. The policy change placed considerable emphasis on identifying at-risk students and providing them with additional support, particularly during their first term of enrollment.

As the LWTA program is a dual enrollment model where high school students enroll in college classes and earn both college and high school credit, it is important to consider factors that contribute to college success. Though differences in grading standards across high schools may contribute to a lack of uniformity, associations between high school GPA and college success are nevertheless well established by research (Noble & Sawyer, 2004). Whereas most studies that examine the explanatory power of high school GPA on college outcomes occur in

the four-year postsecondary setting, one recent study by Belfield and Crosta (2012) used community college data. Belfield and Crosta compared the predictive ability of placement test scores and high school GPA on two college outcomes, college GPA and accumulation of credits. Drawing on a sample of approximately 20,000 students from one state community college system, the researchers found that high school GPA alone explained approximately 21% of the variation in college GPA and 14% of the variation in college credits earned.

Though LWTA conducted a self-study in 2006 and again in 2012 as part of its accreditation process, there has never been a quantitative evaluation of program outcomes nor of the decision to base program model on HSGPA. This study will evaluate the impact and test the assumptions of the 2009 policy.

Significance of the Proposed Study

This proposed study addresses two important issues in education: high school graduation and postsecondary completion. It is significant because of (a) an urgent need to increase educational attainment at both the high school and postsecondary levels, (b) a growing national momentum for the creation of more community and technical college programs aimed at reengaging students who have dropped out of high school, and (c) a paucity of research on the effectiveness of high school programs for at-risk students embedded in community and technical college settings.

Need To Increase Educational Attainment

Kirsch, et al., (2007) described three powerful forces creating a “perfect storm” that fuels inequality and threatens our nation’s future: low levels of academic achievement, changing demographics, and an economy dependent on workers with high levels of educational attainment. Since taking office in 2009, President Obama has called attention to the inextricable

link between the strength of the economy and America's education system, has set goals for all Americans to pursue at least one year of higher education or career training, and has called for the United States to regain its role as the world leader in college completion by 2020 (Duncan, 2012). According to the U.S. Department of Education (2011), the President's goal for college completion translates into the need for eight million more young adults to earn associate and bachelor's degrees by 2020. Philanthropic organizations such as the Bill and Melinda Gates Foundation and the Lumina Foundation have also established their own bold educational attainment goals. For example, the Lumina Foundation (2013) created Goal 2025, which calls for increasing the percentage of Americans with two- or four-year college degrees or credentials to 60% by 2025, an increase of 23 million graduates above 2009 completion rates.

In order to dramatically reverse the present low levels of educational attainment at both the high school and postsecondary levels, and to reach the goals described by President Obama and others, options are needed to reach and retain at-risk, disengaged, and dropout youth. Even after decades of reforms intended to reduce dropout rates, substantial numbers of students continue to leave high school and college without obtaining a credential, and the resulting social and economic impact for students, families, and communities is profound (Dowd, 2005; Reason, 2009b; Tinto & Pusser, 2006).

Dual enrollment programs designed specifically for at-risk students (DE-AR) are now fixtures of the educational landscape with the potential to impact both high school and postsecondary completion rates and, as a result, increase educational capacity. The GTCL model seeks to improve outcomes for at-risk youth by improving rates of high school and college completion, particularly for first-generation, underserved, and economically disadvantaged students.

Growing National Momentum

Due to stubbornly high dropout rates, high school reform has moved to the top of the education policy agenda, capturing the attention of the federal government, governors, educators, faith-based organizations, philanthropists, and the general public. In remarks at the America's Promise Alliance Education Grad Nation event in March 2010, President Obama urged efforts to expand options for students who have dropped out of school (Balfanz, Bridgeland, Bruce, & Fox, 2012), and states are responding.

There has been tremendous growth in DE-AR, as evidenced in two reports by the National Center for Education Statistics. During the 2002-2003 academic year, 5% of public two-year and four-year postsecondary institutions that offered dual-enrollment programs had initiatives specifically geared toward high school students at risk of education failure, with total enrollment of 6,400 students (Kleiner & Lewis, 2005). In a second analysis conducted eight years later using the same survey methodology, the researchers found that the number had increased to 9% of institutions and that the total number of students served had grown to 22,100 (Marken, et al., 2013).

A number of states such as Texas and North Carolina have supportive state policies and have undertaken various initiatives directed toward at-risk students traditionally underrepresented in college, including DE-AR models in partnership with postsecondary institutions where students earn both high school and college credit (Edmunds, et al., 2012; Edmunds, Willse, Arshavsky, & Dallas, 2013; Struhl & Vargas, 2012).

Massachusetts, a state with several GTC programs, has set an aggressive goal that 100% of high school students will graduate within five years of starting ninth grade by 2019. Massachusetts has received \$15 million in funding from the U.S. Department of Education High

School Graduation Initiative, and the state has outlined three policy actions to achieve its graduation goal, one of which is to accelerate the expansion of Gateway to College programs (Curtin, Winner, & Fuentes, 2010).

The increase in DE-AR programs has also been seen in Washington State. In 2011, Washington approved the Launch Year Act (ESSHB 1808), which requires all public schools in the state to increase the number of dual-credit opportunities for all high school students, with the goal of enabling all students to earn at least a year's worth of postsecondary credit upon graduation (Hubert, 2012).

Elected in 2008, Washington Superintendent of Public Instruction Randy Dorn established reducing the state's dropout rate as one of his five priorities for education reform (ESD113, 2009). Though Washington's performance was above the national average, in 2010-2011 only 76.6 % of Washington high school students were graduating within four years and about 10,000 per year were dropping out (Came, 2012). In 2010, Dorn's office implemented the Building Bridges Prevention and Retrieval Program, which outlined plans not only to reduce the number of dropouts, but also to create a system to reengage those who do drop out (Blackledge, 2011).

Then, during the 2010 Washington state legislative session, Engrossed Second Substitute House Bill (ESSHB) 1418 was signed into law. ESSHB 1418 established a statewide dropout reengagement system designed to provide high school dropouts with multiple on-ramps back into education while giving individual programs the flexibility needed in order to work across multiple sectors. This system fosters collaboration between community-based organizations and secondary and postsecondary systems, and it creates both a regulatory framework and a funding structure that encourage this collaboration. The law states, "It is the legislature's intent to

encourage school districts, community and technical colleges, and community-based organizations to participate in this system and provide appropriate instruction and services to reengage older students and help them make progress toward a meaningful credential and career skills” (ESSHB 1418, p. 2).

The GTC program at LWIT (GTCL) was the first program to be approved as a dropout reengagement program under ESSHB 1418. Since this new legislation is expected to result in the proliferation of DE-AR programs like GTCL, empirical scrutiny is in order. More importantly, because the GTCL model is serving students who have already dropped out or are on the verge of dropping out, it is important to establish the effectiveness of this model and learn what institutional actions can be taken to improve outcomes for these students.

Paucity of Research

While there is some research on dual enrollment programs, including those that serve at-risk youth, there is little to no research on educational outcomes of students enrolled in a technical high school program on a technical college campus such as LWTA. This lack of research underscores the need for this study.

Philosophical Approach

Creswell (2009) described three components that researchers should consider in crafting a research design: (a) strategies of inquiry (quantitative, qualitative, or mixed), (b) specific research methods, and (c) identifying a philosophical worldview. Creswell called on researchers to understand and articulate a philosophical worldview, since their worldview will inevitably influence the design.

Postsecondary student persistence has been characterized as a puzzle and an “ill-structured problem” (Braxton, Hirschy, & McClendon, 2004, p.2). One characteristic of ill-

structured problems is uncertainty about which concepts, rules, and principles are necessary to provide a solution (Meacham & Emont, 1989). Ill-structured problems involve multiple possible solution paths and sometimes have no acceptable solutions (Kitchener, 1983).

Enrolling at-risk high school students in a two-year postsecondary setting, where retention is already a significant challenge, can certainly be considered a type of ill-structured problem. The low completion rates among regularly matriculated students attending two-year colleges underscore the need to look at the issue of student success for at-risk youth in postsecondary settings from multiple perspectives. As such, this study deploys a pragmatic worldview, which influences the researcher to identify research methods and questions in light of a concern for finding practically applicable solutions (Creswell, 2009). This worldview is oriented toward solving practical problems in the “real world” (Feilzer, 2010, p. 8). In the present study, quantitative analysis is supplemented with a conceptualization of the program’s theory of change through the lens of one model of institutional action in order to better understand the characteristics of the GTCL program that may have a bearing on student outcomes. According to Weiss (1998), a theory of change refers to the causal processes that are believed to lead to desired outcomes as a result of a program’s actions. The quantitative analysis will determine if there are differences in outcomes for students enrolled in the programs under study. Inferential strength is increased if the empirical results are consistent with the theory of how the program causes the intended or observed outcomes (Rogers, 2008). A pragmatic worldview is useful in an evaluation where it is important to uncover and articulate the program’s theory of change (Fitz-Gibbon & Lyons, 1996; Patton, 2008).

In order to elucidate the GTCL program’s theory of change, Tinto and Pusser’s (2006) model of institutional action will be used to illustrate significant elements of the program and

explain how these program elements are expected to contribute to positive student outcomes. Grounded in decades of persistence research and theory, Tinto and Pusser offer a conceptual framework which shifts from earlier social and academic integration models (where the emphasis is on the student's backgrounds or pre-college characteristics) to a broader conception of how specific actions taken by the institution can foster conditions where students persist to completion. This framework is consistent with the rationale of all GTC programs, which recognize that students come into the program with strengths and challenges and therefore it is incumbent on the institution to design educational experiences that foster student success. Specifically, use of this framework will allow me to construct a more theoretically rich account of the GTCL program's theory of change. Creswell (2009) described the value of a theoretical framework, such as the one used in this study, in tying together the variables so as to provide "an overarching explanation for *how* and *why* one would expect the independent variable to explain or predict the dependent variable" (p. 52). Articulating the causal mechanisms by drawing on scholarly theories is defined by Patton (2008) as a deductive approach and is consistent with a pragmatic worldview.

The results of this study will add to the research base on practices for reengaging dropout high school youth in postsecondary settings. Secondly, the results will provide quantitative information to administrators to help them in considering whether the GTCL model is more effective for serving at-risk youth than the Direct model. If there are differences in outcomes, understanding the program's theory of change will lead to a deeper understanding of possible reasons for these differences and should increase the explanatory utility of the findings.

Limitations

There are several limitations to this study. First, a causal-comparative (ex post facto) design is limited by the information available in archival student records. Variables were preexisting and could not be manipulated; therefore causation cannot be implied and findings must be interpreted cautiously. Another major limitation when using archival data is that the researcher is constrained by the existing information and not all variables of interest were available. It is recognized that other variables, such as socioeconomic status or noncognitive characteristics, may also affect student outcomes yet this study does not consider those factors. It is also assumed that at-risk students served in the GTCL model (AR-GTCL) and those in the Direct model (AR-Direct) are similar to one another in all significant characteristics, such as high school experiences and motivation to seek alternative programming. If the groups being compared are statistically similar, differences in outcome can be more confidently associated with the model; however, without a randomized design it is not possible to eliminate all preexisting differences. This was also a single-institution study, which limits the generalizability of findings. In addition, researcher bias is possible, as I am the Dean of High School Programs at LWIT, the study location. However, this limitation can be mitigated by using a quantitative methodology and displaying ethical behavior when conducting the analysis and interpreting the results.

Delimitations

This study is a snapshot of three groups of high school students who first enrolled at LWTA between Fall 2006 and Spring 2011 and follows those students through April, 2014. As such, it is possible that outcomes from a different time frame or from a different group of students would be dissimilar.

Definitions and Abbreviations

The following terms and abbreviations are used in this study:

Associate degree: Associate degrees awarded by LWIT are of three types: the Associate of Applied Science (AAS), the Associate of Applied Science Transfer Degree (AAS-T), and the Direct Transfer Agreement/Major Related Programs (DTA/MRP). All require a minimum of approximately 100 credits.

Associate degree diploma: A Washington state statutory authorization created in 2009 which allows a community or technical college to award a high school diploma to an individual who is at least 21 and who has earned an associate degree even if they have not met other high school graduation requirements (Substitute House Bill 1758).

At-risk: Students are considered to be academically at-risk if they have had difficulty in school as indicated by a cumulative high school GPA below 2.0 on a four-point scale at the time of admission.

AR-Direct: The policy cohort of students designated to be at-risk based on high school GPA earned in their previous high school(s) and who first enrolled in LWTA prior to Fall of 2009.

AR-GTCL: The policy cohort of students designated to be at-risk based on high school GPA earned in their previous high school(s) and who first enrolled in the GTC program at LWTA between Fall 2009 and Spring 2011.

Attrition: Departure from or delay in successful completion of program requirements.

Certificate of Proficiency (COP): A certificate awarded for completion of a subset of course requirements for the associate degree, of at least one year in length.

Community college: In this study the term will be used to enCOMPASS two-year public community and technical colleges.

COMPASS: Computerized Adaptive Placement Assessment and Support Systems, an untimed computerized college placement and assessment test developed by American College Testing (ACT).

CGPA: Cumulative college grade point average over three terms.

DE-AR: Dual enrollment-at risk, referring to a college-based program allowing at-risk high school students to simultaneously earn credits toward a high school diploma and a postsecondary degree or certificate by taking classes on a community or technical college campus.

Direct entry: The model used to serve all high school students at LWTA prior to Fall 2009, regardless of risk factors. Since Fall 2009, only students deemed to be academically lower risk (as evidenced by a high school GPA greater than 2.0) are served in the direct entry model.

ECHSI: Early College High School Initiative, made up of 13 partner organizations with a range of designs, although they adhere to a common set of principles.

Engagement: “The quality of effort students themselves devote to educationally purposeful activities that contribute directly to desired outcomes” (Hu & Kuh, 2002, p. 555).

First-generation: Students from families where neither parent completed a four-year degree or higher (Davis, 2010).

Foundation: The first academic term (quarter or semester) of the Gateway to College program, structured as a learning community.

GTC: Gateway to College, a comprehensive alternative education model designed to reengage youth who have not been successful in the traditional high school environment. GTC

programs are located on community or technical college campuses across the United States and are structured as dual enrollment (Rider, Winters, & Neilson, 2012).

GTCL: The Gateway to College program operated by LWTA at Lake Washington Institute of Technology. While there are some commonalities across GTC programs, state law and local differences result in variation across programs; as such GTCL is used to distinguish the model as implemented by LWTA.

GTCNN: Gateway to College National Network, a 501(c)(3) organization headquartered in Portland, Oregon and designed to build the capacity of colleges, school districts, and states to develop strategies that help at-risk and academically underprepared students of high school age to earn high school and college credentials. In addition to replicating and supporting the GTC model, GTCNN also engages in research, evaluation, policy advocacy, and consulting (B. Devito, personal communication, June 21, 2013).

High school diploma: Signifies completion of a series of graduation requirements established by the Washington State Board of Education. Requirements may vary by graduation year. The designation of earning a high school diploma also includes those who complete the state requirements via associate degree diploma rules.

HSGPA: High school cumulative grade-point average from all high school courses prior to program entry.

LR-Direct: The policy cohort of students designated to be at lower risk based on high school GPA earned in their previous high school(s), who enrolled between at any time during the study period and who were served in the Direct model.

LWTA: Lake Washington Technical Academy, an accredited special purpose technical high school located on the campus of LWIT.

LWIT: Lake Washington Institute of Technology, located in Kirkland, Washington and part of the state's system of community and technical colleges.

Persistence: Refers to students maintaining or completing their enrollment until intended goals are reached (Hirschy, Bremer, & Castellano, 2011).

Policy cohort: Refers to three groups of students created by the implementation of a 2009 policy at LWTA.

Quarter: One of a variety of time lengths for coursework in place at postsecondary institutions (such as LWIT). Other time frames include semesters or trimesters.

Reengagement: Strategies to connect students who have dropped out or who are on the verge of dropping out, with programs leading to high school completion and readiness for postsecondary education and employment (Wraight & Best, 2009).

Retention: A reflection of institutional success in keeping students who return to enroll in subsequent terms (Hagedorn, 2005).

Skyward: A K12 school administration software product.

SMS: Student Management System, used to administer and manage all student-related business functions for Washington State's community and technical colleges.

Underrepresented: Students who are members of racial and ethnic minorities, low-income, first-generation, or students not considered college-bound (Barnett & Stamm, 2010).

Summary

This chapter provided background information related to low levels of educational attainment at both secondary and postsecondary. Further, Chapter One outlined the statement of the problem, the purpose and significance of the study, and the research questions. In addition, the philosophical approach, definitions of term, limitations and delimitations are discussed.

Chapter Two presents a review of relevant literature that includes factors related to dropping out of high school and college, research on dual enrollment models that span secondary and postsecondary educational environments, and research on persistence in general. Specific initiatives designed for serving at-risk youth are described. Finally, a theoretical framework for institutional action in the study setting is introduced.

CHAPTER 2: LITERATURE REVIEW

This literature review utilizes two lines of persistence research, one at the secondary level and the other at the postsecondary level, since the program under study (LWTA) spans both levels of education. The first section of this chapter examines research on high school and college dropout rates. Next, options for reengaging at-risk, dropout, and underrepresented youth of high school age are discussed, emphasizing those models that occur in postsecondary settings. A brief overview of the dominant theoretical frameworks of student persistence and attrition in higher education follows. Finally, this chapter concludes by introducing a conceptual framework to illuminate significant components of the GTCL program's theory of change.

High school Completion Rates

In order to understand accurately the magnitude and scope of the problem of high school dropout, we must recognize the variety of ways in which relevant statistics are presented. Multiple methods for calculating graduation and dropout rates across states can lead to inconsistencies, making comparisons difficult. In 2008 the U.S. Department of Education finally took steps to ensure standardization of graduation rates across all states, issuing new rules that established a single uniform measure. With this change in methodology to an adjusted cohort graduation rate rate (ACGR), graduation rates will be comparable across schools, districts, and states. The key feature of this method is that students are placed in a cohort based strictly on their first entry into ninth grade and calculations are based on whether they graduate four years later, creating a standardized metric. Students are permitted to take additional time to graduate, but will not be counted as on-time graduates if they take longer than four years to complete, and they will not be considered five-year graduates if they take longer than five years. All states have been required to report their ACGR beginning with the 2010-2011 school year (No Child

Left Behind Non Regulatory Guidance, 2008). However, as of 2012, the Department of Education had issued waivers to 34 states and the District of Columbia, which may attenuate the ability to compare rates accurately across states as promised in the 2008 regulations (Alliance for Excellent Education, 2013).

National dropout statistics from public schools are typically presented as one of four rates: event rates, status rates, cohort rates, and averaged freshman graduation rate (AFGR). Event rates reflect the proportion of students in grades 9 through 12 who drop out in one year. Event rates are calculated for each grade level. Status rates measure the percentage of a population (typically those persons age 16 to 24) who are not enrolled in high school and do not have a high school credential, regardless of when they dropped out. The cohort rate calculates the percentage of students who start ninth grade together and graduate four years later with a regular diploma, using individual student enrollment data. The AFGR rate calculation uses aggregate data to estimate the number of freshmen who graduate on time within four years, ignoring student migration in and out (Stillwell & Sable, 2013).

A compendium report from the U.S. Department of Education on high school dropout and completion rates provides data and analyzes trends from 1972 to 2009, a period of almost four decades. The AFGR across the United States for 2008-2009 was 75.5%, an increase of 3.5% from 2001. There is wide variation across states, with a low of 56.3% in Nevada and a high of 90.7% in Wisconsin. Graduation rates can also vary widely from school to school. Balfanz, Bridgeland, Fox & Moore (2011) estimated that more than two million students attend “dropout factory” high schools in which the graduation rate is no higher than 50%. One review of the sources of data used to calculate dropout and graduation rates concluded that actual

graduation rates are likely lower than those reported by the federal government (Heckman & Lafontaine, 2010).

Dropout rates represent the total number of students across all grades who drop out within a given year. As with graduation rates, dropout rates show disproportionality across states, schools, and subgroups of students (Chapman et al., 2011). According to a 2013 report by the U.S. Department of Education, a total of 514,238 public school students dropped out of grades 9 to 12 in the 2009-2010 school year, resulting in a median state dropout rate of 3.4%. New Hampshire and Idaho had the lowest dropout rates at 1.2% and 1.4%, respectively, while Mississippi and Arizona were the highest at 7.4% and 7.8%, respectively; the rate in Washington state was 4.2 percent. Dropout rates are higher for American Indian/Alaska Native, Black, and Hispanic students (6.7%, 5.5%, and 5.0% respectively). Asian/Pacific Islander students and White students have the lowest rates (1.9% and 2.3% respectively). While students drop out of school in each grade of high school, the rate is higher for students in grades 11 and 12, and the total dropout rate is higher for males in every state (Stillwell & Sable, 2013).

According to the National Center for Education Statistics, dropout rates also vary by family income level. In 2011, dropout rates for students living in homes where the family income was in the lowest quartile (the bottom 25%) was 13%, compared to only 2.3% for those living in the highest family income quartile (Aud et al., 2013). About 6,000 students drop out of school each day, adding up to more than one million students who leave without a high school diploma each year. These estimates do not include students who drop out prior to ninth grade (*Education Week*, 2012).

As noted above, another way to quantify the scope of the dropout problem is to consider the status dropout rate, the percentage of the population (typically those persons age 16 to 24)

who are not enrolled in high school and do not have a high school credential, regardless of when they dropped out. The status rate for 2009 was reported as 8.1%, a decline from 14.6% in 1972; however that still amounts to more than three million 16 to 24 year olds who had either dropped out or failed to earn a high school diploma or an alternative credential. The status dropout rate reflects not just the number of students who drop out of school each year, but also the cumulative impact of those who have already left (Chapman et al., 2011).

Factors Related to Dropping Out of High School

“In some ways, dropping out is no longer mysterious. Five decades of research have uncovered numerous correlates of withdrawal from high school” (Jimerson, Egeland, Sroufe, & Carlson, 2000, p. 526). Much of this research has made use of large, nationally representative datasets obtained from expansive studies such as the National Education Longitudinal Study (NELS:88), the 1990 and 1992 follow-up waves of the NELS, and the federal evaluation of the School Dropout Demonstration Assistance Program (SDDAP). These datasets have considerable capacity to inform causal inferences, and researchers have identified a wide variety of social and academic factors related to dropping out, which can be categorized into four broad domains: individual, family, school, and community factors (Goldschmidt & Wang, 1999; Hammond, Linton, Smink, & Drew, 2007; Rumberger, 2004; Rumberger & Lim, 2008). Each domain can be further described as follows:

Individual factors: Attendance, dislike of school, academic performance, engagement in school activities, drug and alcohol use or abuse, participation in antisocial activities

Family factors: Socioeconomic status (SES), employment status, parenting styles, household composition, and parents’ participation in school activities

School factors: Quality of teaching and resources, school size, effectiveness and equity of school policies and practices, school climate, and engagement of teachers

Community factors: Social, economic, and historical features of neighborhoods and communities

Battin-Pearson et al. (2006) compared five theories of high school dropout, where each theory identifies a unique set of influences drawn from these four broad domains (individual, family, school and community). The purpose of their study was to determine the adequacy of these theories in predicting dropout behavior before tenth grade. The five theories were academic mediation theory, general deviance theory, deviant affiliation theory, poor family socialization theory, and structural strains theory. Using interview, survey, and transcript data from a longitudinal, multi-ethnic sample of urban students, Batten-Pearson et al. (2006) conducted an empirical analysis utilizing confirmatory factor analysis with structural equation modeling. The results of this study indicated that poor academic achievement was the strongest predictor of early dropout. The authors suggested that efforts aimed at decreasing early dropout should be focused on both fostering academic achievement and providing specific support when youth come from low SES families, have deviant affiliations, and participate in deviant behavior.

Longitudinal studies of cohorts of students have provided useful information regarding the personal and academic events that influence students' decisions to leave school. For example, one longitudinal study of 13,000 urban students over an eight-year period (Balfanz, Herzog, & MacIver, 2007) found that attendance, behavior, and course failures in sixth grade could accurately predict 60% of those who would not graduate from high school. The most strongly predictive factors were failing math, failing English, attending school less than 80% of the time, and receiving a poor final behavior grade.

Stearns & Glennie (2006) conceptualize factors related to dropping out as having a push or pull effect. Pull out factors are those occurring outside of school that may compete with a student's educational priorities. Examples of factors which may pull a student away from school

are the need to work and family obligations (such as caring for younger siblings or pregnancy). Jordan, Lara, and McPartland (1996) defined push out factors as those that “negatively impact the connection adolescents make with the school’s environment and cause them to reject the context of schooling” (p. 64). Examples would include institutionalized practices of racism, classism, and marginalization. These practices sometimes are manifested in schools as exclusionary policies, such as requiring students to repeat a grade level or suspensions for truancy (Losen, 2011). Although they should be seeking to improve graduation rates and increase academic achievement, schools are also under considerable pressure to make adequate yearly progress (AYP) and avoid costly reforms associated with the failure to do so. It is posited that some schools may feel pressured to push out low-performing students who are not on track to meet NCLB achievement standards (Balfanz, Legters, West, & Weber, 2007).

Bradley and Renzulli (2011) used the Educational Longitudinal Survey (ELS:2002/2004) to create a more nuanced conceptualization of the reasons why students drop out of school and to determine the effects of race and gender on those reasons. Responses from the 2004 ELS follow-up survey were coded as either push-out factors or pull-out factors. Students who gave responses that were interpreted as both push and pull were dropped from the sample. Further reducing the sample to those students who indicated their race as Black, White or Hispanic resulted in a final sample size of 5,130. Nested multinomial logistic regression was utilized to determine the likelihood of being pushed or pulled out of school by gender and race. Controlling for SES, Bradley and Renzulli (2011) found Hispanic students to be 10 times more likely to leave school for pullout reasons than White males and five times more likely to be pulled out than Black males. Additionally, they found that SES fully accounted for the difference in the likelihood of being pushed or pulled out among Black students as opposed to White students. In

their 2013 study, Doll, Eslami, & Walters add another category, *falling out*, to the list of reasons a student might drop out of school. They make the distinction between push, pull, and falling out based on the student's agency (was the decision the school's, their own, or just circumstance with no distinct reason). Their meta-analysis of seven national studies found pull factors to be the dominant reason for dropping out among all students, though, consistent with Bradley and Renzulli (2011), they note differences by gender and race.

In a report on dropout youth, educational researcher Russell Rumberger (1987) stated the dropout issue is “likely to command increasing attention from researchers, policymakers, and educators at the local, state, and national levels for some time to come” (p. 103). Finn (1989) characterized concern about dropping out as “something of a national obsession” (p. 117); however, more than two decades later this obsession still has translated only into an average graduation rate of slightly more than 75%. Despite a sizable body of literature on the broad domains that contribute to dropping out of high school, no single variable can accurately predict who is at risk. Gleason and Dynarski (2002) determined that even creating composites of multiple risk factors or propensity scores cannot perfectly predict who will drop out of high school. Utilizing multivariable statistics in their model, Gleason and Dynarski were able to correctly identify only 42% of dropouts at the high school level.

Christenson and Thurlow (2004) noted that most research on high school dropout has been dominated by an emphasis on fixed demographic or status variables like race, ethnicity, gender, and SES. The implicit message underlying this emphasis, they observed, is that the factors related to dropping out lie within the characteristics of students or their environments and therefore are relatively unavailable to intervention or remediation. However, Shin and Kendall (2013) pointed out a shift in school dropout literature toward advancing the understanding of

malleable variables related to dropping out, such as student behaviors and attitudes towards school, along with the school practices that influence these behaviors and attitudes. This finding suggests a need to make available a wide variety of programs, strategies, and options for high school completion, particularly targeting those factors most amenable to change. Researchers have suggested that the best antidote to the negative social and economic impacts of dropping out before finishing high school is to reconnect these young people with education and training, particularly those programs that offer alternate routes to completion (Belfield, Levin, & Rosen, 2012; Bridgeland & Milano, 2012; Symonds, Schwartz & Ferguson, 2011).

Factors Related to Dropping Out of Postsecondary Education

Educational attainment is a key issue for community college and university students as well. Many who do graduate from high school need remediation once they continue on to postsecondary study, and many who continue to the postsecondary level fail to complete their program and earn a degree (Balfanz, Bridgeland, Bruce, & Fox, 2013). The dropout rates at postsecondary institutions often exceed those in high school. As noted by Roderick (2006), the problem of low levels of educational attainment does not appear to be lack of aspiration. For example, in 2002, 80% of tenth-graders named a bachelor's degree or higher as their ambition, up from 40% in 1980; however, these high aspirations are not paying off in higher college completion rates.

A report by the Education Trust (2001) revealed that, among students who do graduate from high school, approximately 66% enroll in some kind of postsecondary education immediately thereafter, however; only slightly more than 25% earn a postsecondary credential. Students who drop out of high school but later earn a GED fare even worse. Goldberger (2007) found that nearly 50% of those with a GED eventually enroll in postsecondary education but that

only 4% persist to earn a degree. Patterson, Zhang, Song, and Guison-Dowdy (2010) looked only at persistence to a degree for GED recipients attending institutions with programs lasting up to two years and found a slightly higher completion rate of 12%, a rate still less than one half that of high school graduates.

One report on postsecondary graduation rates found that, of the slightly more than seven million students who began public two-year institutions in 2007 (not accounting for transfers to other institutions), only 21.4% finished within the normal program completion time of two years. Even if one tracks graduation rates three and four years after initial entry, graduation rates for students in public two-year institutions rose to only 32.9% and 37.3%, respectively. For public four-year institutions the four-, six-, and eight-year graduation rates are 37.1%, 57.8%, and 60.4%, respectively (Knapp, Kelly-Reid, & Ginder, 2012). The National Information Center for Higher Education Policymaking and Analysis (NCHEMS) provides an online calculator with pipeline data by state to provide a measure of student progression through the educational system. Using publicly available data, this pipeline calculation represents the percentage of students who complete a traditional trajectory where a student enters ninth grade, graduates within four years, goes directly to a public baccalaureate college, returns for the second year, and then graduates within six years. For the most recent data of 2010, the national pipeline rate was 20.8%. As with high school graduation rates, the pipeline rate varies from state to state, with a low of 10% for Alaska and a high of 30.3% in Massachusetts (www.higheredinfo.org).

A study conducted by the National Center for Education Statistics (Ross et al., 2012) indicated the odds that a 2004 high school graduate would attain an associate or bachelor's degree by 2009 were 32 percent lower for males than for females, after controlling for student, family, high school, and postsecondary institutional characteristics. When controlling for the

same variables, the odds for Black students were 43 percent lower and the odds for Hispanic students were 25 percent lower than for the reference group of White students. A report by the College Board (Lee, Edwards, Menson, & Rawls, 2011) found degree attainment numbers at both two- and four-year schools to be worse for first-generation students. A study using the Postsecondary Education Transcript Study (PETS), collected in 2000 as part of the National Education Longitudinal Study of 1988 (NELS:88), revealed that, when students are the first in their family to attend college, they are only half as likely to earn a postsecondary credential as students who have at least one parent who attended college (Chen, 2005); they also require more remediation, complete fewer credits, and earn lower GPAs. While first-generation students are more likely to be Black or Hispanic and to come from low-income families (Bui, 2002; Ishitani, 2003, Mehta, Newbold, & O'Rourke, 2011), Chen's study found that, even after controlling for background variables, first-generation status is correlated with a reduced likelihood of graduation from any type of college (two- or four-year). These results are consistent with a more recent study by Reardon (2011), who compiled decades of data from 19 nationally representative datasets, and found parents' level of educational attainment to be a more powerful predictor of student achievement than family income. The impact of low levels of educational attainment extends across generational lines, as a father's level of education is correlated with the status attainment and educational success of his children (Blake, 1986). Educational attainment is the most significant factor in cross-generation uplift, a social theory that posits that the gains of one generation positively influence the next one (Bowen, 1997; St. John, Hu, Simmons, Carter, & Weber, 2004).

Researchers have provided various explanations for the postsecondary outcomes of first-generation students. They have suggested that these students receive less assistance in preparing

for college (Choy, 2001), experience lower academic self-efficacy (Vuong, Brown-Welty, & Tacz, 2010), have weaker high school academic preparation requiring more remedial coursework (Chen, 2005), and are more likely to attend the least well-funded, open-access two- and four-year colleges (Carnevale & Strohl, 2013). The impact is significant, given the estimate that approximately 50% of students attending any college are first-generation (Mehta, et al., 2011) and that, among students attending public two-year colleges, this proportion rises to nearly 60% (Phillippe & Valiga, 2000).

The highest dropout rates occur at two-year community colleges. A 2011 report on postsecondary graduation rates found that, of the slightly more than seven million students enrolled in public two-year institutions in 2009 (not accounting for transfers to other institutions), only 11.9% finished within the normal program completion time of two years, 22% in four years, and 28% in six years (Knapp et al., 2011). Some reserachers have pointed out intrinsic difficulties involved in measuring community college student retention, since some students enter without the goal of degree attainment and instead are interested in only specific course completion (Habley, Bloom, & Robbins, 2012; Hagedorn, 2005). Alternately, a student may falsely indicate having a degree goal in order to meet the eligibility requirements for federal financial aid such as the Pell Grant (Hirschy, Bremer, & Castellano, 2011). Similarly, Goldrick-Rab (2010) suggested that descriptions of success in the community college sector could be broadened to recognize widely disparate variations in student goals that may vary over time. Nevertheless, it must be still noted that many students do enter two-year community colleges with the intent of earning a degree or certificate and yet most fail to do so (Bremer, et al., 2011). The impact of this failure is significant since community colleges enroll approximately one half

of all first-time college students in the United States and most of those students will not complete an associate degree (Beach, 2011).

Push and pull factors have also been considered as variables that contribute to student persistence in postsecondary schools. For example, Crisp and Nora (2010) examined the influence of a number of variables, including environmental pull factors, on student success (defined as persisting, transferring to a 4 year college, or earning a degree at the end of the second year of community college) for Hispanic students attending a public community college in 2003–2004. Crisp and Nora drew their sample of 570 students from the Beginning Postsecondary Students Longitudinal Study (BPS:04/06). Multiple regression analysis revealed that environmental pull (operationalized predominantly as a need to work while attending college) exerted a significant negative effect on the likelihood of success.

From an efficiency standpoint alone, it is widely accepted that retaining enrolled students is more efficient and less expensive than expending resources to recruit new ones (Berger & Lyon, 2005; Schuh, 2005; Noel-Levitz, 2013). A longitudinal five-year study that ended in 2009 concluded that state and local governments spent approximately \$3 billion to help pay for the educational costs of students who eventually dropped out of community colleges. Adding in federal appropriations allocated to these students, the estimated total costs ballooned to almost \$4 billion, excluding the out-of-pocket costs those students themselves paid (Schneider & Yin, 2011).

Like dropping out of high school, college attrition has pronounced personal, social, and economic impacts. In 1970, 60% of high school graduates were earning middle-class wages; however, by 2007 that number had dropped to only 45% (Carnevale, Smith, Stone, et al., 2011). The National Center for Education Statistics (NCES) produces an annual report, *The Condition*

of Education, which offers a snapshot of trends in U.S. education. According to this report, in 2011 the median annual income for young adults (age 25-34) with a bachelor's degree was \$45,000, compared to \$22,900 for those without a high school diploma or its equivalent, \$30,000 for those with a high school diploma or its equivalent, and \$37,000 for those who had earned an associate degree (Aud et al., 2013). Between the beginning of the recession in December 2007 and its official end in January 2010, the U.S. economy lost 5.6 million jobs that could be filled by people with a high school education or less (Matthews, 2013). The nation has since shown signs of recovery from the worst recession since the Great Depression, but the structure of the economy has changed permanently and the competitive nature of the job market has intensified. As a result, education and training are more important than ever (Rumberger, 2011).

The background and intervening variables that impact college persistence are well established in the literature. Higher-education institutions have responded with a variety of programs designed to keep college students engaged and persisting. Yet, as Swail, Redd, & Perna (2003, p. 1) note, "For the past 100 years, the institutional graduation rate has stubbornly held at the 50 percent mark: half of all students entering higher education fail to realize their dreams and aspirations based on earning a certificate or degree." Despite decades of research, the rates of college student departure appear intractable (Braxton, et al., 2004; Habley, Bloom, & Robbins, 2012; Reason, 2009a), and the negative consequences of non-completion are profound.

Options to Improve Secondary and Postsecondary Outcomes

Dual Enrollment

Unlike options for earning college credit while still in high school through examination, such as the Advanced Placement (AP) program, IB (International Baccalaureate), and College Level Examination Program (CLEP) program, dual enrollment (DE) refers to programs in which

high school students earn college credits for courses taken through a postsecondary institution. States may also have their own names for dual-enrollment programs such as Running Start (Washington), College Now (New York), or Postsecondary Enrollment Options (Minnesota). DE programs can vary widely in their funding, purpose, eligibility requirements (such as minimum GPA, grade level, and assessment scores), courses, target population, award of credit, and setting (two or four-year college, or high school campus). (Hughes, Karp, Fermin, & Bailey, 2006).

During the 2002–2003 school year, across all states with DE programs, 813,000 high school students were enrolled in at least one dual-credit course (Kleiner and Lewis, 2005). By the end of the 2010-2011 school year, that number had grown to over one million students (Marken, et al., 2013). DE programs offer several advantages to students, including cost savings from earning college credit at low (or no) tuition, reducing the time needed to achieve a degree, and early exposure to an authentic college experience, which may allow students to see themselves as having college potential (Hooker & Brand, 2010). It has also been suggested that DE opportunities help to prepare students academically and socially and increase success for students at the postsecondary level (Andrews, 2001; Bailey & Karp, 2003; Kleiner & Lewis, 2005).

One recent quasi-experimental study tested the contribution of dual enrollment to college degree attainment. An (2013) utilized data from the NELS:88/2000, narrowing the sample to only those students who responded to the fourth follow-up survey and also attended postsecondary school; this resulted in a sample of 8,800 students. Results showed that dual enrollment participation increased the likelihood of degree attainment, even after accounting for a large number of covariates. The predictor variables used in the study included SES, family

structure, SAT score, high school class rank and high school GPA. An's study revealed that dual enrollment participation increased the probability of attaining any postsecondary degree by 7%.

Karp, et al. (2007) provided strong evidence that dual enrollment can have positive effects on a range of educational outcomes. Their study utilized a large K-20 dataset containing all students (nearly 300,000) enrolled in public schools in Florida during two school years (2000-2001 and 2001-2002). In addition to demographic information, the dataset also contained a rich variety of high school and postsecondary variables, permitting longitudinal tracking into postsecondary enrollment (though only at Florida postsecondary institutions). Karp et al. conducted two sets of analyses in order to compare all dual enrollment participants in the state to non-dual enrollment peers, and a second to compare only career and technical education students (CTE) students with CTE students who did not pursue dual enrollment. They defined CTE students as those who took at least three courses in the same "specific labor market preparation area" in high school (Karp et al., 2007, p. 23). Significant findings were that DE students were 4.3% more likely than their peers to earn a high school diploma, CTE DE students were 5% more likely to earn a regular diploma, and male and low-income students experienced the greatest benefit from dual enrollment. In addition, on some measures students with lower high school grades benefited more than students with higher HSGPA.

Struhl and Vargas (2012) conducted a quasi-experimental study of DE impacts in Texas, utilizing a longitudinal dataset of more than 32,000 students (17,980 dual enrollees and 16,454 matched peers who were not dually enrolled). They used propensity score matching to create treatment and comparison groups similar across demographic and academic variables to examine the unique effects of DE on three different postsecondary outcomes: enrollment in college, returning to college for a second year, and earning a degree. Students who attended districts with

limited access to dual enrollment opportunities were eliminated from the study. Separate analyses were run to account for differences between two- and four-year colleges. When controlling for demographics and test scores, Struhl and Vargas found DE students to be 2.30 times more likely to enroll in some type of college than non-DE students. When controlling for interaction effects of race and SES, DE White students were 2.21 times more likely to enroll in any college than non-DE White students, and DE Black students were 1.6 times more likely to enroll than Black non-DE students. When controlling for the type of institution attended, DE students who attended two-year colleges were 1.54 times more likely to persist and 1.83 times more likely to complete their program in three years or less than peers who had not participated in dual enrollment.

Dual Enrollment for At-Risk Youth

As stated previously, the last decade has seen tremendous growth in DE-AR programs and new initiatives that combine high school and college, designed for this population, are springing up across the country. These options can be critical for young people whose educational pathways have become disrupted for a variety of reasons and who will need not only a high school diploma but also some form of postsecondary education in order to succeed in the 21st century. Balfanz (2007) posited that multiple pathways where disengaged students can achieve “adult success” (p. 20) in a compressed time frame are particularly valuable for those students who are considerably beyond normal school age and undereducated. Jobs for the Future (JFF), a Boston-based group whose efforts are directed toward systemic education reform and workforce development, has identified college based reengagement models where postsecondary access is accelerated as a critical component for effective dropout prevention and recovery efforts (Almeida, Steinberg, Santos, & Le, 2010).

The James Irvine Foundation established the goal of increasing the number of at-risk youth in California who completed high school on time and also earned a postsecondary credential by age 25. To reach this goal, the Foundation created the Concurrent Courses Initiative (CCI), which spanned the years 2008-2011. The CCI focused on providing low-income, struggling high school youth with a career-focused dual enrollment opportunity. An evaluation study (Hughes, et al., 2012) examined the outcomes for the 3,000 students involved and found that CCI participants had higher graduation rates, were more likely to enroll in a four-year college, had greater college persistence rates, accumulated more credits as they progressed through college, and were less likely to enroll in basic skills courses in college than similar non-CCI participants.

Early college high school initiative. One set of DE-AR models fall under the umbrella of Early College High School (ECHS). With origins in the middle college movement of the 1970's, the Early College High School Initiative (ECHSI) was launched in 2002 with funding primarily from large philanthropic organizations such as the Bill and Melinda Gates Foundation, Carnegie Corporation of New York, the Ford Foundation, and the W. K. Kellogg Foundation (Nodine, 2009).

Driven by a belief that low-performing students can not only earn a high school diploma but also succeed in rigorous, college level coursework if given the right supports and opportunities, the ECHSI has seen tremendous growth from three programs in 2002 to 280 across 32 states in 2014 (Webb & Gerwin, 2014). In a report on the ECHSI, Berger et al. (2009) described the characteristics common to all ECHSs: (a) all programs are physically located on higher education campuses, usually community colleges; (b) all students earn college credit while still in high school; and (c) all programs make a commitment to five core principles:

1. Serving students underrepresented in higher education (first-generation, low-income, minority)
2. Creation by a local education agency, an institution of higher education, and the community
3. Providing an integrated academic program so that all students earn one to two years of transferable college credit leading to college completion
4. Engaging all students in a comprehensive support system that develops academic and social skills as well as the behaviors and conditions necessary for college completion
5. ECHSs and their higher education partners work with intermediaries to advocate and support policies that advance the early college movement (Berger et al., 2009, p. 4)

With strong interest from a combination of well-endowed foundations, nearly \$1 billion has been invested in the ECHSI effort since 2001. The initiative provides funding to 13 intermediary (also referred to as grantee) organizations charged with working with various partners (e.g. school districts, institutions of higher education, community-based organizations) to launch ECHSs. JFF serves as the overarching intermediary organization. Grantees include organizations experienced in creating or redesigning schools, national constituency-based organizations, community foundations, and higher-education institutions (Jacobsen, 2005).

ECHSs have many similarities to dual-enrollment programs, but they differ in that obtaining an associate degree is the goal, not just the accumulation of college credits. If adopted widely, it is estimated that the ECHS model could cut state education costs per student by \$3,250

through reducing college remediation costs and reducing the length of time required to complete an associate degree (Hoffman, 2005).

Though the ECHSI is just over 10 years old, there are positive results from several experimental studies of grantee programs. A study of three cohorts of ECHS students in North Carolina found that these students made greater progress through a college preparatory mathematics course, had fewer unexcused absences, and had lower suspension rates than the control students (Berger, Adelman, & Cole, 2010). A recently published random assignment study (Berger et al., 2013) found that students who enrolled in one of 10 Early College programs between 2005–2006 and 2007–2008 earned more credits than comparison peers, had higher graduation rates, and were more likely to enroll in college and complete a degree. The program impacts were found to be greater for minority, low-income, and female students.

Gateway to College. The Gateway to College (GTC) model, which originated at Portland Community College (PCC), is one of the ECHSI partners. In 2003 the Bill and Melinda Gates Foundation awarded PCC a multi-million dollar grant to replicate its GTC model across the country. In 2008 the Gateway to College National Network (GTCNN) was formed as an independent nonprofit organization. The GTCNN is the intermediary for GTC. In 2010 the Open Society Foundations joined with the Bill and Melinda Gates Foundation, Carnegie Corporation of New York, The James Irving Foundation, The Kresge Foundation, and The Walmart Foundation to fund its further expansion (Sudetic, 2012). By 2013 GTCNN had grown into a network of over 43 community and technical colleges in 23 states implementing the GTC model, in partnership with well over 100 school districts and an enrollment of nearly 3,000 students (Gateway to College, 2013). There are three GTC programs in Washington state,

located at Highline Community College in Des Moines, LWIT in Kirkland, and Spokane Falls Community College in Spokane.

GTC programs serve youth age 16 to 20 who have dropped out of high school or are on the verge of dropping out. Students complete their high school diploma within the community or technical college setting while simultaneously earning college credits leading to an associate degree or certificate. GTC is intended to offer a second chance for students not succeeding in the traditional high school environment to complete high school and earn significant college credits leading to at least an associate degree. Though local and state regulations may necessitate slight variations in configuration, GTCNN requires all partner programs to adhere to a common set of program elements grounded in the ECHSI's core principles and intended to maintain fidelity to the model. GTC member programs must also participate in extensive on-site, peer-to-peer, and network-led training. For purposes of this study, the abbreviation GTCL is used to indicate the GTC model as implemented by LWTA which may have aspects that differ from other GTC models.

Theories of Student Persistence and Attrition in Postsecondary Education

With an increase in dual enrollment models, it is essential to consider factors that impact college persistence in general. While gaining entry into postsecondary education is important, actually persisting and attaining a degree has the greatest overall personal, social and economic benefit (Swail, et al., 2003). The research literature, representing decades of scholarly effort, is replete with models of retention and attrition describing a myriad of conditions and characteristics that impact educational attainment for college students in general. This body of research has identified a complex set of issues that influence students' decisions to remain in or depart from higher education.

Among the influential theories and models on student persistence, those of Vincent Tinto are perhaps most frequently cited (Berger & Lyon, 2005; Harper & Quaye, 2009). In Tinto's earliest model he defined student attrition as "a longitudinal process of interactions between the individual and the academic and social systems of the college during which a person's experiences in those systems ... continually modify his goals and institutional commitments in ways which lead to persistence and/or to varying forms of dropout" (Tinto, 1975, p. 94). Tinto theorized that a student's individual characteristics, prior experiences, and commitments interact with the academic and social systems of college, and that this interaction most strongly influences whether a student continues to completion or not. Personal, family, and academic attributes and prior educational experiences all affect how students interact with their college's academic and social environments. Tinto concluded that these academic and social interactions impact a student's commitment to the institution and subsequent persistence to graduation.

Although Tinto's 1975 model has remained the "dominant sociological theory of how students navigate through our postsecondary system" (Swail, et al., 2003, p. 1), the model also has its critics, particularly with regard to its assumptions about the impact of academic and social integration on the retention of minority students, where other constructs may have more explanatory power. Rendón (1994) faulted models that view the student as the sole unit of analysis, as if the responsibility rests on students to adapt to the institution. Others have noted that some student departure models fail to recognize the unique challenges of first-generation and minority students, whose distinct educational and social experiences often include persistent marginalization, racial discrimination, lack of role models or community support, and inadequate information (Braxton et al., 2004; Nora & Cabrera, 1996; Tierney, Corwin, & Coyler, 2005; Ting, 2003).

Institutional Action Models

Many empirical studies of retention and attrition have drawn on the early work of Tinto and others, frequently modifying, refining, or reconceptualizing the work of early theorists. Tinto and Pusser (2006) posited a new model that addressed some of the criticisms of Tinto's earlier models. Departing from the earlier emphasis on students' preexisting characteristics (deficit framing) in their new model of institutional action, Tinto and Pusser challenged institutions of higher education to identify courses of action that they can take to help students persist. Tinto (2006) asserted "we must recognize that a college or university once having admitted a student, has an obligation to do what it can to help the student stay and graduate" (p. 6). This statement should apply to both regularly matriculated students and to high school students served in DE-AR models such as GTCL.

Tinto and Pusser (2006) are not the only educational researchers to have identified the potential of the institutional action perspective. Models of student-environment interaction can be traced back to a very early concept of "environmental press" advanced by Pace and Stern (1958), who were among the earliest researchers to consider the impact of the college environment on students. They described environmental press as the characteristics, qualities, and pressures exerted by the environment that can significantly influence student behavior (Hamrick, Evans, & Schuh, 2002).

Rendón (2006) stated, "Once students enter college, it is the structural elements within this system which need to be changed and transformed.... The 'student success problem' is actually a 'higher educational structural problem' where the primary locus of change is within the institution" (p. 21). Reason (2009a) also found that organizational actions such as practices and policies, along with the kind of student experiences that are promoted or discouraged by the

organization, can influence student outcomes. Institutional action is the key element of initiatives such as Achieving the Dream (ATD), a national community college reform effort launched in 2004 by the Lumina Foundation for the purpose of improving rates of persistence and completion among community and technical college students, particularly among low income and minority students. In a five-year evaluation report on ATD community and technical colleges in Washington state, Jenkins, Wachen, Kerrigan, and Mayer (2012) indicated that the best modality for effecting change is for colleges to make changes in institutional policies and practices that will improve student outcomes. According to Jenkins et al. (2012), it is unlikely that one single intervention can result in significant improvements; rather, colleges must consider major redesign of programs and college functions.

Likewise, the theme of institutional action is repeated in a summary report encompassing 25 years of research on why students drop out of high school. Rumberger and Thomas (2000) used a multilevel model to examine dropping out of high school and found that schools themselves exert a powerful effect on the propensity to drop out. Their analysis, using data from the 1990 High School Effectiveness Survey (HSES), a representative sample of 10th-graders from 247 high schools, revealed that individual and family effects explain approximately one-half of the variation in dropout behavior. They contended that the remainder of variation is attributable to school-level factors such as school size, student-teacher ratio, and school policies related to discharging or retaining students. In the literature on high school dropouts there has been some shift away from student characteristics to the more malleable school-level dynamics that impact student persistence.

In their review of 387 studies published in scholarly journals, Rumberger and Lim (2008) called attention to the centrality of institutional action in K-12 persistence and completion research:

Despite all the attention and controversy surrounding the previous factors associated with school effectiveness, it is the area of school processes that many people believe holds the most promise for understanding and improving school performance. While many schools, especially public ones, have little control over the characteristics of the students they serve, their size and location, and the resources they receive, they do have control over how they are managed, the teaching practices they use, and the climate they create to promote student engagement and learning. (p. 60)

Shin and Kendall (2013) also found a shift in school dropout literature towards understanding those variables that can be changed by either the student or the institution (e.g., student behaviors and attitudes toward school, or school practices that influence school engagement and performance). Because the present study is examining a *college* based technical high school (LWTA), it is helpful to draw on theories from both K-12 and higher education, particularly those focused on institutional action where there is strong theoretical alignment with tenets of the GTCL model.

Identifying the GTCL Theory of Change

Program evaluation methodologists have described the importance of uncovering and articulating the program's theory of change that is believed to lead to desired outcomes (Fitz-Gibbon & Morris, 1996; Patton, 2008). Once any differences in outcomes between the AR-Direct and AR-GTCL model are established through the quantitative methodologies deployed in this study, it then becomes essential to understand *why* there may be differences. This final

section of the literature review seeks to identify the elements of those institutional actions described by Tinto and Pusser (2006) that are related to the major components of the GTCL program. Using a conceptual framework is helpful to simplify a complex phenomenon in order to explain or suggest why the phenomenon works as it does and to make its underlying assumptions apparent. Patton (2008) described this method of identifying a program's theory of change as a deductive approach that draws heavily on scholarly theories which is consistent with the pragmatic worldview of this study. Shadish, Cook, and Campbell (2002) have identified the three most important components for theory-driven evaluation as follows: 1) explicating the theory behind a treatment by detailing the expected relationships among inputs, mediating processes, and outcomes; 2) measuring all the constructs postulated in the theory; and 3) analyzing the data to assess the extent to which the postulated relationships actually occurred (p. 501). For the purpose of this study, the focus will be on the first of these components, explicating the theory.

Tinto and Pusser's Model of Institutional Action

In Tinto and Pusser's (2006) model of institutional action, the theoretical emphasis shifts from students' background or pre-college characteristics to a broader conception of how specific actions taken by the institution can foster conditions where students will stay enrolled and persist to completion. This conceptualization provides a structure for understanding factors related to educational attainment at both the high school and college level discussed in this literature review. It places the focus of attention on the institution's role in providing programming and support focused on the malleable factors within institutional control that can foster student persistence.

Drawing on existing studies of effective institutional practices, Tinto and Pusser (2006) proposed five broad categories of action under institutional control that can establish conditions for improving student success: institutional commitment, expectations, support, feedback, and involvement. Each component of institutional action that is central to the GTCL theory of change will be discussed in greater detail in the next section.

Model overview. The conceptual model, as shown in Figure 1, reflects the theory that each student enters the campus with a distinctive set of prior experiences, abilities, attitudes and commitments (shown to the left of the large circle in Figure 1); however, Tinto and Pusser (2006) posit it is the malleable elements of the student's experience, created by the institution and within institutional control (shown within the large circle), that hold the most promise for influencing student success.

Institutional commitment and institutional leadership, shown outside the circle in Figure 1, are viewed as antecedents necessary to create a climate of expectation of student success. Elements within the large circle depict the institutional practices of support, feedback and involvement that, together with an expectational climate, can impact students' quality of effort, learning, and ultimately success (as seen in the rectangular boxes). The dashed circle in Figure 1 captures the researcher's hypothesized contribution of career opportunity to the model in order to depict a significant component of the GTCL's program theory of change. Each of the categories in Tinto and Pusser's model, as well as how each is implemented in the GTCL program is discussed in more detail in the following sections.

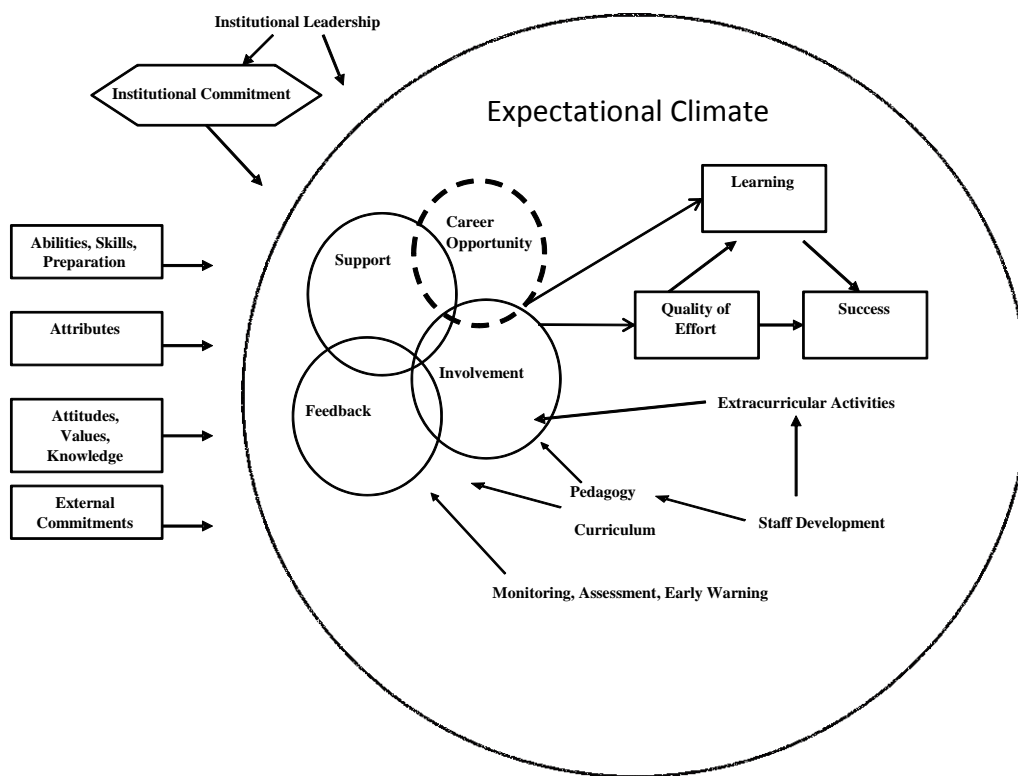


Figure 1. Theoretical model of institutional action. Adapted from *Moving From Theory to Action: Building a Model of Institutional Action for Student Success*, by V. Tinto and B. Pusser, 2006, Washington, DC: The National Postsecondary Education Cooperative, p. 11. Copyright 2006 by the National Postsecondary Education Cooperative.

Institutional commitment. This first category of institutional action is fundamentally an antecedent in order for the other conditions to exist in the organization. Tinto (2005, p. 321) stated, “Institutional commitment is more than just words, more than just mission statements issued in elaborate brochures; it is the willingness to invest the resources and provide the incentives and rewards needed to enhance student success.” This emphasis on institutional commitment is consistent with Tinto’s early work, in which he wrote that student success is achievable when “it springs from the ongoing commitment of an institution, of its faculty and staff, to the education of its students” (Tinto, 1993, p. 212) and that the institution must be

concerned with the welfare of each and every student and must take actions in the best interest of its students (Tinto, 1990).

Kezar and Kinzie (2006) conducted a multisite case study of 20 institutions, examining the relationship between student engagement and institutional mission. They described a strong relationship between graduation rates, persistence, student engagement, and the extent to which the institution's mission makes an explicit commitment to the success of all students. Kezar and Kinzie distinguished between the institution's *living* mission and the *espoused* mission, contending that the living mission represents the actual organizational behaviors that communicate institutional commitment most clearly to its students, faculty, and staff.

Braxton et al. (2004) noted that much of the research on student departure is conducted on residential institutions, but they proposed two organizational elements that may be particularly relevant to students who attend commuter institutions such as two-year community and technical colleges. Institutional commitment is one of these elements. Braxton et al. (2004) suggested that student commitment to the institution (and subsequent persistence) can be positively impacted when students perceive that the institution has a strong and abiding commitment to student welfare.

LWIT has demonstrated a strong institutional commitment to serving disengaged and dropout high school-age students for over 20 years. As part of its accreditation process by the Northwest Commission of Colleges and Universities, LWIT has established core themes that enable the institution to achieve its mission and serve the needs of the community. One of its selected core themes is to provide pathways (multiple entry points). LWTA high school students are explicitly named as one of the populations that the institution has committed to serve via these pathways.

Expectational climate. According to Tinto and Pusser (2006), institutions that hold high expectations for its students are more likely to see students, especially students from groups who have been historically underrepresented in higher education, rise to meet those expectations. Tinto posited that, when students perceive clear, high expectations from college staff and faculty, they are more likely to adopt behaviors that lead to achievement.

Expectations are shaped for student, faculty, and staff behavior in a number of direct and indirect ways that, together, contribute to the creation of a school climate that provides guidance for members of the school community. Astin & Antonio (2012) described the school environment as “not only the programs, personnel, curricula, teaching practices, and facilities that we consider to be part of any educational program but also the social and institutional climate in which the program operates” (p. 87). Oseguera and Rhee (2009) defined campus climate as the “normative perceptions and attitudes, and ambience of the environment” (p. 551).

In light of the significant demographic changes described by Kirsch, et al., (2007), as well as the pressing need for a more educated workforce, campuses can expect to see increases in the numbers of nontraditional, minority, and first-generation students, making it more important than ever to consider what actions the institution can take to heighten a sense of high expectations for all students. Rendón (1994) called attention to the “validating actions” that can be taken at both the classroom level (e.g., actively reaching out to students) and at the institutional level (e.g., training faculty and staff regarding the needs and strengths of culturally diverse students). Hurtado and Carter (1997) and Nora and Cabrera (1996) have observed the high degree to which students from groups historically underrepresented in higher education are positively affected by the perception that faculty and staff hold high expectations for their individual performance. Both sets of researchers described the overwhelming negative

influences of low expectations on the persistence decisions of underrepresented students. Similarly, the impact of teacher expectations is well established in literature on K-12 education. When students perceive that teachers hold high expectations for them, students generally experience an increase in feelings of self-worth, connectedness, and engagement (Auwarter & Aruguete, 2008).

Tinto (2012) emphasized the need for both structured and nonstructured opportunities to communicate expectations. As Kuh (2001) noted:

Just as no single experience has a profound impact on student development, the introduction of individual programs or policies will not by themselves change a campus culture and students' perceptions of whether the institution is supportive and affirming. Only a web of interlocking initiatives can over time shape an institutional culture that promotes student success. (pp. 30-31)

Several researchers believe that faculty members and their contact with students, both in and outside of class, are the most powerful influence for creating the norms and values of academic environments (Bean, 2005; Weidman, 1989). Faculty in the GTCL program hold students to high attendance, behavioral, and class performance expectations in an effort to create an "expectational context" (Tinto, 2012, p. 15) that can guide individual student actions and choices. These expectations are stated clearly during all phases of the intake process and reinforced and modeled in the classroom on a daily basis.

While it is important to clearly state behavioral expectations on the part of students, these expectations must be made real to students through institutional behaviors such as prompt response to absenteeism (Tinto, 2012). Crede, Roch, and Kieszczynka (2010) found a student's attendance in class to be a better predictor of academic performance in college than high school

GPA or SAT scores. They also noted that mandatory attendance policies have a small but positive impact on average grades. Balfanz & Byrnes (2012) evaluated reports on absenteeism from a number of states and conclude that chronic absenteeism is among the strongest predictors of dropping out of high school. Attendance is closely monitored in GTCL and students are required to meet strict attendance standards. Staff seek to identify signs of disengagement early and work with students and their families to provide assistance to correct the problems. Students do face dismissal if they are not able to meet the attendance standards.

GTCL students must attend an orientation program prior to the start of the academic quarter in which they enroll. These orientations are designed to provide clear guidance on expectations; currently enrolled peers attend these orientations to emphasize aspects of college-level expectations, particularly those that may differ from expectations in the high school setting. This is especially important for low-income and first-generation students who may be academically unprepared or lack the cultural capital needed to navigate the community college system (O’Gara, Karp, & Hughes, 2009).

Support. Institutions provide support to students in several ways: academically, socially, and financially. Rodriguez and Conchas (2008) found that certain aspects of support are especially valuable for groups that have been historically marginalized. They stated that students respond to “rigorous, engaging, and supportive academic environments; access to caring adults who are committed to youth advocacy; and, most importantly, support by a climate that recognizes the experiential, intellectual, and community cultural wealth that youth bring to schools and communities” (p. 222).

Comprehensive academic and social support services to sustain student success are a central tenet of all GTC programs. GTCL endeavors to build on student strengths and promote

development across a range of domains—cognitive, social, emotional, and career—in order for at-risk high school students to succeed in a college-based program. Academic and social support is particularly pronounced in the first term of enrollment, during which the primary setting for delivering this support is the classroom. The emphasis on the importance of the student’s first term is consistent with research conducted on college retention. For example, Hosch (2008) found that, after controlling for race and gender, students who earned a first-semester GPA of 3.0 or higher had a six-year graduation rate of 63%, whereas students who either earned a first-semester GPA below 2.0 or did not complete the semester had a six-year graduation rate of only 9%. Hosch’s study established the critical importance of the first semester at an institution in forming students’ patterns of behavior; this is a key tenet of the GTCL model.

Support during transitions. Tinto noted the importance of providing support during transition in his early models: “Different forms of institutional actions for student retention must be carefully timed to meet the changing situations and needs of students as they attempt to progress along the path to college completion” (Tinto, 1988, p. 451). Providing support to students during transition is another important component of the GTCL model. A widely recognized conceptualization of the transition process is Schlossberg’s transition theory (1981), a psychosocial model of development that describes four factors—situation, support, self, and strategies (also referred to as the four S’s)—that affect the outcomes that an individual in transition experiences:

1. Situation - refers to how an individual views the transition
2. Support - sources of support available to the person in transition
3. Self - what type of strengths and weaknesses the individual brings to the transition
4. Strategies - what kinds of coping strategies the individual has

Students are often at risk of departure during key transition points such as the transition between middle and high school or from high school to college (Alspaugh, 2000). Transitions are particularly significant for GTCL students, as they are moving not only from their previous school setting but also into a new type of environment. GTCL students experience an additional transition when they move from the learning community (which they experience during their first term) into the college mainstream. Although Schlossberg's (1981) theory was developed with adults in mind, it is useful in identifying opportunities to influence GTCL students' perceptions of their situation, self, support, and strategies in order to help them to navigate and cope with change. These opportunities occur within the classroom and less formally through interactions with peers and advisors.

One formal effort to support student's perception of transition occurs during a mandatory two-day, credit-bearing orientation class that meets prior to the beginning of the term. During this time, students begin to know their peers and become acclimatized to the campus environment and to the services and opportunities afforded to them as full members of the college community. As Upcraft and Farnsworth (1984) observed, an orientation program represents an institutional effort to help students make a successful transition from their previous environment into the collegiate experience. The GTCL orientation class is consistent with Astin's student involvement theory (1993), which states that, when students feel connected to other students and the campus community, they are more likely to persist to graduation.

Classroom supports. In the college classroom both academic and social supports can be extended to students. Barefoot (2004) and Tinto (2012) have called attention to the importance of the classroom experience particularly for first-year students, as most attrition occurs during the first year. A report by the Education Trust (2001) estimated that more than one-quarter of the

freshmen at four-year colleges and nearly half of those at two-year colleges do not make it to their second year. Two structural mechanisms designed to provide academic and social supports have shown a positive impact on student retention and are also significant components of the GTCL model. These are learning communities and college success courses.

Learning communities. Learning communities are considered one of the most widely used programmatic efforts to improve student outcomes at the community college level (Crisp and Taggart, 2013). Numerous researchers have examined the impact of learning communities on undergraduate success (Kuh, 2008; Lardner & Malnarich, 2008; Tinto, 2000). Smith, Macgregor, Matthews, and Gabelnick (2004) described the purpose of learning communities “to build community, enhance learning, and foster connections among students, faculty, and disciplines” (p. 20). Typically students are enrolled in courses that are linked together so that there is at least some integration of course content between them (Barefoot, 2004). In a review of 17 different studies, Andrade (2007) concluded that the increased persistence noted among students who participated in learning communities was likely a result of student involvement. Others attributed the benefit of learning communities to increased collaboration. Foote (1997), described five components of collaborative learning that occur in a learning community: (a) clear, positive interdependence among students, (b) regular group self-evaluation, (c) interpersonal behaviors that promote each member’s learning and success, (d) individual accountability, and (e) personal responsibility (p. 1).

Another component of the GTCL model is the first-term learning community in which students are grouped into cohorts of fewer than 25 and take all classes together as a group. Classes include reading, writing, math, career exploration, and college strategies. The intention of the GTCL learning community is to boost academic skills; develop non-cognitive skills such

as communication, critical thinking and teamwork; recover credit; and provide students with the knowledge, resources, and support needed to be successful in the college learning environment. Students receive high levels of academic and social support through student faculty interactions and peer influences. Opportunities for collaborative learning encourage meaningful peer interactions where students learn from each other by comparing notes, organizing study groups, and taking the same courses.

In the first-term learning community, GTCL English and math classes are taught by faculty who also teach in the general college, facilitating students' early exposure to the expectations and pace of the college classroom. The faculty who teach the various first-term classes work together to integrate the coursework where possible; for example, joint assignments are given in English and career exploration classes. In addition, regular face-to-face meetings and frequent e-mail correspondence take place throughout the quarter to review student progress and create strategies for overcoming obstacles such as poor attendance, disciplinary issues, or low academic performance.

Kuh (2001) stated, "The key to developing a success-oriented institutional culture is to capture the power of the peer group and to focus on the classroom as the primary locus of culture building" (p. 37). All GTCL classes include an emphasis on group work where students are accountable for their own learning as well as that of their peers. Students are paired with accountability partners; if their partner is absent, students are expected to pick up assignments and share them with the partner. Peer interactions such as those in the GTCL learning community provide encouragement, increase students' sense of belonging, and act as networks of academic and personal support, thus positively influencing student development (Barefoot, 2004; Horn, 1997; Tierney, et al., 2005). Based on social interdependence theory, this type of

positive interdependence has been found to impact achievement at both the K-12 and college levels (Jensen, Johnson, & Johnson, 2002; Roseth, Johnson, & Johnson, 2008). A philosophy of interdependence is also aligned with Friere's (1974) belief that education becomes more fully human through a critical exchange of perspectives rather than through simply receiving knowledge passively. Tinto (2004) stated that, "students who are actively involved with peers, faculty and staff, especially in learning activities, are more likely to learn, persist and graduate" (p. 9). Barefoot (2004) found that two of the major contributions that learning communities make to student success are interaction between students and faculty and integration of course content among the linked courses. She also argued that learning communities are especially helpful for first-year students (whether at residential or commuter institutions) because they create a structure that enables students to engage better with their peers, both academically and socially.

Pascarella and Terenzini (2005) found that a student's interaction with peers was influential in promoting persistence and educational attainment, particularly when there was an active, participatory classroom environment that promoted student involvement. Pascarella and Terenzini recommended learning communities as an instructional approach that fosters increased interaction between students and faculty. The impact of learning communities on postsecondary student engagement and retention is well documented in the scholarly literature (Zhao & Kuh, 2004). Zvoch (2006), who maintained that school organization is a factor in whether students stay in school, characterized smaller learning communities as less intimidating, more communal, and more personal, offering increased chances to promote student sense of belonging and interaction. Zvoch suggested that smaller learning communities might be a better way to organize schools for at-risk students.

A longitudinal study of predominantly low-income students attending 13 community colleges (Engstrom & Tinto, 2008) found that students who participated in learning communities were significantly more likely to persist from their first to their second year, after controlling for student achievement and other demographic characteristics. Sommo, Mayer, Rudd and Cullinan (2012) conducted a random-assignment study conducted at Kingsborough Community College to test the impact of participation in a one-semester learning community. The study, which followed students for six years after their participation in the learning community, found that 35.9% of the program group earned a degree from any institution, compared with 31.3% of the control group.

Engstrom and Tinto (2008) identified four essential elements of effective learning communities: (a) active and collaborative pedagogies, (b) strategies that encourage students to develop meta-cognitive knowledge, (c) integration of campus support services into the learning community, and (d) holding students to high expectations with equally high levels of encouragement and support. Each of these elements is integral to the learning community structure within the GTCL foundation term.

College success courses. Commonly carrying such names such as College Strategies, College Survival, College Life Skills, and College 101, these specially designed courses typically emphasize time management, note taking, study habits, learning styles, and long-term planning as a way of providing information regarding college policies, campus support services, and other resources such as the library. In a study of Florida community college students, Zeidenberg, Jenkins, and Calcagno (2007) compared outcomes for students who completed a success course with those who did not. Using logistic regression to control for student characteristics such as gender, ethnicity, age, English proficiency, and test scores, the researchers

found that success course participants had higher rates of both earning a community college credential and transferring to the state university system. Another study, using a large data set from the Virginia Community College System (VCC), added to the empirical research on college success courses. In this study, Cho and Karp (2012) found that students who enrolled early (i.e., in their first semester or within their first 15 credits) in a college success course were more likely to attain college credits and persist into their second year.

GTCL students are required to complete a one-credit College Strategies course in their first term. Students admitted to the GTCL program typically have the cognitive capability to understand assigned work (as evidenced by COMPASS scores) but may lack the organizational skills needed to complete the task or turn in assigned work. Students must deal with multiple demands on their time and have often fallen out of the habit of doing schoolwork—a problem that may have contributed to their dropping out in the first place. Students may lack resources at home, such as computers and printers, and may thus need a greater level of planning than others in order to complete assignments. During the class, there is a focus on helping students to record and recall important due dates, manage schedules to include time for studying, take notes, organize a notebook, and set goals. The curriculum for the College Strategies class also focuses on developing what Conley (2005) calls “habits of mind,” or those learning behaviors that college faculty have identified as essential for success in college (Conley, 2005, p. 15). Examples of such habits include asking questions in class, supporting opinions, revising papers to improve writing, and evaluating the quality and reliability of information received. There is also an emphasis on helping students develop attitudes and behaviors that have been shown to positively impact student academic performance. Termed non-cognitive behaviors by Farrington

et al. (2012) students are taught how to complete homework, participate in class, and work with other students.

Advising interventions. Distinct from general advising, advising interventions are specifically focused on increasing retention. Various terms used in the research literature to describe this type of advising such as *intensive*, *enhanced*, and *intrusive*. Scrivener and Weiss (2009) examined the effect of enhanced advising on low-income students at two community colleges in Ohio. Students were randomly assigned to either a control group where they could access regular college advising services or to an intervention group. The intervention consisted of increased advising (meeting with a program counselor twice a term for two terms) and a small stipend (to incentivize students' attendance at these more frequent, intensive advising sessions). During the advising meetings, academic progress was discussed and efforts were made to resolve any issues that might affect the students. The intervention lasted for two semesters. Students in the intervention group outperformed the control group during both the second and third (i.e., post-intervention) semester with respect to registration rates, average number of credits attempted, and average number of credits earned. However, after the enhanced advising ceased, program effects faded. Scrivener and Weiss (2009) posited that increasing the program's duration could boost its long-term impact.

Intrusive advising, according to Escobedo (2007), is a pattern of early, intensive, and continuous support. The GTCL model employs a philosophy of intrusive advising during the student's entire enrollment at LWIT. The concept of intrusive advising is encompassed in what Seidman (2005) called a "formula" for student success (p. 296):

$$RET = E_{ID} + (E + IN + C)_{IV}$$

where retention = early identification + early, intensive, continuous intervention. Seidman posited that intervention programs that can identify students' needs early and then provide

continuous and intense support can positively impact college success. Seidman's emphasis on continuous intervention is consistent with the findings in the Scrivener and Weiss (2009) study regarding the need for services to be of longer duration.

GTCL students, identified as at-risk upon enrollment, are assigned a highly qualified advisor who remains attached to the student during the duration of his or her enrollment. This advisor is a member of the LWTA staff and acts as an advocate, guide, and mentor, using a case management approach. Advisors help students through career planning, academic advising, and goal setting. Students have regularly scheduled check-ins at key points such as during the first month of the student's second term. Unlike general college students, GTCL students may not register for courses directly; instead they must meet with their advisor each quarter. These meetings include conversations on how the student is doing academically, socially, and personally. Student needs such as transportation, meals, or temporary financial assistance are addressed and resources are identified. During the quarterly registration meetings, students complete the registration process and review progress toward program completion goals through degree audits. This focus on the end goal of degree completion is consistent with sentiments expressed by Adelman (2006): "The core question is not about basic 'access' to higher education. It is not about persistence to the second term or the second year following postsecondary entry. It is about completion of academic credentials-the culmination of opportunity, guidance, choice, effort, and commitment" (p. xv).

The intrusive advising model used by GTCL shares many similarities with coaching, a strategy found to have positive effects on persistence in a randomized experimental study by Bettinger and Baker (2011). In their study, the college coach's purpose was to encourage persistence and completion by helping students to find ways to overcome both academic and life

barriers and to identify strategies for success. The coach maintained regular contact with students over two semesters. Students randomly assigned to a coach were 14% more likely to be enrolled after the first year than those in the control group. The GTLC approach to advising focuses on what the institution can do to help students learn and practice expectations, develop coping skills, and build strong relationships, all elements of effective dropout intervention described by Hess and Copeland (2001). In order to provide high levels of advising support, LWTA maintains staffing to student ratios of 1:75, well below the typical ratio in a comprehensive high school and well below the ratio of 1:250 recommended by the American School Counselor Association (2012).

GTCL also provides another layer of advising support through college faculty. Tuttle (2000) described a number of different institutional models of advising characterized by varying levels of faculty involvement. The model employed at GTCL is similar to Tuttle's shared-dual model, under which students are assigned to two advisors: one within their program of study and one inside the GTCL program. Most students in the GTCL model are enrolled in a technical program of study after their foundation quarter. Students meet either individually or as a group with their technical faculty member prior to registration each quarter. This faculty member advises the student on course sequencing. The interaction also provides the opportunity to build strong mentoring relationships with students, along with additional support as the students navigate the college experience (Pascarella & Terenzini, 1991; Yarbrough, 2002).

Feedback. Tinto and Pusser (2006) detailed several ways for students to receive frequent feedback on their performance, including entry assessments to identify students at greatest risk academically, institutional assessments, perception surveys, and early warning systems. Early warning systems, based on academic performance and other indicators such as completed

assignments and class attendance, are a cornerstone of providing actionable feedback and monitoring to students (Lotkowski, Robbins, & Noeth, 2004). Tinto (2012) asserted that early warnings based on student performance in the classroom are the most effective form of feedback.

Advisors in the GTCL program alert students and parents or guardians by phone or email when there are multiple absences, when assignments are not turned in, when assignments submitted are below standards, or when inappropriate behavior occurs. During the foundation term, students complete a weekly self-reflection to examine ways in which they are or are not meeting program expectations. Additionally, students and parents or guardians receive three progress reports at intervals during the quarter. Students not meeting expectations during the first reporting period must meet with an advisor to develop a success plan, which is closely monitored. The success plan may include requirements to attend tutoring sessions and to provide documentation of attendance, or to use disability support services if warranted. Students still not meeting expectations after the second progress reporting period may face dismissal with referral to other programs. Consistent with the intrusive advising approach discussed above, GTCL advisors strive to address (early and often) any issue that could impact student performance, such as attendance, behavior, and quality of work, and provide feedback to both the student and (if available) the parent or guardian. Parent involvement is appropriate since these students, though enrolled in college classes, are still high school students. It is also notable that Rendón, Jalomo, and Nora (2000) found social support from family members to be an important factor in the retention of minority college students.

The early alert process is also a mechanism for providing feedback once a student transitions into the LWIT college mainstream after the foundation term. College faculty share concerns relative to a student's attendance or course performance through a web-based system

known as FAST (Faculty Advising Support Tool). This system automatically generates an e-mail that shares the concerns with both the student and the advisor. However, use of FAST is voluntary and not all faculty members file reports via the system (though some use direct e-mail notification instead). Typically, in response to an early alert generated by a college faculty, the student's advisor intervenes by contacting the student to identify barriers to success, solve problems, and connect students to resources on or off campus. Advisors also brainstorm any specific strategies for success in that particular class with the faculty who generated the alert.

LWIT has several tutoring centers that are open to all students. There are also two federal TRIO programs on campus, one designed for first-generation students and one for students with disabilities; however, any student can access TRIO services, which include tutoring, academic counseling, educational planning, academic success workshops, learning labs, financial education, and transfer assistance. TRIO staff also operate a Learning Lab that shares many of the features of success centers, a model found to be effective for students on academic probation in an experimental study by Scrivener, Sommo, and Collado (2009). In this study, conducted at a community college in California, students on academic probation (cumulative GPA below 2.0) were randomly assigned to either a treatment or control condition. The treatment condition consisted of mandatory enrollment in college success class and also required the students to visit the campus success center at least five times during the semester. At the success center students received extra assistance in reading, writing, or math, as well as a place to study, use computers, attend workshops, or get help with homework. After controlling for student demographic variables (and excluding grades from the college success class), students in the treatment condition were twice as likely to return to satisfactory academic standing as students in the control group.

Involvement, engagement, and motivation. The concepts of involvement, engagement, and motivation figure prominently in both secondary and postsecondary retention research. Some have used the terms interchangeably, while other researchers consider each to be a distinct construct explained by unique theoretical underpinnings, factors, and processes. However, all have been shown to be critical components of the learning process and student success. The common thread running through these conceptualizations is the idea of effort and energy that the student applies to academic pursuits.

Involvement. Early retention researchers and theorists stressed the significance of student involvement. Astin (1984) defined involvement as “the quantity and quality of the physical and psychological energy that students invest in the college experience” (p. 294). He considered the level of energy exerted by a student to be a critical component for student success, as he believed that involved students tend to learn and to remain in college. Astin (1996) described the three most important forms of student involvement as academic involvement, involvement with faculty, and involvement with student peer groups. Chickering and Gamson (1999) concluded that students who interacted frequently with faculty and peers were more satisfied with their college experience. Pascarella (1980) also found that informal student contact with faculty plays a significant role in students’ institutional persistence, stating that “significant positive associations exist between extent and quality of student-faculty informal contact and students’ educational aspirations, their attitudes toward college, their academic achievement, intellectual and personal development, and their institutional persistence” (p. 545). Tinto (2004) found similarly that students who were actively involved with peers, faculty, and staff were more likely to persist in college.

Engagement. The construct of engagement has been used to explain differences in educational achievement and attainment among high school and college students. Research has demonstrated that students who are engaged in school tend to earn higher grades and are more likely to persist to completion (Christenson, Reschly, & Wylie, 2012).

Pascarella and Terenzini (2005) characterized engagement as “the critical determinant of the impact of college” (p. 602). Kuh (2003) defined student engagement as “the time and energy students devote to educationally sound activities inside and outside the classroom” (p. 24). A later study by Kuh, Cruce, Shoup, Kinzie and Gonyea (2007) found that student engagement positively affected grades and persistence to the second year at the same institution, even after controlling for a host of pre-college characteristics and other variables such as the parents’ level of education. While Kuh et al. (2007) found engagement in educationally effective practices to be beneficial to all students, the impact on grades and persistence was greatest for student groups underrepresented in postsecondary institutions. Robbins, Allen, Casillas, Peterson, and Le (2006) also emphasized the role of the time and energy spent by students in terms of a concept similar to engagement, which they defined as “academic discipline” (p. 600). In their study of psychosocial factors that impact academic performance and persistence, Robbins et al (2006) found that academic discipline was the best predictor of academic performance among the psychosocial factors studied, even after accounting for prior academic achievement, student demographics, and institutional features.

Similarly, retention researcher Russell Rumberger (2004) found that lack of student engagement is a predictor of dropping out of high school, after controlling for academic achievement and student background. Other theoretical and empirical findings have also indicated that dropping out of high school is a visible indication of a complex and gradual

process of diminishing engagement with school (Alexander, Entwisle, & Kabbani, 2001; Ensminger, Lamkin, & Jacobson, 1996). A study conducted by the California Dropout Research Project (Rotermund, 2007) analyzed survey data from three national studies that asked high school dropouts to report the factors that contributed to their decision to leave school. The reasons most frequently cited—missing too many days of school, not liking school, and failing school—were consistent across the studies and strongly suggest disengagement with schooling (Kortering & Christenson, 2009). Understandably, researchers, educators, and policymakers have increasingly focused on student engagement as the key to addressing problems of low achievement, student boredom and alienation, and high dropout rates (Ainley, 2012; Fredricks, Blumenfeld, & Paris, 2004; Kortering & Braziel, 2008).

Appleton, Christenson, & Furlong (2008) considered engagement to be a meta-construct that combines many separate lines of psychosocial theory and research (e.g., belonging, involvement, and motivation). While there is no standard definition among theorists, in school settings engagement is widely considered to be manifested through various subtypes. One of the earliest theories of engagement in secondary retention literature was Finn's (1989) participation-identification model, where participation leads the student to experience success, which in turn leads to the emotional component of identification (a sense of belonging). This theory defines engagement in school as having both a behavioral component (participation by the student) and an emotional component, termed identification. Expanding on Finn's (1989) two-part typology of participation and identification, newer models have emerged that include either three subtypes: behavioral, cognitive, and emotional (Fredricks, Blumenfeld, & Paris, 2004; Jimerson, Campos, & Greif, 2003), or four subtypes: academic, behavioral, cognitive and psychological (Appleton, Christenson, Kim, & Reschly, 2006; Reschly & Christenson, 2012). Academic

engagement indicators might include participation, time on task, and homework completion. Behavioral engagement is often measured by attendance and appropriate behavior. A student's decision to skip classes, misbehave when in class, or expend little effort might all be behavioral indications of a student's disengagement from school (Balfanz, Herzog, & MacIver, 2007).

Unlike academic and behavioral engagement indicators, which are easily observable, psychological and cognitive forms of engagement suggest internal states of thinking and feeling. A student's intrinsic desire to learn and master material and his or her willingness to expend effort, self-monitor, and establish goals would be examples of cognitive engagement (Fredricks et al., 2004; Furlong and Christenson, 2008). Psychological or emotional engagement is generally conceptualized as attachment to teachers and peers, students' feeling towards school (e.g., liking school or liking to learn), or a sense of belongingness (Finn, 1989; Jimerson et al., 2003). Positive adult-student relationships are another important factor in engagement (Appleton, Christenson, & Furlong, 2008). Lee and Burkham (2002) asserted that positive teacher-student relationships reduce the probability that students will drop out of school. Ozer, Wolf & Kong (2008) also note that adult connections are a key factor in school belonging and school success for at-risk youth. One study found an increase in engagement among high school students when coursework was considered to be personally relevant (Crumpton & Gregory, 2011).

Christenson et al. (2012) contend that engagement is the bottom line for understanding why students drop out of school and is the critical factor that must be addressed in interventions designed to promote school completion. Unlike status indicators such as SES or race, engagement is considered a malleable construct, amenable to institutional interventions

(Archambault, Janosz, Fallu, & Pagani, 2009; Estell & Perdue, 2013; Skinner & Kinderman, 2009).

Motivation. The National Research Council and the Institute of Medicine (2004) suggested that motivation is an antecedent to engagement. Ryan and Deci (2000) discussed motivation as a product of the psychological variables necessary for engagement to occur. Schunk and Miller (2012) described the role of motivation as playing an energizing role with regard to engagement, such that engagement is an observable manifestation of the student's level of motivation. Researchers differ as to which variables are considered to be components of motivation and which are components of engagement. For example, in the model devised by Fredricks et al. (2004), interest is defined as a variable of emotional engagement, while Ginsberg and Wlodkowski (2009) described interest as "the emotional nutrient" (p. 131) necessary for intrinsic motivation and a positive attitude toward learning. Ainley (2012) also distinguished between motivation as an internal (non-observable) psychological process and engagement as observable "energy in action". Like Ginsberg and Wlodkowski (2009), Ainley placed interest at the core of the psychological process of motivation such that interest affects a student's motivation which in turn is manifested as engagement.

Deci and Ryan (1985) posited that intrinsic motivation is likely to increase when the environment is perceived as supporting personal autonomy and choice. Newmann, Wehlage, and Lamborn (1992) studied the role of relevance and found that motivation increases when students are involved in authentic academic work that includes solving real-life problems (i.e., ones viewed as relevant). Hulleman and Harackiewicz (2009) also hypothesized that student's motivation to complete tasks stems from the utility value associated with a task which then also influences interest.

Regardless of the taxonomy of the conceptualizations, most researchers of involvement, motivation, and engagement have suggested a dynamic relationship between the three constructs, with each one playing a role in student achievement (Reschly & Christenson, 2012).

Understanding these multidimensional constructs provides opportunities for more nuanced and targeted interventions at the institutional level. Given the prominent role in research alterable factors such as involvement, engagement, and motivation on student achievement outcomes, it is not surprising that many researchers have concluded that it is incumbent on the institution to shape its environment through programs, policies, and practices in order to increase involvement, encourage engagement, and foster motivation. The GTCL program seeks to improve student involvement, engagement, and motivation through several institutional mechanisms such as increasing relevance and choice, strengthening relationships, and creating a positive and supportive school climate.

Career opportunity. Tinto and Pusser (2006) encouraged others to propose additions to their model. I have added the construct of career opportunity to Tinto and Pusser's model as a sixth category of action under institutional control, depicted in Figure 1 as a dashed circle. LWTA has theorized that for students in the GTCL program, career opportunity (along with support, feedback, and involvement) exerts an influence on students' quality of effort and learning, which ultimately influences academic achievement.

Career opportunity is a significant component of the GTCL program's theory of change for several reasons. First, as a technical college, LWIT seeks primarily to prepare students for careers in high-demand technical fields. Meeting the state's workforce needs necessitates maximizing the number of students who successfully complete postsecondary credentials. A report by the Harvard Graduate School of Education (Symonds, et al., 2011) called for the

creation of multiple pathways to 21st-century jobs, with more emphasis on completing high school and pursuing an associate degree or a postsecondary occupational credential in an occupation with high labor market demand. The authors suggested that one major reason why students drop out of high school is their failure to see a clear, transparent connection between their program of study and tangible opportunities in the labor market. The connection is made clear for at-risk students in the GTCL program, which affords direct access to a program of study where they can earn a marketable associate degree or certificate along with a high school diploma.

Second, the importance of career decidedness (operationalized in colleges as selection of a major) is well established at both the four- and two-year level. In a study of factors related to academic success among college sophomores at a public university, Graunke and Woosley (2005) found that commitment to a major by the second year of college was a positive predictor of GPA. A study conducted by the Community College Research Center (Jenkins & Cho, 2012) found that students who failed to enter a coherent program of study within a year of enrollment were one-third less likely to complete any sort of credential than those who chose a degree program within their first year. Jenkins and Cho (2012) also suggested that one of the best ways in which community colleges can increase completion rates is to assist students in the process of selecting a major. Similar results were found in a study of California community colleges (Moore & Shulock, 2011). In this study over 400,000 students were followed over a six-year period (2004-2010). Results reveal that students who entered a program (major) within one year of enrolling were more likely to complete a certificate, earn a degree, or transfer to another postsecondary program. Students who waited to enter a major until the second year were more than one-third less likely to complete any program within six years. The completion rate for

students who entered a program in the first year was twice as high as for students who entered at any later point. Moore and Shulock also controlled for college preparedness (as measured by the number of developmental courses attempted) and found that early program entry more than doubled the completion rate among students who took more than one basic skills course (47.5% versus 23.4%). These studies provide compelling support for helping students to decide on a program major early.

Finally, based on dropout literature, it is reasonable to believe that at-risk youth served in the GTCL program may have been hindered in their access to career and educational resources (such as role models, internships, and job shadowing opportunities) due to social, academic, and environmental constraints or barriers that they may have experienced as a result of their SES or first-generation status. For example, nationally over 77% of Gateway to College students are first-generation. At GTCL, 53% percent of students report receiving public assistance (a proxy for low SES) and 71% are first-generation (N. McGiver, personal communication, June 14, 2013). The negative impact of first-generation status alone on educational attainment has been well established by researchers using large nationally representative data sets, notably Chen (2005) and Reardon (2011). A recent study conducted by the Georgetown Public Policy Institute described how systematic inequities such as poverty and racial discrimination may serve to impede the development of vocational identity and restrict individual opportunity (Carnevale & Strohl, 2013). As such, career opportunity is posited to be an important compensatory lever that, when coupled with the other components of institutional action as identified in the theoretical framework, can improve educational outcomes for GTCL students.

The hypothetical conceptualization of career opportunity relies on the integration of perspectives from a variety of domains and theories such as adolescent development, motivation,

career development theories, and other disciplines. This approach is consistent with a trend noted in student persistence research toward integration of multiple theoretical perspectives (Valentine, et al., 2011). The specific components that constitute the proposed construct of career opportunity at GTCL are environmental affordances and career exploration. A visual representation of the components of career opportunity is provided in Figure 2.

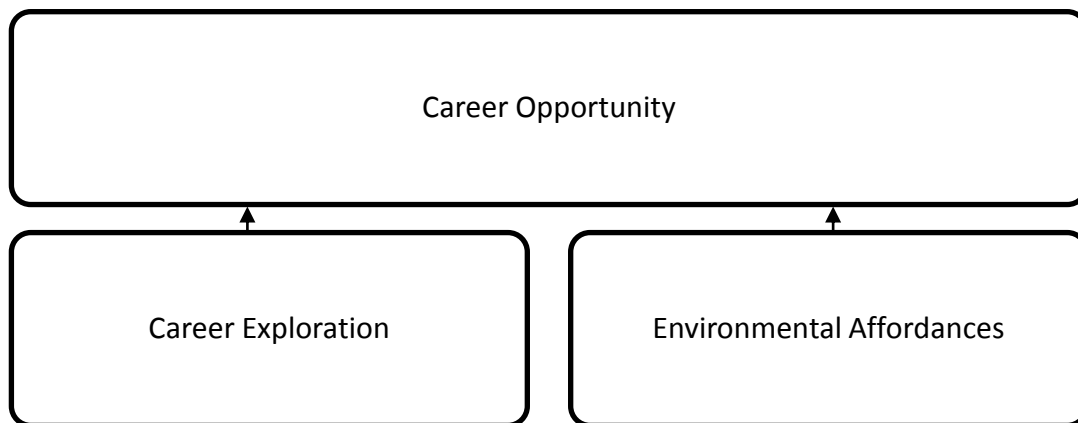


Figure 2. Theoretical construct of career opportunity.

Career exploration. Career exploration is defined as a process of gathering information about oneself and the environment in order to make vocational choices that foster progress in career development (Blustein, 1992). Deci and Ryan (1985) conceived of exploratory activity as an aspect of self-determination (the capacity to be willful in one's life), while others have considered exploration as a component of identity development in line with Erikson's developmental lifespan view. The identity development process is central to many career development theories, particularly those seeking to elucidate how adolescents perceive their environment and construct belief systems and self-perceptions. Erikson (1968) suggested that the identity formation process includes two related tasks that typically underscore the characteristics of the late adolescent stage: exploration and commitment. In their study of the

developmental benefits of career exploration, Flum and Kaplan (2006) took an Eriksonian view, seeing career exploration as a central tenet of a self-constructed identity and as an active process that leads to career commitments. In contrast to innate exploration of the environment by infants, Flum and Kaplan described adolescent exploration that leads to identity as a more conscious and strategic exploratory process. They believed that for exploratory skills and behaviors to develop in adolescents, they must be learned and supported in the educational environment; therefore environmental forces must evoke, sustain, and reinforce exploratory behavior, particularly for youth who have been marginalized. Other researchers have reached a similar conclusion that multiple forces and negative messages often inhibit the career development of at-risk youth and that interventions designed to facilitate development of a vocational identity are particularly important (Diemer & Blustein, 2007; Perry, 2008).

Career exploration for GTCL students is operationalized through a mandatory four-credit course during the foundation term. The underlying rationale for this course is based on central concepts and ideas identified by Sampson, Reardon, Peterson, and Lenz (2004) who discussed the value to students of gathering and processing self-awareness, occupational options, and decision-making skills. Over the course of the term, GTCL students explore their career-related interests, skills, and abilities both individually and in groups. Students use a variety of instruments to evaluate their personalities, interests, and values; the results are then compared to the requirements of specific programs of study (majors). Students use this information to plan course enrollment in future terms at the college. Learning activities include lectures by the instructor, panel presentations, small- and large-group work, and program visits. The course is designed to support students' exploration of interests through a structured process of gathering and processing knowledge of oneself and of occupations so that they can make informed

educational and vocational choices. Students are provided with experiences that build confidence and competence in decision making and expose them to the wide array of programs available at LWIT.

Whiston, Brecheisen, and Stephens (2003) conducted a meta-analysis of 57 studies in which participants were randomly assigned to different modalities of career counseling. The majority of the studies involved college students (68%), while others examined high school students or adults. Whiston et al. (2003) found that more structured group approaches (similar to the GTCL career exploration course) increase the effectiveness of career development activities and programs on career decision making.

Environmental affordances. The term “environmental affordance” is appropriated from early work by ecological psychologist James Gibson, who used the term to refer to aspects of the environment itself that contribute to the kind of interactions that occur (Greeno, 1994). Students in GTCL are not only able to develop their vocational identity but also to enroll directly in programs of study related to their identified vocational interests upon completion of the foundation term. A key assumption is that the proximity between establishment of a vocational identity and enrollment in a program of study related to the student’s identified vocational interests will enable students to internalize the connections between school and career, increasing engagement and persistence (Solberg, Howard, Blustein, & Close, 2002). Related scholarship has characterized this connection as creating “vocational hope,” or a positive motivational state, because students can more easily “envision a future in which meaningful work is attainable” (Brown, Lamp, Telander, & Hacker, 2012, p. 383).

Environmental (contextual) influences also figure prominently in several other theories of career development. For example, Lerner’s (2002) developmental-contextual framework

suggested an interaction between the individual and the environment where an individual's perception of barriers (or lack of barriers) shapes the perception of career opportunities and contributes to the establishment of a vocational identity.

Summary

Educational attainment is more important than ever in today's economy. Many factors influence decisions to persist, and there is no one-size-fits-all approach. This is true whether one is concerned for regularly matriculated college students or special populations such as dual enrollment programs designed for at-risk high school students.

This literature review utilized the theoretical framework identified in the adapted Tinto and Pusser (2006) model of institutional action with the goal of explicating the GTCL program's theory of change and identifying the practices posited to improve outcomes for students. Because the Gateway to College model at LWIT is designed to select and serve students with a myriad of personal, social, situational, and contextual factors that can impinge on persistence, the focus is on the institutional actions that can be taken to create environmental conditions for success, rather than on correcting deficits within individual students. This study does not attempt to empirically test the constructs of institutional action in Tinto and Pusser's 2006 model; rather, it treats the model as a useful framework for uncovering and understanding the GTCL theory of change and in informing the strategies deployed to reengage high school dropouts and other at-risk students in a technical high school. The model also provides an example of the breadth of institutional efforts and the wide range of programs that can be applied to increase the intensity of retention efforts. As Kuh et al. (2007) observed:

Students attending institutions that employ a comprehensive system of complementary initiatives based on effective educational practices are more likely to perform better academically, to be more satisfied, and to persist and graduate. (p. 37)

They consider learning communities, intrusive advising, early warning systems, safety nets, and peer mentoring to be among the most effective components. They also note that while exposure to educationally effective practices, like those discussed in the theoretical framework and supported in the literature review, are associated with desired outcomes for all students, it is the historically underserved students that benefit the most. For U.S. citizens to reach the level of educational attainment necessary so that we can remain competitive as a nation and prosper as individuals, an increase in persistence at both the secondary and postsecondary levels is imperative. Dual enrollment programs, especially those designed for at-risk group have been shown to be an important strategy for improving both high school and postsecondary educational outcomes. Concomitantly, the two-year community and technical colleges at the center of dual enrollment programs, need to understand what actions can be taken to improve student success for all students (American Association of Community Colleges, 2012).

CHAPTER 3: METHODOLOGY

The purpose of this study was to test the assumptions and analyze the potential impact of a 2009 policy decision and program intervention. There are four goals associated with this study. The first was to articulate a theory of change to explain how the GTCL program intervention was expected to impact academic achievement of at-risk students. This was accomplished in Chapter 2. The second goal was to quantitatively test the policy assumption that students with an incoming HSGPA at or above a 2.0 have higher levels of academic achievement (and therefore can accurately be considered to be at lower risk) than those with incoming HSGPA below 2.0 (considered to be at-risk) by examining how these students performed. The third goal was to quantitatively examine the differences in academic achievement between the two groups of at-risk students. The final goal was to determine which pre-admission and post-admission variables are useful in predicting academic achievement.

Chapter 3 provides a discussion of the research methodology utilized for this study in order to accomplish goals two, three, and four and is organized as follows: (a) research design, (b) study population, (c) research questions, (d) variable selection, (e) data sources, (f) data collection, and (g) data analysis.

Research Design

The main purpose of this quantitative, causal-comparative (ex post facto) study was to understand variation in academic achievement among different groups of students who transferred into a dual enrollment technical high school (LWTA) in order to assess the impact of a policy decision implemented in 2009. In addition, the study was designed to determine the degree to which there is a relationship between academic achievement and two different models of serving at-risk students and to determine the extent to which a variety of institutional,

demographic, and academic variables are useful to predict outcomes that are measures of academic achievement.

This research study is referred to as causal-comparative (ex post facto) since the outcome and suggested cause have already occurred. As such, there is no manipulation of the independent variables (Gay, Mills, & Airisan, 2009). There are a number of concerns about internal and external validity in a causal-comparative research design. Fraenkel & Wallen (2006) suggest that the creation of homogeneous comparison groups can increase internal validity. For this study, while groups of students differed in their risk status, all students left their previous high schools, met eligibility requirements and elected to attend LWTA, a technical high school. External validity refers to the degree to which results of a study can be generalized to a larger population. The study design and sampling approach do not meet the principles necessary to construct external validity outlined by Shadish, et al. (2002). Generalizability beyond the particular program under study is recognized as a limitation of this study. Additionally, in causal-comparative design, care must be taken to avoid the assumption that successful prediction implies causation; the design of this study is expected to “permit investigation of variables that cannot or should not be investigated experimentally, facilitate decision making, and provide guidance for experimental studies” (Gay et al., 2009, p. 220). As such, the findings should be interpreted cautiously.

Study Population

The population of students examined in this study comprised three distinct groups who first enrolled at Lake Washington Technical Academy (LWTA), a dual enrollment technical high school located on the campus of Lake Washington Institute of Technology (LWIT), a technical college located in a suburb of Seattle, during five school years (06-07, 07-08, 08-09, 09-10, and

10-11). Students who maintain satisfactory academic progress are eligible to remain enrolled until the end of the school year in which the student completes the requirements for a high school diploma, an associate degree, or until they reach age 21, whichever comes first. A typical progression for a high school student is to graduate from high school and then attend college. However, since LWTA is a dual enrollment program, it is possible for students to earn both a high school diploma and an associate degree while they are still considered to be high school students.

The three groups of students are referred to as policy cohorts as they represent changes in program policy over the study years. Since its origin as a dual enrollment technical high school in 1991, LWTA served all students, regardless of risk factors, in one model, the direct entry (Direct) model. In this model, students enroll directly in college classes and earn credits that apply to both a high school diploma and a college degree. There is limited support provided to students in the Direct model. Academically at-risk students who entered LWTA prior to Fall 2009 were enrolled in the Direct model where no specialized support services were provided. In the study, these students are described as AR-Direct. Based on their high school GPA, these students would have been eligible for the GTCL model had it existed at the time. In the Fall of 2009, LWTA implemented the GTCL model for at-risk students with the expectation that its use would lead to improvement in academic achievement as measured by first-year GPA (CGPA) and attainment of a high school diploma and/or a college credential. Students deemed to be at-risk and who entered the program during the 2009-2010 and 2010-2011 school years were served by the GTCL model. This group of students is referred to as AR-GTCL. LWTA retained its original Direct model for students who were not deemed to be academically at-risk based on high school GPA. This group of students is referred to as LR-Direct indicating they are considered to

be at lower academic risk and were served in the Direct model (although since all high school students at LWTA left their previous high school setting for a variety of reasons, even those in the lower risk group may still have several risk factors that could affect academic achievement). This study excluded students who had been homeschooled prior to transferring into LWTA, since in most cases these students had not generated a transcript from a formal high school, making it difficult to assess risk status based on HSGPA.

Research Questions and Hypotheses

Given the quantitative goals of this study, the following research questions and associated null and alternate hypotheses were formulated and tested in this study:

Research Questions and Hypotheses

1. Are there statistically significant differences between policy cohorts when examined by (a) gender, (b) age, (c) race, (d) term of entry, (e) COMPASS reading, (f) COMPASS writing, (g) COMPASS math, (h) number of incoming credits from their previous high school(s), and (i) incoming HSGPA?

H₀1.a: There are no significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by gender.

H_A1.a: There are significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by gender.

H₀1.b: There are no significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by age.

H_A1.b: There are significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by age.

H₀1.c: There are no significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by race.

H_A1.c: There are significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by race.

H₀1.d: There are no significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by term of entry.

H_A1.d: There are significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by term of entry.

H₀1.e: There are no significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by COMPASS writing scores.

H_A1.e: There are significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by COMPASS writing scores.

H₀1.f: There are no significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by COMPASS reading scores.

H_A1.f: There are significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by COMPASS reading scores.

H₀1.g: There are no significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by COMPASS math scores.

H_A1.g: There are significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by COMPASS math scores.

H₀1.h: There are no significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by number of incoming credits from previous high school(s).

H_A1.h: There are significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by number of incoming credits from previous high school(s).

H₀1.i: There are no significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by incoming HSGPA.

H_A1.i: There are significant differences between LR-Direct, AR-Direct and AR-GTCL students when examined by incoming HSGPA.

2. Are there differences in academic achievement between policy cohorts as measured by cumulative GPA (CGPA) after three terms?

H₀2: Policy cohort will have no significant effect on CGPA after three terms.

H_A2: Policy cohort will have a significant effect on CGPA after three terms with LR-Direct having the highest CGPA, followed by AT-GTCL, and AR-Direct having the lowest CGPA.

3. To what extent do institutional, demographic, and pre-admission academic factors predict CGPA?

H₀3: Institutional, demographic, and pre-admission factors will not predict CGPA after three terms.

H_A3: Institutional, demographic, and pre-admission factors will predict CGPA after three terms.

4. Are there differences in academic achievement between policy cohorts as measured by attainment of a high school diploma?

H₀4: Policy cohort will not have a significant effect on attainment of high school diploma.

H_A4: Policy cohort will have a significant effect on attainment of high school diploma with LR-Direct having the highest rate of attainment of high school diploma, followed by AT-GTCL, and AR-Direct having the lowest attainment of high school diploma.

5. To what extent do institutional, demographic, pre-admission academic factors, and post-admission academic factors predict attainment of a high school diploma?

H₀5: The attainment of a high school diploma cannot be correctly predicted from the independent variables (policy cohort, age, gender, race, term of entry, COMPASS Reading, COMPASS Writing, COMPASS Math, number of high school credits earned before entry, and first year cumulative GPA).

H_A5: The attainment of a high school diploma can be predicted from the independent variables (policy cohort, age, gender, race, term of entry, COMPASS Reading, COMPASS Writing, COMPASS Math, number of high school credits earned before entry, and first year cumulative GPA).

6. Are there differences between policy cohorts in academic achievement as measured by attainment of a college credential?

H₀6: Policy cohort will not have a significant effect on attainment of a college credential.

H_A6: Policy cohort will have a significant effect on attainment of a college credential.

7. To what extent do institutional, demographic, pre-admission academic factors, and post-admission academic factors predict attainment of a college credential?

H₀7: The attainment of a college credential cannot be correctly predicted from the independent variables (policy cohort, age, gender, race, term of entry, COMPASS Reading, COMPASS Writing, COMPASS Math, number of high school credits earned before entry, and first year cumulative GPA).

H_A7: The attainment of a college credential can be predicted from the independent variables (policy cohort, age, gender, race, term of entry, COMPASS Reading, COMPASS Writing, COMPASS Math, number of high school credits earned before entry, and first year cumulative GPA).

Variable Selection

There were a number of considerations in the selection of dependent and independent variables for this study. First, the literature review discussed in Chapter 2 provides a theoretical and empirically based foundation to guide the selection informed by a number of research studies on factors related to student achievement at both the high school and postsecondary levels. Because the program under study (LWTA) is a dual enrollment model where high school students are enrolled in college classes, it is necessary to consider both sets of literature. It is also important to limit the number of variables to those deemed essential to obtain a more mathematically stable model (Hosmer & Lemeshow, 2000). An additional factor in selecting variables is based on convenience, as the source of data, namely archival data from student records, transcripts, and institutional databases, constrains the number of variables for which information is available.

Dependent Variables

The dependent variables used in this study vary based on the specific research question; in all, three dependent variables that reflect different aspects of academic achievement were considered.

Dependent variable 1. The first dependent variable is CGPA. This continuous variable was calculated from all coursework that the student attempted from joining the program through the first three quarters whether concurrent or not. Courses in which the student received an incomplete (I) or withdrew (W) were not counted as part of the GPA. At LWTA, course grades of I become F should the student not meet the requirements in place at the time when the grade of I is issued. Instructors issue numeric decimal grades in increments of 0.1 based on a traditional 4.0 scale where A = 4.0, B = 3.0, C = 2.0, D = 1.0, and F = 0 points. For each student in the sample, a quarterly GPA (QGPA) was calculated as follows:

1. The number of credits for each course is multiplied by the numeric decimal grade to equal a number of grade points. For example, an English 101 course at LWIT is five credits. If the student earned a numeric grade of 3.7, this would yield 18.5 grade points.
2. The total number of grade points is divided by total credits attempted to equal the QGPA.

The CGPA can then be calculated as the sum of three QGPAs divided by three.

The choice of CGPA as an outcome variable was guided by research literature that points to college GPA in general and early college GPA in particular as significant predictors of student success. In their meta-analysis of 30 years of studies related to the impact of the college experience on students, Pascarella & Terenzini (2005) note, “Virtually without exception,

students' grades make statistically significant, frequently substantial, and indeed often the largest contribution to student persistence and attainment" (p. 397). Additional researchers have found that the GPA earned during the first year of college and, in some cases, in the first semester is a better indicator of continued enrollment and academic success than other variables (Allen, 1999; Camara & Echternacht, 2000; Hoffman & Lowitzki, 2005). In one study, first-year college grades predicted persistence substantially better than the SAT (St. John, Hu, Simmons, & Musoba, 2001). Early academic performance in college has been found to be the strongest predictor for degree attainment in a number of studies (Adelman 2006; Pascarella & Terenzini, 2005; Reason, 2003; Wintre & Bowers, 2007). A 2002 study by the National Center for Education Statistics (Bradburn, 2002) found that lower academic performance during the first year of enrollment was associated with a higher rate of attrition at two-year public, four-year public, and four-year private nonprofit institutions, when other factors related to departure from postsecondary education were accounted for. DesJardins, Kim, and Rzonca (2003) conducted a study to analyze the impact of college GPA and found the higher a student's GPA in year one the lower the odds of dropping out. Bradburn (2002) found students at both two-year and four-year schools with GPAs under 2.75 in their first year were more likely to leave than students with GPAs of 2.75 or higher. The effects of GPA can linger beyond initial enrollment in a community college. Wang (2009) found that for community college students who transfer, pre-transfer GPA is the strongest predictor of baccalaureate completion. According to Wang's study, a one standard deviation increase in GPA prior to transfer was associated with a 14.7% greater likelihood of baccalaureate degree completion.

Dependent variables 2 and 3. The primary purpose of LWTA is to help students who have left the traditional high school setting for a variety of reasons experience academic

achievement. The end goal is to help students obtain a high school diploma and/or a college credential, in order to create a viable path to economic opportunity. Students who fail to graduate from high school are more likely to experience higher rates of unemployment, lower earnings, and are at higher risk of incarceration (Ikomi, 2010). Further, it is well established that attainment of a postsecondary credential allows an individual to surpass the lifetime earnings of someone with only a high school diploma. While a student may benefit in many ways from any college experience, anything less than attainment of a credential falls short of the economic benefits of earning a degree (Cabrera, Burkum, & LaNasa, 2005).

Dependent variable 2 is attainment of a high school diploma only. This dichotomous variable is coded with a value of one (1) if the student did earn a high school diploma at any time during the study period and coded with a value of zero (0) if the student did not earn a high school diploma during the study period. It should be noted that due to statutory authority established in 2009 through Washington State's Substitute House Bill 1758, all students who attain an associate degree also can be awarded a high school diploma once they reach the age of 21. For purposes of this study dependent variable 2, attainment of a high school diploma, refers to students who earned a high school diploma via credit completion or associate degree attainment.

Dependent variable 3, the final outcome variable in this study, is attainment of a college credential defined as either an associate degree or a certificate of completion from LWIT at any time from the student's time of entry through the end of the study period. Certificates of at least one year in length were included because research suggests these type of certificates have value in the labor market and increase earnings. Compared to attainment of a high school diploma alone, on average a certificate results in an earnings premium of approximately 20% (Carnevale,

Rose, and Hanson, 2012) and improves the odds of employment (Carnevale, Jayasundera, & Hanson, 2012; Rosenbaum & Rosenbaum, 2015). This variable is dichotomous, coded such that a one (1) indicates a student did earn a college credential or zero (0) if the student did not earn a college credential.

Independent Variables

The selected IVs are categorized by type as: (a) institutional, (b) demographic, (c) pre-entry academic factors, and (d) post-entry academic factors. Institutional variables are the three policy cohorts, AR-Direct, AR-GTCL, and LR-Direct. Demographic variables are gender, race, age at entry, and term of entry. Pre-entry academic variables considered are number of high school credits earned prior to entry and ACT COMPASS scores (Reading, Writing Skills, and Math). CGPA is also used as an IV post-entry academic factor in considered in research questions five and seven.

One pre-entry academic factor, incoming high school GPA (HSGPA), was collected but excluded as a study variable in the regression analyses as there were high levels of multicollinearity between high school GPA and policy cohort. This is expected since policy cohort decisions are based on HSGPA. However, the means and standard deviations for HSGPA by policy cohort are reported in the descriptive section in Chapter 4. Research question one also examines differences in HSGPA between the policy cohorts.

Another consideration for the independent variables was sample size. Some researchers recommend a minimum ratio of 10 to 1 of cases to predictors (with a minimum sample size of 100) for the results to be considered stable (Peng, Lee & Ingersoll, 2002); however, this can vary depending on the statistical test that is being performed. For regression models that test the individual contribution of a set of predictors, Tabachnick and Fidell (2013) suggest a rule of

thumb of using the higher result of two calculations: 1) $N \geq 104 + m$ or 2) $N \geq 50 + 8m$ (where m is the number of IVs). For this study, depending on the research question, the number of independent variables varies from 9 to 10. Using the higher number of 10 and Tabachnick and Fidell's rule of thumb, a minimum sample size between 114 and 130 is suggested. The sample size of 594 obtained for this study can therefore be considered acceptable as it falls within these guidelines.

See Table 2 for a complete summary of the independent and dependent variables to be considered in this study and the coding scheme. It should be noted that one variable, CGPA is used as both a DV in research questions 2 and 3 and is also used as an IV in research questions 5 and 7.

Table 2

Variables Coding

Dependent (outcome)	Description	Variable Type
CGPA	Scale value (0-4.0)	Continuous
High school diploma attainment	No = 0, Yes = 1	Dichotomous
College credential attainment	No = 0, Yes = 1	Dichotomous
Independent (predictor)		
Institutional		
Policy cohort	0=AR-Direct 1=AR-GTCL 2=LR-Direct	Categorical
Demographic		
Gender	Male = 0, Female = 1	Categorical
Race	White = 0, Other = 1	Categorical
Age	Age of the student at entry Scale value (16-20)	Continuous
Term of entry	Fall =1, Winter =2, Spring =3	Categorical
Pre-entry academic		
Incoming HS credits	Total number of credits earned by each student prior to entry into LWTA; Obtained from high school transcript(s)	Continuous
COMPASS Reading	Scale value (0-99)	Continuous
COMPASS Writing Skills	Scale value (0-99)	Continuous
COMPASS Math	Pre-algebra score Scale value (0-99)	Continuous
Post-entry academic		
CGPA	Scale value (0-4.0)	Continuous

Data Sources

Three sources of archival student records were utilized to create a data set to address the research questions: (a) students' high school transcripts from all previous schools attended, (b) the LWIT Student Management System (SMS), and (c) Skyward, a K12 school administration database utilized by LWTA. Since LWTA is a dual enrollment high school located within a technical college (LWIT), it is necessary to maintain a distinct records system for high school purposes. For example, Data obtained from student transcripts included gender, ethnicity, date of birth, and high school GPA. SMS is an online database used internally in the day-to-day operations of LWIT. High school students can be identified by a unique FPS (fee pay status) code in the college's Student Management System (SMS). Data obtained from SMS were transcripts of all college courses, college GPA by term, COMPASS reading, writing and math scores, and college credential awarded (if any). The Skyward database contained data regarding completion of the high school diploma.

Data Collection

Approval for data collection was obtained from the President of Lake Washington Institute of Technology, the location of the program under study (Appendix A). Prior to conducting any data collection or analysis, a Human Subjects application to conduct research was submitted to, and approved by, University of Washington Human Subjects Review Board (Appendix B). Collection of data took place in April and May, 2014. Data was extracted from student transcripts and from the LWIT SMS and entered into an Excel worksheet to create the data set. As noted above, this study excludes students who were previously homeschooled as they typically do not have a standardized transcript. Because of this it would be impossible to ascertain if a student was deemed to be at-risk or not based on the criteria used by the program.

One hundred and seventy (170) students who only attended for two terms were omitted from the study. Once the data set were collected, confidentiality was protected by replacing all student identifying information with a unique code that could not be traced back to the individual student. The data set was stored in a password-protected file on the LWIT server, which was backed up nightly.

The data set contained in the Excel worksheet was then imported into SPSS® Graduate Pack 17.0 and checked for data entry errors or missing data. Since the study utilized transcript records, the LWIT SMS system, and the LWTA Skyward system, there was very little missing data; however listwise deletion was used to drop any cases with a missing value for at least one of the specified variables. This resulted in deletion of two cases. Consequently, the final sample was 594 students including 194 AR-Direct, 136 AR-GTCL, and 264 LR-Direct.

Data Analysis

Utilizing SPSS® Graduate Pack 17.0, a quantitative methodology was used to analyze the data collected. The selection of statistical tests was guided by the research questions and includes descriptive statistics, correlations, ANOVA, independent samples *t* tests, chi-square for independence, and regression analysis. Linear regression was used to analyze continuous outcomes while controlling for covariates, and logistic regression techniques were used to analyze categorical outcomes. Using Cohen's (1992) guidelines, effect sizes were calculated to determine the practical significance of the results. The .05 level of significance was used as the alpha level to test the null hypotheses of all research questions.

Descriptive statistics and zero-ordered correlations were provided first in order to understand the characteristics of the population under study. Research question 1 was designed to determine how the policy cohorts differed in pre-entry characteristics specifically examined by gender, age, race, term of entry, COMPASS scores, number of incoming credits from their

previous high school, and incoming high school GPA. Chi-square tests for independence and one-way ANOVAs were used.

For research question 2, a one-way ANOVA with planned comparisons and post-hoc analyses was used to identify differences in mean scores on the continuous dependent variable CGPA by policy cohort.

Research question 3 sought to determine to what extent a set of institutional, demographic, and pre-entry academic variables predicted CGPA. Multiple linear regression (MLR) was employed to estimate the independent relation between the outcome variable and the independent variables. MLR estimates the relative importance of several hypothesized predictors and assesses the contribution of the combined variables to change the dependent variable. There are a number of ways to enter variables when conducting a regression analysis. An important purpose of this study was to explore differences in academic achievement between three policy cohorts of students created by a 2009 policy change. As such, there was a conceptual rationale for the order of entry for the variables and hierarchical entry was used. Established a priori, the variable with the greatest theoretical importance, policy cohort, was entered first into the regression model.

To address research question 4, examining differences between policy cohorts for attainment of a high school diploma, a Pearson Chi-square test was used. Odds ratios were also calculated.

Binary logistic regression analyses were used to address research questions 5 and 7. The dependent, or outcome, variable for these questions are categorical with two levels-attainment or nonattainment, while the predictor variables are mixed. Linear regression is the most commonly used statistical method for predicting outcomes and determining if a relationship exists between

the independent and dependent variables; however, because linear regression makes certain assumptions about the dependent variable, it is not always suitable. Logistic regression models are commonly used to analyze the relationships between response variables and multiple explanatory variables and can be used when there are both categorical and continuous independent variables (Hosmer & Lemeshow, 2000). Binomial logistic regression with block entry was used to evaluate how well a group of variables predicted membership in each of the two dichotomous outcomes: 1) earned a high school diploma versus did not earn a high school diploma, and 2) earned a college credential versus did not earn a college credential.

As with multiple regression, there are a variety of methods for the entry of variables into the equation. Sequential regression was employed to determine if institutional, demographic, or academic blocks of variables improved prediction of one of two aspects of academic achievement, namely attainment of a high school diploma or a college credential. As such, there was a conceptual rationale for the order of entry for the variables and hierarchical entry was used. Established a priori, the institutional variable of policy cohort has the greatest theoretical importance, and as such, was entered first. The other blocks of predictor variables were demographic (gender, race, age at entry, term of entry) and pre-entry academic (COMPASS scores in reading, writing, and math, incoming high school credits, and CGPA).

Binary logistic regression modeling provides estimates of the magnitude and significance of the relationship between independent variables and a categorical dependent variable. For categorical data, effect size estimates are represented by odds ratios (Agresti, 2007). Odds express the likelihood of an event occurring relative to the likelihood of that event not occurring. While one of the assumptions of any logistic regression is the absence of specification errors where no relevant predictors are excluded and no irrelevant variables are included, well-designed

research questions and knowledge of the topic will minimize this type of error (Meyers, Gamst, & Guarino, 2006).

Research question 6 examines differences by policy cohort on attainment of a college credential. For this question, a Pearson Chi-square test was used, and strength of relationship was assessed using odds ratios.

Summary

Using a causal-comparative (ex post facto) design, this study utilized archival data to examine the impact of policy changes on three groups of students. Chapter 3 provided an overview of the research design, study population, research questions, variable selection, data sources, data collection, and data analysis. Guided by the research questions, an evaluation of the impact of a policy change on measures of academic achievement for three groups of students was conducted. Given the theoretical importance of understanding differences in outcomes between the two groups of at-risk students in particular, this comparison was analyzed separately in many of the research questions. Though the results of this study are not expected to be generalizable, the findings contribute to the greater body of knowledge regarding dual enrollment programs for high school students, and dual enrollment programs for at-risk high school students in particular. The results and interpretations of the data analyses are presented in Chapter 4.

CHAPTER 4: RESULTS

The purpose of this study was to evaluate the impact and test the assumptions of a 2009 policy intervention. There are four goals associated with this study. The first was to articulate a theory of change to explain how the GTCL program was expected to impact academic achievement. This goal was accomplished in Chapter 2. The remaining goals are quantitative. Goal two was to quantitatively test the policy assumption that students with an incoming HSGPA at or above a 2.0 have higher levels of academic achievement (and therefore can accurately be considered to be at lower risk) than those with incoming HSGPA below 2.0 (consider to be at-risk) by examining how these students performed. The third goal was to quantitatively examine the differences in academic achievement between the two groups of at-risk students. The fourth and final goal was to determine which pre-admission and post-admission variables are useful in predicting academic achievement.

This chapter will present the data and results of statistical analysis associated with each of the research questions which accomplish goals two, three and four. First, in order to better understand the characteristics of the study population, descriptive statistics are provided and are organized by institutional, demographic, and pre-entry academic variables.

Characteristics of Sample

This study pulls data from the archival records of 594 students who enrolled during a five year period from September 2006 to June 2011.

Institutional Variable (Policy cohort)

As shown in Table 3, of the 594 students in the study, 44.4% are identified as low risk (LR-Direct) while the majority (60.6%) are identified as being at-risk. Of the at-risk students,

32.7% were enrolled prior to implementation of the GTCL model, and 22.9% received the GTCL intervention.

Table 3

Frequency and Percentage by Policy Cohort

Policy cohort	Frequencies (%)		
	LR-Direct	AR-Direct	AR-GTCL
	264 (44.4%)	194 (32.7%)	136 (22.9%)

Note. $N = 594$.

Demographic Variables

Gender. As shown in Table 4, there were 389 males and 205 females. Males make up the majority in each of the policy cohorts where they comprise 65% of the total population. By policy cohort, males are 56.1% of the LR-Direct group, 77.8% of the AR-Direct sample, and 66.2% of the AR-GTCL sample. Females comprise 35% of the total sample population and make up 43.9% of the LR-Direct group, 22.2% of the AR-Direct group, and 33.8% of the AR-GTCL group.

Table 4

Frequency and Percentage by Gender

Variable	Frequencies (%)			
	LR-Direct	AR-Direct	AR-GTCL	$n(\% \text{ of Total})$
Gender				
Male	148 (56.1%)	151 (77.8%)	90 (66.2%)	389 (65%)
Female	116 (43.9%)	43 (22.2%)	46 (33.8%)	205 (35%)

Note. $N = 594$.

Age. For age at entry, the 17 year old group had the largest representation (36%), followed by 16 year olds (27%), 18 year olds (26%), 19 year olds (8%) and 20 year olds (2%). Table 5 provides the frequency and percentage for the sample by age and Table 6 provides the means and standard deviations.

Table 5
Frequency and Percentage by Age

Variable	Frequencies (%)			
	LR-Direct	AR-Direct	AR-GTCL	<i>n</i> (% of Total)
Age				
16	88 (33.3%)	45 (23.2%)	28 (20.6%)	161 (27%)
17	103 (39.0%)	67 (34.5%)	46 (33.8%)	216 (36%)
18	60 (22.7%)	59 (30.4%)	37 (27.2%)	156 (26%)
19	9 (3.4%)	19 (9.8%)	21 (15.4%)	49 (8%)
20	4 (1.5%)	4 (2.1%)	4 (2.9%)	12 (2%)

Note. *N* = 594.

Table 6
Mean and Standard Deviation by Age

Variable	<i>M</i> (<i>SD</i>)		
	LR-Direct	AR-Direct	AR-GTCL
Age	17.01(0.91)	17.33(1.00)	17.46 (1.07)

Note. *N* = 594.

Race. The number of students in some racial subgroups was small enough to risk disclosing the identities of the sample. For this reason all minority students were included in one

“other race/ethnicity” subgroup instead of analyzing each racial/ethnic subgroup separately. The majority of the sample was white (73%), other minorities comprised 27%. Frequency and percentages are presented in Table 7.

Table 7

Frequency and Percentage by Race

Variable	Frequencies (%)			
	LR-Direct	AR-Direct	AR-GTCL	n(% of Total)
Race				
White	202 (76.5%)	142 (73.2%)	92 (67.6%)	436 (73%)
All other	62 (23.5%)	52 (26.8%)	44 (32.4%)	158 (27%)

Note. N = 594.

Term of entry. As shown in Table 8, the majority of students enrolled in fall term (59.4%) followed by winter term entry (21.9%) and spring (18.7%).

Table 8

Frequency and Percentage by Term of Entry

Variable	Frequencies (%)			
	LR-Direct	AR-Direct	AT-GTCL	n(% of Total)
Fall	183 (69.3%)	115 (59.3%)	55 (40.4%)	353 (59.4%)
Winter	47 (17.8%)	41 (21.1%)	42 (30.9%)	130 (21.9%)
Spring	34 (12.9%)	38 (19.6%)	39 (28.7%)	111 (18.7%)

Note. N = 594.

Pre-entry Academic Variables

COMPASS scores. Mean and standard deviations for the COMPASS writing, reading and math tests are provided in Table 9.

Table 9

COMPASS Scores by Policy Cohorts

Variable	<i>M(SD)</i>		
	LR-Direct	AR-Direct	AR-GTCL
COMPASS scores			
Writing	77.61(21.33)	71.38 (25.25)	74.28(18.21)
Reading	86.00(10.90)	84.15 (8.84)	83.98(9.76)
Math	68.66(20.88)	60.12 (22.46)	57.76(19.23)

High school credits. Mean and standard deviations for each policy cohort with regard to number of high school credits earned prior to entry into LWTA are provided in Table 10.

Table 10

High School Credits Earned Prior to Entry

Variable	<i>M(SD)</i>		
	LR-Direct	AR-Direct	AR-GTCL
High school credits	15.40(5.17)	12.22(5.17)	10.72(4.74)

HS GPA on entry. This variable is highly correlated with policy cohort (which is established based on HSGPA) and therefore was not included as a study variable, however in order to

fully describe the population sample, means and standard deviations for each policy cohort with regard to high school GPA earned prior to entry into LWTA are provided in Table 11.

Table 11

High School GPA on Entry

Variable	<i>M(SD)</i>		
	LR-Direct	AR-Direct	AR-GTCL
HS GPA on entry	2.78(.54)	1.34(.50)	1.29(.54)

Intercorrelations. Predictor variables are screened for collinearity by reviewing Pearson product moment correlations. Table 12 provides the intercorrelations among the predictor variables policy cohort, gender, age, race, term of entry, COMPASS writing, COMPASS reading, COMPASS math, incoming credits and first year GPA (CGPA). Secondary analyses of these intercorrelations are conducted in research question one.

Table 12

Correlation Matrix for Predictor Variables

	1	2	3	4	5	6	7	8	9
1. Policy cohort									
2. Gender	.199**								
3. Age	-.149**	-0.66							
4. Race	.038	.012	.173						
5. Term entered	-.107**	-.011	.201**	.018					
6. COMPASS Writing	.129**	.076	-.097*	.083*	-.044				
7. COMPASS Reading	.083*	-.047	-.056	.120**	-.069	.472**			
8. COMPASS Math	.182**	-.217**	-.103*	.087*	-.134**	.365**	.376*		
9. Incoming credits	.273**	-.005	.326**	.003	-.003	.056	.012	.144	
10. Average GPA over 3 terms (CGPA)	.370**	.070	-.169**	.087*	-.139**	.127**	.068	.150**	.117**

* $p < .05$. ** $p < .01$.

Research Questions

Research Question 1

Given the bivariate correlations above, research question one is designed as a secondary analysis based on those findings and asks: Are there statistically significant differences between policy cohorts when examined by (a) gender, (b) age, (c) race, (d) term of entry, (e) COMPASS writing, (f) COMPASS reading, (g) COMPASS math, (h) number of incoming credits from their previous high school(s), and (i) incoming HSGPA. Each of these institutional, demographic, and academic pre-entry variables are considered individually as sub-questions 1a-i.

1a. Gender. As shown in Table 13, results of a Chi-square test for independence indicate that there are significant differences in gender between the policy cohorts, $X^2 = 23.50$, $df = 2$, $N = 594$, $p = .000$. Strength of relationship was assessed using the Cramer's $V = .20$, a small effect size using Cohen's (1988) standards for interpreting Cramer's V .

An examination of the adjusted standardized residuals for values greater than 2.0 (Agresti, 2007) indicated there are more males in the AR-Direct policy cohort and more females in the LR-Direct policy cohort than expected and that these two cells are the significant contributors to the chi-square relationship between policy cohort and gender. The null hypothesis was rejected.

Table 13

Chi-square Analysis of Policy Cohorts and Gender

Variable	N	Gender		X^2	p
		Male(%)	Female(%)		
Cohort				23.50	.000
LR-Direct	264	148(56.1%)	116(56.6%)		
AR-Direct	194	151(77.8%)	43(22.2%)		
AR-GTCL	136	90(66.2%)	46(33.8%)		
Totals	594	241(73%)	89(27%)		

To further examine differences in gender between the at-risk policy cohorts only, a Chi-square test for independence (with Yates Continuity correction for a 2x2 table) was conducted. Results indicate there are significant differences in the gender of the two at-risk cohorts, $X^2 = 4.94$, $df = 1$, $N = 330$, $p = .03$. Males make up 77.8% of the AR-Direct policy cohort, whereas only 66.2% of the AR-GTCL group are males. The strength of relationship is small as assessed with Phi = .13. The null hypothesis was rejected.

1b. Age. A one-way analysis of variance (ANOVA) was conducted to determine if the age on entry was different for groups of students in different policy cohorts. A Levene's test revealed that the homogeneity of variance assumption was not met ($p = .000$). As such, the Welch's F test was used (Field, 2009). The one-way ANOVA of students' average age revealed a statistically significant difference between groups, Welch's $F(2,591) = 11.54$, $p < .001$.

Since the homogeneity of variance assumption was not met, post-hoc comparisons using the Games-Howell procedure were conducted to determine which pairs of means differed significantly. The mean age for LR-Direct students was statistically significantly lower ($17.01 \pm$

.91, $p = .000$) than both the AR-Direct students (17.33 ± 1.00 , $p = .001$) and the AR-GTCL students (17.46 ± 1.07 , $p = .001$). SPSS does not provide measures of effect size as eta squared (η^2) for ANOVA effects, however this value can be calculated as:

$$\eta^2 = SS_{\text{between}} / SS_{\text{total}}$$

Cohen's conventions (1988) consider effect sizes expressed as η^2 of .01, .06 and .14 as small, medium and large respectively. In this ANOVA, $\eta^2 = .04$ which is considered to be between a small and medium effect size. The null hypothesis was rejected. When considering only the two at-risk groups there was no statistically significant difference in the mean age ($p = .446$). The null hypothesis for this contrast was retained.

1c. Race. A Chi-square test for independence indicated no significant association between policy cohort and race, $X^2 = 3.62$, $df = 2$, $N = 594$, $p = .16$. Results are presented in Table 14. The null hypothesis was retained.

Table 14

Chi-square Analysis of Policy Cohorts and Race

Variable	N	Race		X^2	p
		White(%)	Non-White(%)		
Cohort				3.62	.164
LR-Direct	264	202(76.5%)	62(23.5%)		
AR-Direct	194	142(73.2%)	52(26.8%)		
AR-GTCL	136	92(67.6%)	44(32.4%)		
Totals	594	436(73.4%)	158(26.6%)		

1d. Term of entry. As shown in Table 15, results of a Chi-square test for independence indicate that there are significant differences in term of entry between the policy cohorts, $X^2 = 31.80$, $df = 4$, $N = 594$, $p = .000$. Strength of relationship was assessed using the Cramer's $V = .16$, a small effect size using Cohen's (1988) standards for interpreting Cramer's V .

An analysis of the adjusted standardized residuals for values greater than 2.0 (Agresti, 2007) indicated there are fewer AR-GTCL students who enroll in Fall term (and more in Winter and Spring terms) than expected. There are more students who enroll in Fall term in the LR-Direct cohort than expected, and fewer LR-Direct students who enroll in Winter or Spring. These six cells are the significant contributors to the chi-square relationship between policy cohort and term of entry. The null hypothesis was rejected.

Table 15

Chi-square Analysis of Policy Cohorts and Term of Entry

Variable	N	Term of entry			X^2	p
		Fall(%)	Winter(%)	Spring(%)		
Cohort					31.80	.000
LR-Direct	264	183(69.3%)	47(17.8%)	34(12.9%)		
AR-Direct	194	115(59.3%)	41(21.1%)	38(19.6%)		
AR-GTCL	136	55(40.4%)	42(30.9%)	39(28.7%)		
Totals	594	353(59.4%)	30(21.9%)	111(18.7%)		

To further examine differences in term of entry between the at-risk policy cohorts only, a Chi-square test for independence (with Yates Continuity correction for a 2x2 table) was conducted. Results indicate there are significant differences in the term of entry of the two at-risk cohorts, $X^2 = 11.36$, $df = 2$, $N = 330$, $p = .003$. Of the 170 at-risk students who enter in Fall

term 59.3% (n = 115) were AR-Direct students, whereas only 40.4% (n = 55) of AR-GTCL students entered in a Fall quarter. Strength of relationship was assessed using the Cramer's V = .19, a small effect size using Cohen's (1988) standards for interpreting Cramer's V. The null hypothesis was rejected.

COMPASS scores. Three separate one-way analysis of variance (ANOVA) were conducted for each of the pre-entry sub-tests to determine if the mean scores differed by policy cohort. When the assumption of homogeneity of variance was violated, Welch's *F* was used (Field, 2009).

1e. COMPASS writing. Homogeneity of variances was confirmed by the Levene's test ($p=.06$). There was a statistically significant difference between groups as determined by one-way ANOVA, $F(2,591) = 5.00, p = .007$. Post-hoc comparison's using the Tukey's honestly significant difference (HSD) indicates the mean COMPASS writing score for LR-Direct students was statistically significantly higher (77.61 ± 21.33) than the AR-Direct students (71.38 ± 22.26) but there was no significant difference with the AR-GTCL students (74.28 ± 18.21). There was also no significant difference between AR-Direct and AR-GTCL groups. The null hypothesis was partially rejected.

1f. COMPASS reading. An ANOVA test found no significant difference between the group means on COMPASS reading, $F(2,591) = 2.70, p = .077$. The mean reading score for LR-Direct was 86.00 (± 10.04) and the mean reading score for AR-Direct was 84.15 (± 8.85), while the mean reading scores for AR-GTCL students was 83.98 (± 9.76). The null hypothesis was retained.

1g. COMPASS math. A Levene's test revealed that the homogeneity of variance assumption was not met ($p= .024$). As such, the Welch's *F* test was used. The one-way

ANOVA of student's average COMPASS math score revealed a statistically significant difference between groups, *Welch's* $F(2,591) = 15.47, p < .001$. Post-hoc comparisons using the Games-Howell procedure revealed that mean COMPASS math scores for LR-Direct students were statistically significantly higher (68.66 ± 20.88) than both AR-Direct students (60.12 ± 22.46) and AR-GTCL students (57.76 ± 19.24). A small to medium effect size was calculated, $\eta^2 = .05$.

A separate ANOVA was conducted to compare the mean COMPASS math scores between just the at-risk groups of students; there was no significant difference, ANOVA, $F(2,591) = .992, p = .320$.

1.h. HS credits on entry. A one-way analysis of variance (ANOVA) was conducted to determine if the number of credits on entry was different for groups of students in the three different policy cohorts. Homogeneity of variances was confirmed by the Levene's test ($p = .619$). There was a statistically significant difference between groups as determined by one-way ANOVA, $F(2,591) = 44.68, p < .001$. Post-hoc comparisons using the Tukey's HSD revealed that the mean incoming credits for LR-Direct students was statistically significantly higher ($15.40 \pm 5.17, p = .000$) than both the AR-Direct students ($12.22 \pm 5.17, p < .001$) and the AR-GTCL students ($10.72 \pm 4.74, p < .001$). A medium to large effect size was calculated, $\eta^2 = .13$. The null hypothesis was rejected.

When comparing just the at-risk groups of students, the AR-Direct students had a statistically significant higher number of incoming credits (12.22 ± 5.17) than the AR-GTCL group of students ($10.72 \pm 4.74, p = .023$), ANOVA, $F(1,328) = 7.19, p = .008$. However, the effect size was small, $\eta^2 = .02$. The null hypothesis was retained.

1.i. HSGPA on entry. A one way ANOVA was conducted in order to determine differences in mean HSGPA between the policy cohorts. A Levene's test revealed that the homogeneity of variance assumption was not met ($p = .042$). There was a statistically significant difference between groups, *Welch's* $F(2,591) = 554.16$, $p < .001$. Post-hoc comparisons using the Games-Howell procedure revealed that mean HSGPA for LR-Direct students was statistically significantly higher ($2.78 \pm .54$) than both AR-Direct students ($1.34 \pm .50$) and AR-GTCL students ($1.30 \pm .54$). A very large effect size was calculated, $\eta^2 = .65$. The null hypothesis was rejected.

A separate ANOVA was conducted to compare the mean HSGPA between just the at-risk groups of students; there was no significant difference, ANOVA, $F(2,591) = .769$, $p = .381$. The null hypothesis was retained.

Research Question 2

Are there differences in academic achievement between policy cohorts as measured by cumulative GPA (CGPA) after three terms?

First, a one-way analysis of variance (ANOVA) with post-hoc tests was used to identify differences in mean scores on the continuous dependent variable CGPA for the three policy cohorts of students. Homogeneity of variances was confirmed by the Levene's test ($p = .865$). There was a statistically significant difference between groups as determined by one-way ANOVA, $F(2,591) = 52.59$, $p < .001$. A large effect size was calculated, $\eta^2 = .15$. Post-hoc comparisons using the Tukey's HSD revealed that the mean CGPA for LR-Direct students was statistically significantly higher ($2.88 \pm .77$, $p < .001$) than both the AR-Direct students ($2.20 \pm .77$, $p = .000$) and the AR-GTCL students ($2.30 \pm .73$, $p < .001$).

A secondary analysis was conducted using planned contrasts to further examine a priori hypotheses that are of the greatest interest as suggested by Field (2009). The first hypothesis was that lower risk students will earn higher CGPA than at-risk students; therefore, the first contrast compared the two at-risk groups (AR-Direct and AR-GTCL) with the lower risk group. A second hypothesis was that AR-GTCL students would earn higher CGPA than AR-Direct was tested in a second planned contrast. Planned contrasts revealed that being low risk significantly increased CGPA scores, $t(9.96)$, $p < .001$, but being in the AR-GTCL group did not significantly increase CGPA compared to being in AR-Direct, $t(-1.25)$, $p = .212$, therefore the null hypothesis was rejected.

Research Question 3

To what extent do institutional, demographic and pre-admission academic factors predict CGPA?

A multiple linear regression (MLR) was conducted to determine the predictive power of institutional, demographic, and pre-entry academic variables on the criterion variable CGPA. Dummy coding was used for policy cohort and term of entry. For policy cohort, AR-Direct and AR-GTCL were converted into the dummy variables with LR-Direct as the reference (omitted) group. For term of entry, Winter and Spring were converted into dummy variables with Fall as the reference category.

MLR estimates the relative importance of several hypothesized predictors and assesses the contribution of the combined variables to change the dependent variable. There are a number of ways to enter variables when conducting a regression analysis. Following the suggestion of Cohen, Cohen, Aiken, and West (2003) the order of entry of the variables was established a priori based on “causal flow” (p. 65) where variables that are predicted to have the most research

relevance are entered first and the R^2 is examined after each addition. R-square, (R^2), also known as the coefficient of determination, indicates the amount of variance in the dependent variables by the predictor variables. Given one of the main goals of this study, to test the assumptions of a 2009 policy change and intervention (which created three distinct policy cohorts), there was a conceptual rationale for the order of entry for the variables and hierarchical entry was used. Policy cohort, the variable with the greatest theoretical importance, was entered first into the regression model.

The direction of the relationship between variables is indicated by the signs (plus or minus) of the regression or Beta (β) coefficients. If a Beta (β) coefficient is positive, then the relationship of this variable with the outcome variable is positive; if the Beta (β) coefficient is negative, then the relationship is negative.

In a multiple regression analysis it is important to check that certain assumptions have been met. A Durbin-Watson test was conducted and the test statistic of 2.0 indicates there is serial independence of errors and no correlation between residuals (Field, 2009). Another assumption to check is multicollinearity, where variables are closely related to one another. In a linear regression, the predictor variables should not have a strong relationship with each other (Azen & Walker, 2011). While Tabachnick & Fidell (2013) note multiple regression is robust to some violations of assumptions, multicollinearity among the predictor variables may result in inflated standard errors or excessively large estimated coefficients (Hosmer & Lemeshow, 2000). A check for this assumption can be made by examination of the collinearity statistics provided in the SPSS output of tolerance and variance inflation factor (VIF). The assumption of multicollinearity was confirmed with VIF (range 1.03- 1.58) and tolerance (range .631-.975), all within suggested values (Field, 2009). As such, there is no concern that predictor variables

excessively influence each other. In addition, Cook's distance values were inspected for values greater than 1.0 which would indicate undue influence of a particular case on the model (Field, 2009), no values exceeded 1.0.

In the model, institutional variables of policy cohort were added in the first block. Overall this model was significant and $R^2 = .153$ which indicates that adding in policy cohort explains 15.1% of the variance $F(3,590)=35.54, p < .001$. Adding demographic variables gives an R^2 change of .017, explaining an additional 1.7% of the variance, ($F(3,586) = 17.16, p < .001$). Adding pre-entry academic variables to the model in the final block does not significantly improve the model's prediction of CGPA ($R^2 = .006, F(11,582) = 11.33, p < .001$).

For the final model, being in the AR-Direct policy cohort ($t(582) = -7.57, p < .001$), being in the AR-GTCL cohort ($t(582) = -4.92, p < .001$), and age ($t(582) = -2.08, p < .05$), were all significant predictors of CGPA. Table 16 summarizes the regression analysis results. As can be seen from Table 16, these variables all had negative (β) coefficients indicating a negative relationship with CGPA. Age, for example ($\beta = -.075$), suggests that for every year increase in age, a .075 unit decrease in CGPA is predicted, holding all other variables constant. The policy cohort variable was dummy coded such that LR-Direct was the reference (omitted) group. As compared to the reference group of LR-Direct students, AR-Direct students had a $\beta = -.606$ indicating AR-Direct students are predicted to earn a CGPA of .606 less relative to the low risk group of students whereas, when compared to the reference group, the AR-GTCL students ($\beta = -.458$) are predicted to earn a CGPA that is .458 points lower.

Neither term of entry, gender, race, COMPASS reading, COMPASS writing, COMPASS math, or number of incoming credits make a unique contribution to the regression model. As

there are variables that contribute significantly to the prediction of CGPA, the null hypothesis was rejected.

Table 16

Summary of Multiple Linear Regression for CGPA

Variable	Coefficients		β	<i>t</i>	Sig.
	Unstandardized coefficients	Standardized coefficients			
	<i>B</i>	<i>SE</i>			
Low risk vs AR-Direct	-.606	.080	-.344	-7.573	.000
Low risk vs AR-GTCL	-.458	.093	-.233	-4.922	.000
Age	-.075	.036	-.091	-2.079	.038
Gender	.004	.070	.002	.056	.955
Race	.110	.071	.059	1.537	.125
Fall vs Winter	-.119	.081	-.059	-1.469	.142
Fall vs Spring	-.120	.085	-.057	-1.409	.159
COMPASS Writing	.002	.002	.062	1.376	.169
COMPASS Reading	-.002	.004	-.022	-.496	.620
COMPASS Math	.001	.002	.039	.867	.386
Incoming Credits	.004	.007	.030	.651	.515

Research Question 4

Are there differences in academic achievement between policy cohorts as measured by attainment of a high school diploma?

As shown in Table 17, 363 (61.1 %) of the study population earned a high school diploma. Of the 363 students earning a high school diploma, 78% were in the LR-Direct policy cohort, 46.9% were in the AR-Direct cohort and 48.5% were in the AR-GTCL cohort. A Chi-square test for independence with Pearson Chi-square was used to test whether there was a significant association between policy cohort and whether or not a student earns a high school

diploma only. There was a significant association, $\chi^2(2, n = 594) = 57.33, p < .001$. The null hypothesis was rejected.

Table 17

Chi-square Analysis of Policy Cohorts and High School Diploma Attainment

Variable	N	Earned HS diploma only		X ²	p
		Yes(%)	No(%)		
Cohort				57.33	.000
LR-Direct	264	206(78.0%)	58(22.0%)		
AR-Direct	194	91(46.9%)	103(53.1%)		
AR-GTCL	136	66(48.5%)	70(51.5%)		
Totals	594	363(61.1%)	231(38.9%)		

Odds ratios can be computed from the cell counts in Table 17 as a measure of association using the following formula where a and b denote frequencies in the first row of a 2x2 table and c and d denote frequencies in the second row (Rudas, 1998), also known as a cross-product ratio:

$$OR = \frac{a/c}{b/d} = \frac{ad}{bc}$$

This formula is used to calculate an odds ratio for LR-Direct and AR-Direct and between attainment of a high school diploma and no attainment of a high school diploma. Compared to students in AR-Direct, LR-Direct are 4.02 times as likely to earn a high school diploma vs not earning a high school diploma.

$$OR = \frac{206/91}{58/103} = \frac{(206)(103)}{(58)(91)} = 4.02$$

A second odds ratio is calculated for LR-Direct and AR-GTCL and between attainment of a high school diploma and no attainment of a high school diploma as follows:

$$\text{OR} = \frac{206/66}{58/70} = \frac{(206)(70)}{(58)(66)} = 3.76$$

Compared to students in AR-GTCL, LR-Direct are 3.76 times as likely to earn a high school diploma vs. not earning a high school diploma.

Research Question 5

To what extent do institutional, demographic, pre-admission academic factors and post-admission academic factors predict attainment of a high school diploma?

The dependent or outcome variable for this question is categorical with two levels—attainment or nonattainment of a high school diploma—while the predictor variables are mixed. Therefore, the use of the binomial logistic regression is the most suitable technique for this question (Hosmer & Lemeshow, 2000). This form of statistical analysis allows the associations between scores to be displayed and the direction, form, and strength of the relationships between variables to be illustrated (Creswell, 2009). Logistic regression calculates the log odds that a particular dichotomous outcome, high school diploma attainment in this case, will occur given the independent variables. A sequential binary logistic regression was performed, considering high school diploma attainment as the outcome variable, with predictors entered in three blocks. The ordering of the variables can be determined by the researcher based on theoretical importance or other considerations (Tabinckak & Fidell, 2013). For this model, the variable of central interest, policy cohort was entered first followed by demographic variables (age, gender, race and term of entry) and pre-entry academic variables (COMPASS Reading, Writing, Math and number of incoming credits) and one post-entry academic variable, CGPA. Policy cohort

(LR-Direct, AR-Direct, and AR-GTCL) were dummy coded and the low risk policy cohort (LR-Direct) was the reference (omitted) group.

Residual statistics diagnostics for individual cases were examined to assess if any cases exerted undue influence on the model. Specifically values of Cook's distance, DFBeta, and average leverage were inspected for each case and for each explanatory variable. No values for Cook's distance or DFBeta exceeded 1.0, within acceptable limits according to Field (2009). Using the formula for calculating the average leverage value suggested by Fields (p. 217) where $\text{leverage} = (k + 1)/n$, for this model a leverage result of .021 is obtained $(12 + 1)/594$. No cases exceed the calculated average leverage value indicating no cases exerting an undue influence. Standardized residuals provide measures of the fit of the model. The SPSS output showed that no cases had an absolute value of ZRESID equal to or larger than 3.0 and fewer than 1% of cases had absolute values above 2.0.

The Likelihood-ratio test was used to test the statistical significance of the prediction models. The Wald statistic was employed to examine the statistical significance of the individual predictor variables. The Hosmer-Lemeshow test was performed to examine the goodness-of-fit of the models. This test measures the level of agreement between the observed and predicted outcomes. If the logistic model is a good fit, then the Hosmer-Lemeshow Statistics produces a non-significant chi-square (Tabachnick & Fidell, 2012). Another way of evaluating the effectiveness of a regression model is to calculate how strong the relationship is between the explanatory variables and the outcomes with the Nagelkerke R^2 , which provides a pseudo R^2 value (Cohen, Cohen, West & Aiken, 2003).

A test of the full model for statistical significance indicates there are predictors in the model that distinguish between high school diploma attainment and no diploma attainment.

Hosmer and Lemeshow test results for the final model were not statistically significant, $\chi^2 = 12.01(8)$, $p = .151$, indicating predicted group membership corresponded closely to the actual group membership and supporting the model used for this study.

The full model provided a statistically significant improvement over the constant only model, $\chi^2 = (12, n = 594) = 234.46$, $p < .001$. The Nagelkerke statistic, $R^2 = .44$ indicated a moderate to strong relationship that accounted for approximately 44% of the total variance.

In addition, classification tables, comparing observed and predicted probabilities, were assessed. The full model showed that 299 out of 363 students (82.4%) were correctly predicted as earning a high school diploma, and 146 out of 231 students (63.2 %) were correctly predicted as failing to earn a high school diploma. The overall predictive accuracy was 74.9%.

Several variables emerge as significantly predictive of high school diploma attainment as measured by the p -values. Table 18 illustrates which of the independent variables make a significant contribution to the prediction of whether a student will earn a high school diploma. The regression coefficients, standard errors, Wald statistics, p -values, and odds ratios with 95% confidence intervals are presented for each independent variable. The effect the individual predictor variable may have on attainment of a high school diploma is determined by the sign (negative or positive) of its coefficient in the model. A score of greater than 1.0 indicates a positive relationship while a score of less than 1.0 indicates a negative relationship. Beta (β) values show the relative contribution of their independent variable on the dependent variable when controlling for the effects of the other predictors. An odds ratio (indicated as Exp (β) in SPSS) is the change in the odds of an outcome occurring given a unit change in the independent variable. An odds ratio greater than 1.00 indicates a positive relationship between the dependent

and independent variables whereas an odds ratio less than 1.00 indicate as the predictor increases, the odds of the outcome occurring decrease.

Significance is determined with the Wald statistic which indicates there are four independent variables that were independently statistically significant predictors of attainment of a high school diploma. These are race, COMPASS math, incoming credits, and CGPA.

The race variable ($\beta = .708$) is statistically significant with $p = .005$ and the relationship is positive with $\text{Exp}(\beta) = 2.03$. This means the reference group (white students) are 2.03 times more likely to earn a high school diploma than minority students. Using the 95% confidence interval, white students were between 1.24 and 3.33 times more likely than minority students to earn a high school diploma, controlling for all other covariates.

The COMPASS math score variable ($\beta = -.013$) is statistically significant with $p = .031$ and the relationship is negative with $\text{Exp}(\beta) = .987$. This means a unit increase in COMPASS math scores will decrease the odds of earning a high school diploma by 1.3% ($.987 - 1.0 = .013$).

The number of incoming credits was found to be a highly statistically significant predictor of attainment of a high school diploma with $p < .001$ and the relationship is positive with $\text{Exp}(\beta) = 1.18$. This means for each unit increase in incoming high school credits, a student is 18% more likely to earn a high school diploma ($1.18 - 1.0 = .18$). Put another way, a student who has earned 11 high school credits on entry into LWTA is 18% more likely to earn a high school diploma than a student who enters with 10 high school credits, all other things being equal.

CGPA had the strongest influence on attainment of a high school diploma ($\beta = 1.53$, $p < .001$). The relationship is positive with $\text{Exp}(\beta) = 4.60$. Students are 4.60 times more likely to earn a high school diploma for every unit increase in CGPA. Stated differently, for each unit

increase in CGPA a student is 360% ($4.60 - 1.0 = 3.60$) more likely to earn a high school diploma. This means a student who earns a 3.0 cumulative first year GPA (CGPA) is 360% more likely to earn a high school diploma than a student who earns a CGPA of 2.0.

As there are variables that contribute significantly to the prediction of attainment of a high school diploma, the null hypothesis was rejected.

Table 18

Summary of Logistic Regression for High School Diploma Attainment

Variable	β	SE	Wald	df	Sig.	Exp(β)	95% CI
Policy Cohort-AR-Direct	-.302	.269	1.254	1	.263	.740	[0.44, 1.25]
Policy Cohort-AR-GTCL	-.186	.302	.380	1	.538	.830	[0.46, 1.50]
Age	-.226	.124	3.334	1	.068	.798	[0.63, 1.02]
Gender	-.157	.243	.418	1	.518	.855	[0.53, 1.38]
Race	.708	.253	7.86	1	.005	2.030	[1.24, 3.33]
Term Entered(1)	-.014	.266	.003	1	.959	.987	[0.58, 1.66]
Term Entered(2)	-.096	.281	.115	1	.734	.909	[0.52, 1.58]
COMPASS Writing	.003	.006	.192	1	.662	1.003	[0.99, 1.01]
COMPASS Reading	.003	.012	.052	1	.819	1.003	[0.98, 1.03]
COMPASS Math	-.013	.006	4.66	1	.031	.987	[0.98, 0.99]
Incoming Credits	.169	.026	42.14	1	.000	1.184	[1.12, 1.25]
CGPA	1.53	.159	92.89	1	.000	4.60	[3.37, 6.29]

Research Question 6

Are there differences in academic achievement between policy cohorts as measured by attainment of a college credential?

As shown in table 19, 183 students in the study population earned a college credential. 45.8% of the LR-Direct cohort earned a college credential while only 18% of the AR-Direct

group and 19.9% of the AR-GTCL group earned a college credential. Only 30.8% of the entire sample population earned a college credential. A Chi-square test for independence found a significant association between policy cohort and whether or not a student earns a college credential, $\chi^2(2, n = 594) = 50.45, p < .001$, Cramer's V = .291, a small to medium effect size using Cohen's (1988) standards for interpreting Cramer's V.

An examination of the adjusted standardized residuals for values greater than 2.0 indicated there are fewer college credentials earned in the AR-Direct and AR-GTCL cohorts than expected and more college credentials earned in the LR-Direct group than expected. The null hypothesis was rejected

Table 19

Chi-square Analysis of Policy Cohorts and College Credential Attainment

Variable	N	Earned college credential		X ²	p
		Yes(%)	No(%)		
Cohort				50.45	.000
LR-Direct	264	121(45.8%)	143(54.2%)		
AR-Direct	194	35(18.0%)	159(82.0%)		
AR-GTCL	136	27(19.9%)	109(80.1%)		
Totals	594	183(30.8%)	411(69.2%)		

Odds ratios are computed from the cell counts in Table 19 as a measure of association using the Rudas (1998) formula:

$$OR = \frac{121/35}{143/159} = \frac{(121)(159)}{(143)(35)} = 3.84$$

Compared to students in AR-Direct, LR-Direct are 3.84 times as likely to earn a college credential. A second odds ratio is calculated for LR-Direct and AR-GTCL and between attainment of a college credential and no attainment of a college credential as follows:

$$\text{OR} = \frac{121/27}{143/109} = \frac{(121)(109)}{(143)(27)} = 3.41$$

Compared to students in AR-GTCL, LR-Direct are 3.41 times as likely to earn a college credential vs. not earning a college credential.

Research Question 7

To what extent do institutional, demographic, pre-admission academic factors, and post-admission academic factors predict attainment of a college credential?

Logistic regression calculates the log odds that a particular dichotomous outcome, credential attainment in this case, will occur given the independent variables. A sequential binary logistic regression was performed, considering college credential attainment as the outcome variable, with nine predictors entered in three blocks. The ordering of the variables can be determined by the researcher based on theoretical importance or other considerations (Tabachnick & Fidell, 2013). For this model, the variable of central interest, policy cohort was entered first followed by demographic variables (age, gender, race and term of entry), pre-entry academic variables (COMPASS Reading, Writing, Math, and number of incoming credits) and a post-entry academic variable (CGPA). Policy cohort (LR-Direct, AR-Direct, and AR-GTCL) were dummy coded and the low risk policy cohort (LR-Direct) was coded as the reference (omitted) group. The dependent or outcome variable for this question is categorical with two levels—attainment or nonattainment of a college credential—while the predictor variables are mixed. Residual statistics diagnostics for individual cases were examined to assess if any cases exerted undue influence on the model. Specifically values of Cook's distance and DFBeta, and

leverage were inspected for each case and for each explanatory variable. No influential cases were discovered. Standardized residuals provide measures of the fit of the model. The SPSS output showed that no cases had an absolute value of ZRESID equal to or larger than 3.0 and fewer than 1% of cases had absolute values above 2.0.

A test of the full model for statistical significance indicates there are predictors in the model that distinguish between credential attainment and no credential attainment. Hosmer and Lemeshow test results for the final model were not statistically significant, $\chi^2 = 12.99(8)$, $p = .112$, indicating predicted group membership corresponded closely to the actual group membership and supporting the model used for this study.

The full model provided a statistically significant improvement over the constant only model, $\chi^2 = (11, n = 594) = 64.03$, $p < .001$. Results of the Nagelkerke $R^2 = .14$ indicated that the full model accounted for approximately 14% of the total variance. The model showed that 87 out of 183 students (47.5%) were correctly predicted as earning a college credential, and 362 out of 411 students (88.1%) were correctly predicted as failing to earn a college credential. The overall predictive accuracy was 75.6%.

Several variables emerge as making a significant contribution to the prediction of college credential attainment as measured by the p -values. These are policy cohort, age, and CGPA. In Table 20 the regression coefficients, standard errors, Wald statistics, p -values, and odds ratios with 95% confidence intervals are presented for each independent variable. The effect the individual predictor variable may have on attainment of a college credential is determined by the sign (negative or positive) of its coefficient in the model. A score of greater than 1.0 indicates a positive relationship while a score of less than 1.0 indicates a negative relationship. Beta (β) values show the relative contribution of their independent variable on the dependent variable

when controlling for the effects of the other predictors. An odds ratio (indicated as Exp (β) in SPSS) is the change in the odds of an outcome occurring given a unit change in the independent variable. An odds ratio greater than 1.00 indicates a positive relationship between the dependent and independent variables whereas an odds ratio less than 1.00 indicate as the predictor increases, the odds of the outcome occurring decrease.

As compared to the reference group of LR-Direct, the AR-Direct students showed a negative β value (-.543). This means students in this cohort were less likely to earn a college credential than students in the low risk policy cohort, Exp (β) = .58. This means, when compared to LR-Direct students, the AR-Direct students were 41.9% (.58 – 1.0 = .419) less likely to earn a college credential, controlling for all other variables. This contrast was marginally significant ($p = .049$). Using the 95% confidence interval, students who were in the AR-Direct policy cohort were between .34 and .99 times less likely as students in the LR-Direct policy cohort to earn a college credential, controlling for all other covariates. The variable measuring age at entry showed a negative β value (-.26). This means the older a student was at entry, the less likely they were to earn a college credential. Furthermore the effect size of Exp (β) of .77 suggests that for each additional year of age, a student was 23% (.77 – 1.0 = .23) less likely to attain a college credential. This means a student who enters the program at age 19 is 23% less likely to earn a college credential than a student who enters the program at age 18.

CGPA was the most statistically significant predictor of attainment of a college credential ($\beta = 1.37, p < .001$). The Exp (β) = 3.93, indicating that for each additional whole grade point, a student was almost four times more likely to earn a college credential. Put differently, for each additional grade point unit, a student is 293% (1-3.93) more likely to earn a college credential. This means a student who earns a 3.0 cumulative first year GPA (CGPA) is 293% more likely to

earn a college credential than a student who earns a first year GPA (CGPA) of 2.0. As there are several variables that contribute significantly to the prediction of a college credential, the null hypothesis was rejected.

Table 20

Summary of Logistic Regression for College Credential Attainment

Variable	β	SE	Wald	df	Sig.	Exp(β)	95% CI
Policy Cohort (LR-Direct=Reference)							
Policy Cohort-AR-Direct	-.543	.276	3.875	1	.049	.581	[0.34, .998]
Policy Cohort-AR-GTCL	-.467	.315	2.199	1	.138	.627	[0.34- 1.16]
Age	-.257	.125	4.217	1	.040	.773	[0.60, 0.99]
Gender	.167	.228	.539	1	.463	1.182	[0.76, 1.85]
Race	.388	.237	2.667	1	.102	1.474	[0.93, 2.35]
Term entered(1)	.048	.270	.031	1	.860	1.049	[0.62, 1.78]
Term entered(2)	.249	.287	.754	1	.385	1.282	[0.73, 2.25]
COMPASS Writing	-.008	.006	1.907	1	.167	.992	[0.98, 1.00]
COMPASS Reading	.022	.012	3.248	1	.072	1.022	[1.00, 1.05]
COMPASS Math	.000	.006	.021	1	.886	.999	[0.99, 1.01]
Incoming credits	.028	.023	1.409	1	.235	1.028	[0.98, 1.08]
CGPA	1.369	.172	63.094	1	.000	3.932	[2.80, 5.51]

Summary of Results

There were three goals for the quantitative portion of this study. First was to quantitatively test the policy assumption that students with an incoming HSGPA at or above a 2.0 have higher levels of academic achievement (and therefore can accurately be considered to be at lower risk) than those with incoming HSGPA below 2.0 (considered to be at-risk) by examining how these students performed. The next quantitative goal (goal three) was to

quantitatively examine the differences in academic achievement between the two groups of at-risk students. The final goal (goal four) was to determine which pre-admission and post-admission variables are useful in predicting academic achievement; operationalized as CGPA, attainment of a high school diploma, and attainment of a college credential. The three quantitative goals of this study were accomplished through a set of seven research questions.

Descriptive statistics and zero-ordered correlations were provided to understand the characteristics of the study population. Chi-square square tests for independence and one-way ANOVA examined differences in the policy cohorts. Linear and binary logistic regressions were conducted to estimate the effects of set of theoretically grounded institutional, demographic, academic pre-entry, and academic post-entry variables in predicting three outcomes associated with academic achievement: 1) first year cumulative GPA (CGPA), 2) attainment of a high school diploma, and 3) attainment of a college credential. The institutional variables were the three distinct policy cohorts. Demographic variables were age, race, gender, term of entry, and number of high school credits earned prior to entry. Pre-entry academic variables were COMPASS reading, writing and math scores, and number of high school credits earned prior to entry. The post entry academic variable was CGPA. A discussion of the findings for each research question is presented in Chapter 5 along with limitations, recommendations for future research, implications, and conclusions.

CHAPTER 5: CONCLUSION

The Bureau of Labor Statistics (2013), in its employment projections for the 2010-2020 decade, estimated that there will be 54 million job openings during that time period. Of these, slightly more than 20% will require a bachelor's degree or higher, while another 50% will require a high school diploma and at least some postsecondary education. Access to jobs with wages that facilitate entry into the middle class depends increasingly on obtaining at least some postsecondary education (Carnevale, Smith, & Strohl, 2010). However, the security and opportunity that usually follow educational attainment are elusive for millions of Americans who do not graduate from high school or complete any college.

In his 2012 State of the Union address, President Barack Obama called on the nation's two-year public community and technical colleges to address the shortage of highly skilled workers needed to grow the U.S. economy, particularly in the high-wage areas of advanced manufacturing, transportation, healthcare, and the "STEM" fields of science, technology, engineering, and math (Office of the Press Secretary, 2012). The President has challenged community and technical colleges to graduate an additional five million Americans by 2020 (Baime, 2011). The program at the center of this study, Lake Washington Technical Academy (LWTA), a dual enrollment technical high school located on the campus of a technical college (LWIT) seeks to support its high school students to obtain not only a high school diploma but also a college credential that can lead to employment stability and a family sustaining wage.

LWIT, the host college faces many demands including enrollment fluctuations, steep cuts in state funding, rising tuition, and a multitude of student needs. At the same time, community and technical colleges face increasing pressure from state legislatures to link funding to student outcomes (Jenkins & Rodriguez, 2013). The end result is the need to do more with less.

According to one evaluation researcher, “As not everything can be done, there must be a basis for deciding which things are worth doing” (Patton, 1997, p. 11). LWIT administrators must have information about the effectiveness of all its programs in order to make informed decisions about what is worth doing. Regarding the operation of LWTA, consideration must be given to the institution’s mission, the impact on regularly matriculating students and college faculty, and the appropriate use of public funds. The institution must also consider the educational achievement of students attending LWTA and to what extent institutional actions can be taken to positively impact student success. Empirical data are needed to assist administrators in making decisions regarding the refinement or continuation of such programs. This study sought to provide useful data and to test the assumptions associated with a 2009 policy decision that incoming high school GPA could be used to categorize student’s risk status and that an intervention model (GTCL) could improve academic outcomes for students deemed to be most at-risk. The results of this study provide important information to the institution and contribute to the scholarship regarding at-risk youth and dual enrollment.

Overview of the Study

There were four goals associated with this study. The first was to articulate a theory of change to explain how the GTCL program intervention was expected to impact academic achievement of at-risk students. The second goal was to quantitatively test the policy assumption that students with an incoming HSGPA at or above a 2.0 have higher levels of academic achievement (and therefore can accurately be considered to be at lower risk) than those with incoming HSGPA below 2.0 (consider to be at-risk) by examining how these students performed. The third goal was to quantitatively examine the differences in academic achievement between the two groups of at-risk students. The fourth and final goal was to

determine which pre-admission and post-admission variables are useful in predicting academic achievement for students in the study.

Seven research questions were developed and analyzed using quantitative methods. The results of these analyses were presented in chapter four. In this final chapter a discussion of these findings is presented along with implications for practice, limitations for interpreting the results, recommendations for future research, and the conclusion.

Discussion of the Results

This section discusses the results of each of the seven research questions. The salient findings are then framed in light of the study goals. Overall, the results provide important and actionable information for the institution.

Research question one, and the corresponding sub-questions sought to determine what, if any, significant demographic or academic differences existed between the three groups of students created by the policy change in order to better understand the population under study. The policy cohorts are: 1) those students who were considered to be at-risk based in their incoming high school GPA but who were enrolled prior to the GTCL intervention model (designated AR-Direct), 2) students who had incoming HSGPAs at or above 2.0 and therefore were considered to be at less risk (designated as LR-Direct), and 3) those students considered to be at-risk academically and who were served in the GTCL model (AR-GTCL). As demographic and academic variables are among those considered in later research questions as predictors, it is important to know how the policy cohorts differ. Statistically significant differences were found so the null hypothesis was rejected.

These significant results are summarized as follows. Regarding gender, there were more males in the AR-Direct policy cohort and more females in the LR-Direct policy cohort. LR-

direct students were statistically significantly younger than students in either the AR-Direct or AR-GTCL cohorts. By term of entry, it was found that AR-GTCL students were less likely to enroll in Fall quarter than LR-Direct and AR-Direct.

Regarding the academic variables, LR-Direct students had higher COMPASS math scores than the other policy cohorts. LR-Direct students had statistically significantly more high school credits on entry than at-risk groups while AR-Direct students had statistically significantly more high school credits on entry than AR-GTCL group.

Research question two examined the effect of policy cohort on CGPA. There were significant differences by policy cohort and the null hypothesis was rejected. Specifically, the mean CGPA was higher for LR-Direct students than for both at-risk policy cohorts. This finding was expected as the LR-Direct students demonstrated higher levels of academic performance prior to entry as measured by their previous high school GPA (HSGPA). Furthermore, the results of research question two provide strong support for the policy assumption that students with an incoming HSGPA at or above a 2.0 (the LR-Direct students) would have higher levels of academic achievement than the at-risk students. This finding is consistent with the literature review that showed HSGPA to be a significant predictor of academic outcomes at both the high school and college level. For example, in their study of 24,894 Chicago Public high school students, Allensworth & Easton (2007) found that students with less than a C (2.0) average were more likely to drop-out. In another study, Belfield and Crosta (2012) examined predictive ability of HSGPA on two college outcomes, college GPA and accumulation of credits. Drawing on a sample of approximately 20,000 students from one state community college system, the researchers found that HSGPA alone explained approximately 21% of the variation in college GPA and 14% of the variation in college credits earned.

Research question three examined whether a set of institutional, demographics, and pre-admission academic factors would predict first year cumulative GPA (CGPA). A linear regression was used and the variables found to be significant predictors of CGPA were being in an at-risk policy cohort and age. Approximately 15% of the variance was explained by policy cohort alone, this reinforces the role of prior academic achievement on first year GPA, recall that the at-risk policy cohorts are comprised of students who entered LWTA with a HSGPA less than 2.0. After controlling for all other variables, AR-Direct students were predicted to earn a CGPA that is .606 points less than a low risk student. AR-GTCL students were predicted to earn a CGPA that is .459 points less than a low risk student.

Though the effect was small, there was also a finding that with increases in age at entry, a student earned a lower CGPA. This result was surprising. One might expect the older and more mature a student is, the better they would perform academically but this assumption is not supported by study findings. One explanation could be that the older student a student is, the more they experience external demands on time, attention, and resources (pull factors) that interfere with educational endeavors. The impact of pull factors on dropping out was established in the literature review for both high school and college students. In a meta-analysis of seven national studies, Doll, Eslami, & Walters (2013) found pull factors to be the dominant reason for dropping out of high school. Crisp and Nora (2010) examined the influence of a number of variables, including environmental pull factors, on college student success and found pull factors make a significant contribution to persistence decisions.

Research question four examined whether there were differences by policy cohort on attainment of a high school diploma. Of the students that earned a high school diploma, 78% were in the LR-Direct policy cohort, 46.9% were in the AR-Direct cohort and 48.5% were in the

AR-GTCL cohort. This finding was expected as the LR-Direct students demonstrated higher levels of academic performance prior to entry as measured by their previous high school GPA.

Research question five utilized a binomial logistic regression analysis to test whether institutional, demographic, pre-entry academic and post entry academic variables are useful in predicting attainment of a high school diploma. Based on the results of the logistic regression analysis, attainment of a high school diploma is influenced by number of incoming credits, CGPA, race, and COMPASS math scores. The most significant contributor to the prediction of attainment of a high school diploma was CGPA. For every unit increase in CGPA, a student is 360% more likely to earn a high school diploma. Another significant predictor of attainment of a high school diploma was the number of high school credits a student has earned prior to entry. For each additional high school credit earned at entry, a student is 18% more likely to earn a high school diploma.

Results indicated that the odds of earning a high school diploma were reduced for minority students. This disparity is disappointing as the focus of LWTA is to provide an alternative to students who often have been marginalized and as a result, experienced failure in their previous high school. One explanation may be that there are other factors, not included in the model that could have explanatory value. For example, first generation status and SES were not available. Another explanation may be the lack of “compositional diversity” (Hurtado, Alvarez, Guillermo-Wann, Cuellar, & Arellano; 2012, p. 44) given that 73% of students in the study sample were white compared to only 27% of other race/ethnicities combined. This could result in an unwelcoming climate and a diminished sense of belonging. In addition to the study population of high school students, the college student body at large, and its faculty are predominately white. Minority students may experience forms of microaggressions and other

forms of racism which could impact academic motivation affecting academic performance. Harper et al. (2011) describe the psychoemotional burden of “onlyness” (p. 190) caused by navigating a campus environment with few peers and roles models from one’s racial or ethnic group.

Another small but significant finding from the logistic regression is the reduced odds of earning a high school diploma with higher scores on the COMPASS math test. For each additional point earned on the COMPASS math test, a student is 1.1% less likely to earn a high school diploma. This was unexpected. One explanation could be that COMPASS scores are used in admission decisions and in course placement. LWIT establishes test cut scores that are used as the sole criteria for placing a student into a certain math class. The placement decision is the same whether the student scores 1 point above the cutoff or 25 points above. For example, a student who earned a score of 60 on the pre-algebra scale would be placed into Math 90 (Introduction to Algebra), as would a student who earned a score of 85. Higher COMPASS math scores may result in over-placement in a math class beyond the student’s actual skill level. There may also be disconnect between the material tested on the COMPASS pre-algebra test and the requirements necessary to succeed in the actual college level math class. As noted in the literature review, several researchers have called the predictive ability of placement test into question (Belfield & Crosta, 2012; Scott-Clayton, 2012). The importance of these variables exceeds that of policy cohort, meaning that risk status loses significance in the model and what matters more is race, COMPASS math scores, number of incoming credits, and CGPA.

Research question six examined whether there were differences by policy cohort on attainment of a college credential. Of the 183 students in the study population who earned a college credential, 45.8% of these were from the LR-Direct cohort while 18% of the AR-Direct

group and 19.9% of the AR-GTCL group earned a college credential. Only 30.8% of the entire sample population earned a college credential. While the AR-GTCL group earned a slightly higher percentage of college credentials (19.9%) than the AR-Direct group (18%), the difference was not statistically significant.

Research question seven utilized a binomial logistic regression analysis to test whether institutional, demographic, pre-entry academic and post entry academic variables are useful in predicting attainment of a college credential. There were three significant predictors of attainment of a college credential. These were policy cohort, age, and CGPA. AR-Direct were less likely to earn a college credential compared to reference group LR-Direct. Regarding age, results indicate for each additional year of age, the likelihood of earning a college credential is reduced. This is understandable since once a student reaches age 21 they are no longer eligible as a high school student and therefore allowed to enroll in college classes tuition free.

As was seen with attainment of a high school diploma, CGPA was by far the most significant factor in attainment of a college credential. For each additional whole grade point, a student was almost 4 times more likely to earn a college credential. This is expected given the strong body of literature connecting grades with a range of outcomes. Other researchers have found that the GPA earned during the first year of college and, in some cases, in the first semester is a better indicator of continued enrollment and academic success than other variables (Allen, 1999; Camara & Echternacht, 2000; Hoffman & Lowitzki, 2005).

With the significance level of AR-Direct approaching non-significance ($p = .049$), the importance of risk status almost disappears and what matters more for attainment of a college credential is age and CGPA. The importance of first year grades is consistent with the literature connecting grades with a range of outcomes such as degree attainment (Adelman 2006;

Pascarella & Terenzini, 2005; Reason, 2003; Wintre & Bowers, 2007), retention (Bradburn, 2002; DesJardins, Kim, and Rzonca, 2003) and completion after transfer (Wang, 2009).

Summary of the Findings Compared with Study Goals

In order to unpack the practical significance of the study results, findings are next presented in context of each of the four study goals.

Goal 1: Articulate a Theory of Change

LWTA sought to improve the academic outcomes of students with a 2009 policy change and program intervention. The policy change was to categorize students by academic risk level based on their incoming high school GPA, and then to provide different levels of support to students identified as being at-risk. The GTCL model was selected as the intervention to provide a higher level of support to students determined to be at-risk. The policy further established that students determined to be at lower academic risk would be served in the direct entry model. Using a conceptual framework is helpful to simplify a complex phenomenon in order to explain or suggest why the phenomenon works as it does and to make its underlying assumptions apparent. Patton (2008) described this method of identifying a program's theory of change as a deductive approach that draws heavily on scholarly theories.

In order to articulate a theory of change of how and why the GTCL model is expected to increase the academic achievement, this study utilized Tinto and Pusser's (2006) model of institutional action. Consistent with GTCL practice of accepting students who have a history of weak success, in the Tinto & Pusser model emphasis shifts from students' background or characteristics to a broader conception of how specific actions taken by the institution can foster conditions where students will stay enrolled and persist to completion. This conceptualization provides a structure for understanding factors related to educational attainment for students who

are dually enrolled in both high school and college as discussed in the literature review. It places the focus of attention on the institution's role in providing programming and support focused on the malleable factors within institutional control that can foster student persistence. Drawing on existing studies of effective institutional practices, Tinto and Pusser (2006) systematically construct the elements that can establish conditions for improving student success. These are institutional commitment, expectations, support, feedback, and involvement. The researcher has added a sixth element of career opportunity to the model as this element is central to the operation of the GTCL model. Taken together, the theoretical framework has considerable implications for policy and practice. Rather than focusing on student deficits, the framework underscores the structures, practices and climate within the purview of the institution that can be brought to bear to improve student quality of effort, and learning which leads ultimately to academic success.

Goal 2: Test the Policy Assumption of Identifying a Student's Risk Status by HSGPA

The results of bivariate and multivariate analysis conducted in this study provides overwhelming evidence that support the 2009 policy decision that students with incoming HSGPA at or above a 2.0 (LR-Direct) achieve higher levels of academic performance than students identified as being at-risk. Simply stated, lower risk students earned higher first year CGPA, and earned more high school diplomas and college credentials than at-risk students.

Goal 3: Examine Differences in Academic Achievement Between At-Risk Cohorts

One goal of this study was to evaluate how AR-GTCL students performed relative to AR-Direct students in three measures of academic achievement, first year cumulative GPA (CGPA), attainment of a high school diploma, and attainment of a college credential (defined as either an associate degree or certificate). AR-GTCL students did earn higher mean CGPA, earned more

high school diplomas, and earned more college credentials than AR-Direct students. Although the results did not reach the level of statistical significance, the pattern of every result was in the predicted direction that AR-GTCL students would have higher levels of academic achievement.

Regarding attainment of a high school diploma, the results gain salience when taking into consideration that students in the AR-GTCL group entered the program with statistically significantly fewer credits, which was found to be a significant negative predictor in the regression model for attainment of a high school diploma. These observed differences and their practical importance are not to be dismissed. The finding of no significant difference in comparison of the two at-risk groups is actually an encouraging result, it suggests that at-risk students who receive the intensive support provided in the GTCL model performed on-par with AR-Direct students despite entering with fewer incoming high school credits. The findings of non-significance here and with regard to the other measures of academic achievement, might be contributed to sample size. The total sample size was 594, of which just 330 were in the at-risk cohorts. Increasing the sample size would result in higher power and improvement in the detection of differences.

Goal Four: Identify Variables Useful in Predicting Academic Achievement

Predicting CGPA. A linear regression was used and found, when all other study variables are taken into account, being in either of the two at-risk policy cohort, and age at entry were useful in predicting CGPA. The nature of the relationship was negative, meaning being at risk or older reduces CGPA. Though the overall model has low explanatory value, explaining only slight more than 16% of the variance, we can conclude that a student's risk status (as defined by having a HSGPA below 2.0 at entry), and to a lesser extent age, are useful in predicting CGPA. Recall from research question one that LR-Direct students had statistically

significantly higher incoming high school GPA so this result is consistent with the literature that high school GPA is a strong predictor of college GPA.

Predicting Attainment of a High School Diploma. A binomial logistic regression analysis was conducted to test whether institutional, demographic, pre-entry academic and post entry academic variables can predict attainment of a high school diploma. When controlling for all other variables in the model, CGPA, number of incoming credits, and COMPASS math scores all make a significant contribution to the prediction of attainment of a high school diploma. The variable with the most explanatory power was a student's first year performance (CGPA).

Predicting Attainment of a College Credential. A binomial logistic regression analysis was conducted to test whether institutional, demographic, pre-entry academic and post entry academic variables can predict attainment of a college credential. There were three significant predictors of attainment of a college credential. These were policy cohort, age, and CGPA.

As was seen with attainment of a high school diploma, CGPA was the most significant factor in attainment of a college credential. For each additional whole grade point, a student was almost 4 times more likely to earn a college credential. This is expected given the strong body of literature connecting grades with a host of educational outcomes.

Implications for Practice

This study contributed to the research literature and, as importantly, the findings and conclusions lead to recommendations with practical significance for program administrators and institutional leadership. Tinto & Pusser (2006) asserted that once a student is admitted, it is the institution's obligation to do what it can to help the student stay and to graduate. This is true for both regularly matriculated students and for high school students served in dual enrollment

models for at risk youth such as such as GTCL. This statement has served as the underlying basis for this research and for many of the practices and programs that have been put into place at LWTA. Concern about the academic achievement of students prompted discussions of the importance of determining which students might need a higher level of support that that provided in the direct entry model, and which intervention might provide that higher level of support. LWTA hoped that increasing level of support through the GTCL model would improve academic outcomes for at-risk students. Prior to 2009, little was done to understand the attributes of students admitted to the program or to assess readiness and it did not differentiate services based on risk status. While all students admitted share some attributes, (e.g. all left their previous high school without graduating and all met minimum standards on COMPASS placement tests), students enter with a wide range of reasons for seeking an alternative program along with variations in academic preparation, personal attributes, and demographic characteristics. As a result of this study, more information is known about some key predictive variables that are readily available upon admission which may help administrators focus on creating the conditions (identified in the theoretical framework) that are hypothesized to have the greatest impact on academic achievement. Four specific recommendations for practice are described next.

Recommendation 1: Provide an Array of Supports to All Students

Tinto and Pusser's 2006 model of institutional action is used as a conceptual model to illuminate the theory of action of how the additional supports might impact student outcomes. The results from this study do not provide strong evidence that the GTCL intervention had the expected impact for AR-GTCL students. However, there may be aspects of support that can be strengthened. Institutional decision-makers might also consider that exposure to a set of

comprehensive educational practices as described in the theoretical framework could benefit students deemed to be at lower risk and could result in improvements in academic performance for that group of students.

These supports are particularly important during the first year. Of the variables studied, first year GPA (CGPA) was the strongest predictor of attainment of both a high school diploma and a college credential. The importance of this post-entry variable in predicting attainment is consistent with findings in the literature review. As stated by Pascarella & Terenzini (2005) “Virtually without exception, students’ grades make statistically significant, frequently substantial, and indeed often the largest contribution to student persistence and attainment” (p. 397). This study provides data that suggests institutional efforts aimed at providing a constellation of student supports intended to improve academic performance such as those outlined in the theoretical framework may have the greatest impact on attainment of both high school diploma and a college credential. Tinto (2012) acknowledges that student’s themselves must expend effort towards their own success but, as importantly, notes that the institution itself, once having admitted a student, has “moral obligation” to establish the conditions that will improved the likelihood of completion (p. 120). Tinto suggests that intensive institutional support in the first year, particularly through the use of learning communities (such as those used in the GTCL model) is critical for the success of academically unprepared students.

This recommendation is also based on a proposition that providing some or all of these supports to students identified as being at lower academic risk will also increase their levels of educational attainment. It has been established that the LR-Direct students do perform at much higher academic levels than AR-Direct and AR-GTCL. For example, LR-Direct students achieved a mean CGPA of 2.88 (SD= $\pm .77$), 78% of the study population in the low risk group

attained a high school diploma and 45.8% earned a college credential. However, there is still a great deal room for improvement for this group of students and they may respond well to additional and targeted support. Recall that this study found that for each unit increase in CGPA a student is 360% more likely to earn a high school diploma and 293% more likely to earn a college credential. Efforts focused on improving the first year GPA for lower risk students could result in significantly higher odds of earning these important credentials and is worth exploring.

Recommendation 2: Continue to Offer the GTCL Intervention for At-Risk Students

For high school-age students who have dropped out, reconnecting with education and training may be the best antidote to the long list of negative private and social impacts facing them (Belfield, et al., 2012; Bridgeland & Milano, 2012; Symonds, et al., 2011). Dual enrollment shows promise as a strategy for improving educational outcomes for all students including those most at risk (Allen & Dodger, 2012; Bloom & Ivry, 2010; Steinberg & Almeida, 2007). This study has highlighted the differences in levels of educational attainment in one dual-enrollment program based on risk status. The GTCL model incurs greater operational expense than the direct entry model due to network membership fees, its lower student-to-staff ratios, and an array of specific actions described in the theoretical framework aimed at improving student effort, learning and success. Though the differences did not reach a level of statistical significance, the pattern of every result comparing outcomes for AR-GTCL students with AR-Direct was in the predicted direction; AR-GTCL students did earn higher mean CGPA, and earned more high school diplomas and college credentials than AR-Direct students. Regarding attainment of a high school diploma, these results gain salience when taking into consideration that students in the AR-GTCL group entered the program with statistically significantly fewer credits. Recall from research question five, incoming credits was a significant predictor of

attainment of a high school diploma where for each additional credit at entry, a student is 18% more likely to earn a high school diploma.

LWTA could certainly implement all the elements of the model described in the theoretical framework without being a member of the Gateway to College national network (GTCNN), however there are several reasons why maintaining the membership affiliation is of value. First, GTCNN provides strong technical assistance and high quality professional development to its members. Secondly, GTCNN is active in state and national policy creation and advocacy focusing on expanding capacity, establishing sustainable funding and creating alternative accountability options (Gateway to College National Network, 2015). GTCNN also engages in on-going research to inform practice. Finally, GTCNN is able to secure funding from large and well established philanthropic organizations to start new programs and support existing programs in a variety of ways including developing tools for improving financial reporting and providing grants aimed at meeting local needs. The potential of the GTCL model for improving the academic outcomes at-risk youth is such that it should be continued.

Recommendation 3: Strengthen Institutional Climate

Clearly LWTA must specifically address the disparities in attainment of a high school diploma based on race/ethnicity. The major need here is to identify the hard-to-see barriers to educational attainment and to pay particular attention to what the institution can do to create a supportive institutional climate for all students (including those enrolled through LWTA). The importance of institutional commitment in the creation of a positive campus climate is central to the theoretical framework described in this study. As noted by Rhee (2008) institutional commitment to diversity is a significant factor in student retention. Hurtado & Guillermo-Wann (2013) also note marked decreases in reports of discrimination and bias when student perceptions

of institutional commitment to diversity increase. Research has firmly established that the campus racial climate can significantly impact a student's sense of belonging (Pittman & Richmond, 2007), academic motivation, academic achievement and degree attainment (Chithambo, Huey, & Cespedes-Knadle, 2014; Locks, Hurtado, Bowman, & Oseguera, 2008; Reynolds, Sneva, & Beehler, 2010; Solórzano, Ceja, & Yosso, 2000).

LWIT has recognized the important contribution of equity, diversity and inclusion on campus climate and recently begun taking action including hiring outside consultants, analyzing data, and hosting forums with broad participation by faculty, staff and students. This work has led to the establishment of a campus-wide Equity, Diversity, and Inclusion Plan (EDIP). This plan is intentional in establishing equity, diversity and inclusion as critical components of a comprehensive strategy for achieving the structural elements and institutional culture necessary to enhance student success and specifically improve the educational outcomes for minority students. The efforts that LWIT has made are in the right direction. Further it is recommended that the college pay particular attention to all the dimensions of the campus climate such as those described in the DLE (diverse learning environment) model by Hurtado et al., 2012. For example, the DLE model calls for an examination of hiring practices, curriculum, pedagogy, and teaching methods as contextual elements that go beyond improving compositional diversity. A multidimensional framework such as DLE can be used to better understand all elements of the institutional climate that can be brought to bear in advancing success for all students. Focusing on the institutions policies, practices, structures, personnel, programs and processes has the potential to transform the institution and improve the overall experience for all students (Rassen, Chaplot, Jenkins & Johnstone, 2013).

Recommendation 4: Strengthen Pre-Admission Evaluation Process

The likelihood of attaining a high school diploma was influenced by the number of credits a student had earned in their previous high school(s). It has been clearly shown in the literature that high school performance has been an indicator of academic performance and predictor of success in college. This finding raises questions about whether LWTA may need to strengthen the admission evaluation process by taking into consideration additional aspects of a student's academic history in determining not only their risk status, but also the types of supports that would be needed to help the student be successful. For example, examining the number of credits a student earned prior to entry may provide a more nuanced understanding of a student's risk status than HSGPA alone.

In addition, the unexpected finding that COMPASS math scores were a small but negative predictor of attainment of a high school diploma raises questions about using a single measure to make course placement decisions. In a correlational study of the utility of placement tests across a state community college system, Scott-Clayton (2012) found using high school GPA alone resulted in better outcomes than using placement test scores alone. LWTA should make math course placement decisions informed by HSGPA and COMPASS math scores for all students.

Limitations

There are a number of limitations that should be considered when drawing conclusions about the findings of this study. One limitation of this study is that attainment of a high school diploma or college credentials have only been tracked within the institution. It is possible that a student transferred back to their home high school, enrolled into a different dual enrollment or alternative program, or perhaps enrolled directly into another college and earned these credentials at another location.

A causal-comparative (ex post facto) design is limited by the information available in archival student records. Variables were preexisting and could not be manipulated; therefore causation cannot be implied and findings must be interpreted cautiously. This is especially important to note since the two at-risk groups were significantly different on several factors. Another major limitation when using archival data is that the researcher is constrained by the existing information and not all variables of interest were available. Some theoretically important variables such as first generation status, and SES were not included.

Furthermore, this study is limited to a single institution over a specific time period and results may not be generalized over other variations in treatments, settings, or outcomes (Shadish et al., 2002)

Recommendations for Future Research

This study raises several issues that warrant further research. Many of the outcome variables examined in this report may be related to other factors that were not examined in this study. Further research should be conducted to examine if other variables such as SES, level of parental education, and disability status could contribute to the prediction of academic achievement. Additionally, a longitudinal design could be used to track the attainment of credentials over a longer period of time. For example, the academic records of students who entered LWTA in 2006 were examined up to eight years after entry (April, 2014) to see if they obtained an academic credential at any time during this period, while students who entered in 2011 were only tracked for three years.

It was noted that one hundred and seventy (170) students who only attended for two terms were omitted from the study. This warrants further investigation. It is recommended that further studies should analyze this group of students to understand the factors that may have

contributed to their early departure. For example, qualitative methods, such as exit interviews, could be used to reveal the reasons students depart early. A better understanding of why these students leave could be used to develop institutional actions that could be taken in order to retain these students.

The theoretical framework of institutional action is a comprehensive approach which contains a variety of components. It might be useful to attempt to determine which component(s) are the most effective and contribute the most to academic achievement. Another area recommended for future research is the role of major. Multilevel design would allow us to separate differences in student achievement related to individual characteristics (i.e. gender) from those related to school context factors such as major. It would be interesting to examine the course taking patterns that make up the student's first year to see how that may impact academic outcomes. For example, are there differences in first year GPA for students who take all academic classes versus those who take predominately technical coursework?

Efforts could be taken to measure other non-cognitive factors that may contribute to academic achievement such as self-efficacy. Self-efficacy influences the decisions people make and the courses of action they pursue (Pajares & Schunk, 2001). Not surprisingly, individuals are more inclined to engage in tasks about which they feel competent and confident and avoid those where they do not. Numerous researchers have found a positive link between self-efficacy and educational achievement at both the high school and college level (Chemers, Hu, & Garcia, 2001; Robbins, Zimmerman & Kinsantas, 2005; Malka & Covington, 2005; Robbins, et al., 2006; Galyon, Blondin, Yaw, Nalls, & Williams, 2012). There are commercially available psychometric tests with appropriate degrees of reliability and validity that could yield diagnostic information about a number of psychological and behavioral constructs that have been linked to

educational achievement at the high school and college level such as self-efficacy (Chemers, Hu, & Garcia, 2001). Specifically, these instruments could yield diagnostic information to help identify areas where the program could design interventions aimed at providing additional support and/or leveraging student strengths.

Additionally, a mixed methods design should be considered to reveal themes not detected in a quantitative study. According to Creswell (2009), this methodology is appropriate when neither the quantitative data nor the qualitative data alone are sufficient to fully illuminate the questions asked by the researcher. For example, student interviews could be conducted to elicit student voice in order provide a richer understanding of student perspectives and experiences. Yazzie-Mintz (2007) suggests that by listening to what students say about their perceptions of their school experiences, educators may better understand what students need and where improvements can be made to address those needs. Furthermore, an appropriate next step to consider would be a study with a randomized control design which would allow causal inference to be made about an intervention such as Gateway to College. However, while experimental studies with random assignment produce the strongest evidence (Gay et al., 2009) random assignment studies are not always feasible in educational settings. Rumrill, Cook, & Wiley (2011) suggest the use of a regression-discontinuity design (RDD) to evaluate program effects in educational settings when random assignment is not possible. RDD eliminates the need for a control group and rather assigns individuals to a treatment or control group based on calculation of a cutoff score. Though it should be noted that regression-discontinuity design requires a much larger sample size (Lee & Munk, 2008) and can have less statistical power than a random assignment study (Walters, Lareau, & Ranis, 2009).

Conclusion

Researchers, economists, and educators concur that educational attainment is the single most important antecedent to earning a family-sustaining wage and is a key factor in the nation's ability to remain competitive in an increasingly complex and global economy. There is an urgent need to increase educational attainment at both the high school and postsecondary levels.

Emerging research has indicated dual enrollment programs, including those designed for at-risk youth, have potential to improve educational attainment. Lake Washington Institute of

Technology has supported its dual enrollment technical high school for over 25 years. In doing so, the college has demonstrated a strong commitment to providing a concurrent pathway into higher education for high school age students. In the current higher education environment administrators are called on to effectively evaluate the extent to which all efforts are contributing to the mission of the institution. As noted by evaluation researcher Patton (1997), an institution must have a basis for deciding which things are worth doing when not everything can be done.

The findings of this study offer support to suggest that at-risk youth who experience the Gateway to College model at LWTA, with its extensive and deep constellation of supports, is worth doing. For these students, model does matter.

References

- Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college 2006*. Washington, DC: U.S. Department of Education. Retrieved from <http://www.ed.gov/rschstat/research/pubs/toolboxrevisited/toolbox.pdf>
- Agresti, A. (2007). *Introduction to categorical data analysis* (2nd ed). John Wiley & Sons, Inc., Hoboken, New Jersey.
- Ainley, M. (2012). Student's interest and engagement in classroom activities. In S. L. Christenson, A. L. Reschly, and C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 283-302). New York: Springer.
- Alexander, K., Entwisle, D., and Kabbani, N. (2001). The dropout process in life course perspective: Early risk factors at home and school. *Teachers College Record*, 103(5), 760–822.
- Allen, D. (1999). Desire to finish college: An empirical link between motivation and persistence. *Research in Higher Education*, 40(4), 461-485.
- Allen, D., & Dodger, M. (2012). Does dual enrollment increase students' success in college? Evidence from a quasi-experimental analysis of dual enrollment in New York City. *New Directions for Higher Education*, 11–19. doi:10.1002/ he.20010
- Allensworth, E. M., & Easton, J. Q. (2007). *What matters for staying on-track and graduating in Chicago public high schools: A close look at course grades, failures, and attendance in the freshman year*. Consortium on Chicago School Research at the University of Chicago: Retrieved from <https://ccsr.uchicago.edu/sites/default/files/publications/07%20What%20Matters%20Final.pdf>

- Alliance for Excellent Education. (2013). The effect of esea waiver plans on high school graduation rate accountability | all4ed.org
- Almeida, C., Steinberg, A., Santos, J., Le, C. (2010). *Six pillars of effective dropout prevention and recovery: An assessment of current state policies and how to improve it*. Retrieved from Jobs for the Future: <http://www.jff.org/publications/education/six-pillars-effective-dropout-prevention/1125>
- Alspaugh, J. (2000). The effect of transition grade to high school, gender, and grade-level upon dropout rates. *American Secondary Education*, 29(1), 2-9.
- American Association of Community Colleges. (2012, April). *Reclaiming the American dream: A report from the 21st century commission on the future of community colleges*. Retrieved from American Association of Community Colleges: https://www.insidehighered.com/sites/default/server_files/files/21stCentReport.pdf
- American School Counselor Association. (2012). *The ASCA national model: A framework for school counseling programs* (3rd ed.). Alexandria, VA:
- An, B. P. (2013). The impact of dual enrollment on college degree attainment: Do low-SES students benefit? *Educational Evaluation and Policy Analysis*, 35(4), 57–75. doi: 10.3102/0162373712461933
- Andrade, M. S. (2007). Learning communities: Examining positive outcomes. *Journal of College Student Retention: Research, Theory & Practice*, 9(1), 1-20.
- Andrews, H. A. (2004). Dual credit research outcomes for students. *Community College Journal of Research and Practices*, 28(5), 415-422.

- Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the student engagement instrument. *Journal of School Psychology, 44*(5), 427- 445.
- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools, 45*(5), 369-386.
- Archambault L., Janosz, M., Morizot J., & Pagani, L. S. (2009). Adolescent behavioral, affective, and cognitive engagement in school: Relationship to dropout. *The Journal of School Health, 79*(9), 408-415.
- Archambault, L., Janosz, M., Fallu, J. S., & Pagani, L. S. (2009). Student engagement and its relationship with early high school dropout, *Journal of Adolescence, 32*(3), 650-671.
doi: 10.1016/j.adolescence.2008.06.007
- Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel, 25*, 297-308.
- Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco: Jossey-Bass.
- Astin, A. W. (1996). Involvement in learning revisited: Lessons we have learned. *Journal of College Student Development, 37*(2), 123-134.
- Astin, A. W. & Antonio, A. L. (2012). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education* (2nd Ed). New York: Rowman & Littlefield.
- Aud, S., Wilkinson-Flicker, S., Kristapovich, P., Rathbun, A., Wang, X., & Zhang, J. (2013). *The Condition of Education 2013 (NCES 2013-037)*. U.S. Department of Education, National

- Center for Education Statistics. Washington, DC. Retrieved from <http://nces.ed.gov/pubsearch>.
- Auwarter, A. E., & Aruguete, M. S. (2008). Effects of student gender and socioeconomic status on teacher perceptions. *Journal of Educational Research, 101*(4), 242-246.
- Azen, R. & Walker, C. M. (2011). *Categorical data analysis for the behavioral and social sciences*. New York: NY. Taylor and Frances Group.
- Bailey, T. R. & Karp, M. M. (2003). *Promoting college access and success: A review of dual credit and other high school/college transition programs*. Washington, DC: U.S. Department of Education.
- Baime, D. (2011). Obama's best bet: \$5-billion for community colleges. *The Chronicle of Higher Education*. Retrieved from <http://chronicle.com/article/Obamas-Best-Bet-5-Billion/128990>
- Balfanz, R. (2007). *What your community can do to end its drop-out crisis: Learning from research and practice*. Retrieved from Johns Hopkins University: http://web.jhu.edu/CSOS/images/Final_dropout_Balfanz.pdf
- Balfanz, R., Bridgeland, J. M., Bruce, M., & Fox, J. (2012). *Building a Grad Nation: Progress and challenge in ending the high school dropout epidemic*. Retrieved from <http://www.edweek.org/media/14grad1.pdf>
- Balfanz, R., Bridgeland, J. M., Bruce, M., & Fox, J. (2013). *Building a Grad Nation: Progress and challenge in ending the high school dropout epidemic: Annual update*. Retrieved from <http://www.americaspromise.org/~media/Files/Our%20Work/Grad%20Nation/Building%20a%20Grad%20Nation/BuildingAGradNation2013Full.ashx>

- Balfanz, R., Bridgeland, J. M., Fox, J. H., DePaoli, J. L., Ingram, E. S., & Maushard, M. (2014). *Building a grad nation: Progress and challenge in ending the high school dropout epidemic* (Rep.). Retrieved from Civic Enterprises:
http://gradnation.org/sites/default/files/17548_BGN_Report_FinalFULL_5.2.14.pdf
- Balfanz, R., Bridgeland, J. M., Fox, J., & Moore, L. A. (2011). *Building a grad nation: Progress and challenge in ending the high school dropout epidemic 2010-2011 annual update*. Retrieved from
http://www.civicerprises.net/reports/building_a_grad_nation_2011_update.pdf
- Balfanz, R., & Byrnes, V. (2012). *Chronic absenteeism: Summarizing what we know from nationally available data*. Baltimore: Johns Hopkins University Center for Social Organization of Schools.
- Balfanz, R., Herzog, L., & MacIver, D. J. (2007). Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: Early identification and effective interventions. *Educational Psychologist, 42*(4), 223–235.
- Balfanz, R., Legters, N., West, T. C., & Weber, L. M. (2007). Are NCLB's measures, incentives, and improvement strategies the right ones for the nation's low-performing high schools? *American Educational Research Journal, 44*(3), 559–593.
doi: 10.3102/0002831207306768
- Barefoot, B. (2004). Higher education's revolving door: Confronting the problem of student dropout in US colleges and universities. *Open Learning, 19*(1), 9-18.
- Barnett, E. & Stamm, L. (2010). *Dual enrollment: A strategy for educational advancement of all students*. Retrieved from Blackboard Institute
http://www.blackboardinstitute.com/pdf/Bbinstitute_DualEnrollment.pdf

- Battin-Pearson, S., Newcomb, M. D., Abbott, R. D., Hill, K. G., Catalano, R. F., & Hawkins, J. D. (2000). Predictors of early high school dropout: A test of five theories. *Journal of Educational Psychology, 92*(3), 568-82.
- Beach, J. M. (2011). *Gateway to opportunity? A history of the community college in the United States*. Sterling, VA: Stylus Publishing, LLC.
- Bean, J. P. (2005). Nine themes of college student retention. In A. Seidman (Ed.), *College student retention: Formula for student success* (pp. 215-240). Westport, CT: Praeger.
- Belfield, C. R., & Crosta, P. M. (2012). *Predicting success in college: The importance of placement tests and high school transcripts*. Community College Research Center Teachers College, Columbia University, CCRC Working Paper No. 42
<http://hdl.handle.net/10022/AC:P:13086>
- Belfield, C. R., Levin, H. M., & Rosen, R. (2012). *The economic value of opportunity youth*. Retrieved from
http://www.civicenterprises.net/MediaLibrary/Docs/econ_value_opportunity_youth.pdf
- Berger, A. R., Adelman, N., & Cole, S. (2010). The Early College High School Initiative: An overview of five evaluation years. *Peabody Journal of Education, 85*(3), 333-347.
- Berger, A. R., Cole, S., Duffy, H., Edwards, S., Knudson, J., Kurki, A., Golden, L., ... SRI International. (2009). *Fifth annual early college high school initiative evaluation synthesis report. Six years and counting: The ECHSI matures*. American Institutes for Research. Washington: DC.
- Berger, A. R., Turk-Bicakci, L., Garet, M., Song, M., Knudson, J., ...& Stephan, J. (2013). *Early college, early success: Early College High School Initiative impact study*. Retrieved from American Institutes for Research.

- Berger, J. B., & Lyon, S. C. (2005). Past to present: A historical look at retention. In A. Seidman (Ed.), *College student retention: Formula for student success* (pp. 1-30). Westport, CT: Praeger.
- Bettinger, E., & Baker, R. (2011). The effects of student coaching in college: An evaluation of a randomized experiment in student mentoring (NBER Working Paper 16881). Cambridge, MA: National Bureau of Economic Research.
- Blackledge, A. (2011). *Building bridges workgroup: Report to the Legislature*. Retrieved from Washington State Legislature: <http://www.k12.wa.us/LegisGov/2011documents/BuildingBridges.pdf>.
- Blake, J. (1986). Number of siblings, family background, and the process of educational attainment. *Social Biology*, 33(1-2), 5-21.
- Bloom, D., Thompson, S. L., Ivry, R. (2010). *Building a learning agenda around disconnected youth*. Retrieved from mdrc: <http://www.mdrc.org/publications/545/abstract.html>
- Blustein, D. L. (1992). Applying current theory and research in career exploration to practice. *The Career Development Quarterly*, 4(2), 174–184. doi: 10.1002/j.2161-0045.1992.tb00368.x
- Bowen, H. R. (1997). *Investment in learning: The individual and social value of American higher education*. Baltimore: Johns Hopkins University Press.
- Bradburn, E. M. (2002). *Short-term Enrollment in Postsecondary Education: Student Background and Institutional Differences in Reasons for Early Departure, 1996-98, NCES 2003-153*. US Department of Education, National Center for Education Statistics. Retrieved from: <http://nces.ed.gov/pubs2003/2003153.pdf>

- Bradley, C. L., & Renzulli, L. A. (2011). The complexity of non-completion: Being pushed or pulled to drop out of high school. *Social Forces*, 90(2), 521-545.
- Braxton, J. M., Hirschy, A. S., & McClendon, S. A. (2004). *Understanding and Reducing College Student Departure. ASHE-ERIC Higher Education Report, 30, No. 3*. San Francisco, CA: Wiley Subscription Services.
- Bremer, C. D., Opsal, C., Hirschy, A., Castellano, M., Center, B., Geise, A., & Medhanie, A. (2011). *Relative impact of interventions to improve achievement and retention in postsecondary occupational programs*. Louisville, KY: National Research Center for Career and Technical Education, University of Louisville.
- Bridgeland, J. M., & Milano, J. A. (2012). *Opportunity road: The promise and challenge of America's forgotten youth*. Retrieved from http://www.civicenterprises.net/MediaLibrary/Docs/opportunity_road.pdf
- Brown, S. D., Lamp, K., Telander, K. J., & Hacker, J. (2012). Career development as prevention: Toward a social cognitive model of vocational hope. *The Oxford Handbook of Prevention in Counseling Psychology*.
- Buddin, R. (2012). *Implications of educational attainment trends for labor market outcomes*. ACT Research Report Series 2012 (7). Retrieved from http://media.act.org/documents/ACT_RR2012-7.pdf
- Bui, K. V. T. (2002). First-generation college students at a four-year university: Background characteristics, reasons for pursuing higher education, and first-year experiences. *College Student Journal*, 36, 3-11.
- Bureau of Labor Statistics. (2013), Labor Force Statistics (CPS), Retrieved from: <http://www.bls.gov/webapps/legacy/cpsatab4.htm>

- Cabrera, A. F., Burkum, K. R. & LaNasa, S. M. (2005). College student retention: A formula for student success. In A. Seidman (Ed.), *Pathways to a four-year degree: Determinants of transfer and degree completion* (pp. 155-214). Westport, CT: American Council on Education/Praeger Series on Higher Education.
- Came, D. (2012). Report to the Legislature: Graduation and dropout Statistics annual report 2010–11. Office of Superintendent of Public Instruction: Retrieved from http://www.k12.wa.us/LegisGov/2012documents/GradDropoutStats_2010-11.pdf
- Camera, W. J., & Echternacht, G. (2000). *The SAT[R] I and high school grades: Utility in predicting success in college. Research notes.* (College Entrance Examination Board Rep. No. CB-RN-10). New York, NY: The College Board.
- Carnevale, A. P, Jayasundera, T. & Hanson, A. R. (2012). *Career and technical education: Five ways that pay on the way to a B.A.* Georgetown University Center on Education and the Workforce: Retrieved from <https://cew.georgetown.edu/wp-content/uploads/2014/11/CTE.FiveWays.FullReport.pdf>
- Carnevale, A. P., Rose, S. J., & Hanson, A. R. (2012). *Certificates: Gateway to gainful employment and college degrees.* Georgetown University Center on Education and the Workforce: Retrieved from <https://cew.georgetown.edu/wp-content/uploads/2014/11/Certificates.FullReport.061812.pdf>
- Carnevale, A. P., Smith, N., Stone, J. R. III, Kotamraju, P., Steuernagel, B., & Green, K. (2011). *Career clusters: Forecasting demand for high school through college jobs, 2008-2018.* Washington, DC: Georgetown University Center on Education and the Workforce.

- Carnevale, A. P., Smith, N., & Strohl, J. (2010). *Help wanted: Projections of jobs and education requirements through 2018*. Retrieved from Georgetown University Center on Education and the Workforce: <http://cew.georgetown.edu/jobs2018/>
- Carnevale, A. P. & Strohl, J. (2013). *Separate and unequal: How higher education reinforces the intergenerational reproduction of white racial privilege*. Center of Education and the Workforce, Georgetown Public Policy Institute, Georgetown University. Retrieved from <http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/Separate&Unequal.FR.pdf>
- Chapman, C., Laird, J., Ifill, N., & KewalRamani, A. (2011). *Trends in high school dropout and completion rates in the United States: 1972 – 2009*. (Report No. NCES 2012-006). Retrieved from U.S. Department of Education, National Center for Education Statistics: <http://nces.ed.gov/pubs2011/2011012.pdf>
- Chemers, M. M., Hu, L., & Garcia, B. F. (2001). Academic self-efficacy and first-year college student performance and adjustment. *Journal of Educational Psychology*, 93(1), 55-64. doi: 10.1037//0022-0663.93.1.55
- Chen, X. (2005). *First generation students in postsecondary education: A look at their college transcripts*. (Report No. NCES 2005-171). Retrieved from U.S. Department of Education, National Center for Education Statistics: <http://nces.ed.gov/pubs2005/2005171.pdf>
- Chickering, A. W. & Gamson, Z. F. (1999). Development and adaptations of the seven principles for good practice in undergraduate education. *New Directions for Teaching and Learning*, 80, 75-81. doi: 10.1002/tl.8006

- Chithambo, T. P., Huey, S. J., & Cespedes-Knadle, Y. (2014). Perceived discrimination and Latino youth adjustment: Examining the role of relinquished control and sociocultural influences. *Journal of Latina/o Psychology, 2*(1), 54-66.
- Cho, S. W., & Karp, M. J. (2012). *Student success courses and educational outcomes at Virginia community colleges*. (CCRC Working Paper No. 40). New York, NY: Columbia University, Teachers College, Community College Research Center. Student Success Courses and Educational Outcomes at Virginia Community Colleges. Retrieved from: <http://hdl.handle.net/10022/AC:P:13084>
- Choy, S. P. (2001). *Students whose parents did not go to college: Postsecondary access, persistence, and attainment*. (Report No. NCES 2001-126). Retrieved from U.S. Department of Education, National Center for Education Statistics: <http://nces.ed.gov/pubs2001/2001126.pdf>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.
doi.org/10.1037/0033-2909.112.1.155
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.
- Conley, D. T. (2005). *College knowledge: What it really takes for students to succeed and what we can do to get them ready*. San Francisco, CA: Jossey-Bass.
- Crede, M., Roch, S. G., & Kieszczynka, U. M. (2010). Class attendance in college: A meta-analytic review of the relationship of class attendance with grades and student characteristics. *Review of Educational Research, 80*(2), 272-295.

- Christenson, S. L., & Thurlow, M. L. (2004). School dropouts: Prevention, considerations, interventions, and challenges. *Current Directions in Psychological Science, 13*(1), 36-39.
- Christenson, S. L., Reschly, A. L., & Wylie, C. (Eds.). (2012). *Handbook of research on student engagement*. New York: Springer.
- Crede, M., Roch, S. G., & Kieszczynka, U. M. (2010). Class attendance in college: A meta-analytic review of the relationship of class attendance with grades and student characteristics. *Review of Educational Research, 80*(2), 272-295.
- Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. Los Angeles, CA: Sage.
- Crisp, G. & Nora, A. (2010). Hispanic student success: Factors influencing the persistence and transfer decisions of Latino community college students enrolled in developmental education. *Research in Higher Education, 51*(2), 175-194.
- Crisp, G. & Taggart, A. (2013). Community college student success programs: A synthesis, critique, and research agenda. *Community College Journal of Research and Practice, 37*(2), 114-130.
- Crumpton, H. E. & Gregory, A. (2011). I'm not learning: The role of academic relevancy for low-achieving students. *Journal of Educational Research, 104*(1), 42-53. doi: 10.1080/00220670903567398
- Curtin, J. C., Winner, K., & Fuentes, N. (2010). *Massachusetts statewide proposal for the high school graduation initiative (HSGI) program*. Retrieved from Massachusetts Department of Elementary and Secondary Education: <http://www.doe.mass.edu/dropout/HSGINarrative.pdf>

- Davis, J. (2010). *The first generation student experience: Implications for campus practice, and strategies for improving persistence and success*. Sterling, Virginia: ACPA Publication Stylus Publishing
- DeBaun, D. & Roc, M. (2013). *Saving futures, saving dollars: The impact of education on crime reduction and earnings*. Retrieved from Alliance for Excellent Education:
<http://all4ed.org/wp-content/uploads/2013/09/SavingFutures.pdf>
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Diemer, M. A. & Blustein, D.L. (2006). Critical consciousness and career development among urban youth. *Journal of Vocational Behavior, 68*(2), 220-232.
- Deschenes, S., Cuban, L. & Tyack, D. (2001). Mismatch: Historical perspectives on schools and students who don't fit them. *Teachers College Record, 103*(4), 525-547.
- DesJardins, S. L., Kim, D., & Rzonca, C. S. (2003). A nested analysis of factors affecting bachelor's degree completion. *Journal of College Student Retention, 4*(4), 407-435.
- Doll, J., Eslami, Z., & Walters, L. (2013). Understanding why students drop out of high school, according to their own reports: Are they pushed or pulled, or do they fall out: a comparative analysis of seven nationally representative studies, *SAGE Open, 3*(4), 1–15. doi:
10.1177/2158244013503834
- Dowd, A. C. (2005). *Data don't drive: Building a practitioner-driven culture of inquiry to assess community college performance*. Retrieved from Lumina Foundation:
<http://www.luminafoundation.org/publications/datadontdrive2005.pdf>
- Duncan, A. (2012, April 19). *U.S. Department of Education releases blueprint to transform career and technical education* [Press release]. Retrieved from <http://ed.gov/news/press-releases/us-department-education>.

- Engrossed Second Substitute House Bill 1418, Chapter 20, Laws of 2010. 61st Legislature, Washington State, 2010 Regular Session. Retrieved from Washington State Legislature: <http://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bills/Session%20Law%202010/1418-S2.SL.pdf>
- Education Trust. (2001). Youth at the crossroads: Facing high school and beyond. *Thinking K-16*, 5(1). Retrieved from http://www.edtrust.org/sites/edtrust.org/files/publications/files/k16_winter01.pdf
- Education Week. (2012). *Diplomas count 2012: Graduation by the numbers*. Retrieved from <http://www.edweek.org/ew/toc/2012/06/07/>
- Edmunds, J. A., Willse, J., Bartz, D., Scales, W. D., Dallas, A., Bernstein, L., Glennie, E., ... Silberman, T. (2010). Preparing students for college: The implementation and impact of the early college high school model. *Peabody Journal of Education*, 85(3), 348-364.
- Edmunds, J. A., Bernstein, L., Unlu, F., Glennie, E., Willse, J., Smith, A., & Arshavsky, N. (2012). Expanding the start of the college pipeline: Ninth grade findings from an experimental study of the impact of the Early College High School model. *Journal of Research on Educational Effectiveness*, 5(2), 136-159. doi: 10.1080/19345747.2012.656182
- Edmunds, J. A., Willse, J., Arshavsky, N., & Dallas, A. (2013). Mandated engagement: The impact of early college high schools. *Teachers College Record*, 115(7), 1-31. Retrieved from <http://www.tcrecord.org> ID Number: 17044.
- Ensminger, M. E., Lamkin, R. P., & Jacobson, N. (1996). School leaving: A longitudinal perspective including neighborhood effects. *Child Development*, 67(5), 2400-2416.

- Engle, J. (2007). Postsecondary access and success for first-generation college students. *American Academic*, 3(1), 25-48.
- Engle, J., Bermeo, A., & O'Brien, C. (2006). Straight from the source: What works for first-generation college students. Washington, DC: Pell Institute for the Study of Opportunity in Higher Education.
- Engstrom, C. & Tinto, V. (2008). Learning better together: The impact of learning communities on the persistence of low-income students. *Opportunity Matters*, 1,5-21. Retrieved from http://www.sdbor.edu/services/studentaffairs/documents/LearningBetterTogether_Engstrom-Tinto-2008.pdf
- Erikson, E. H. (1968). *Identity, youth and crisis*. New York: W. W. Norton Company.
- ESD113, (2009, January 14). *K-12 education: An agenda for change*. Retrieved from: <http://esd113.org/cms/lib3/WA01001093/Centricity/Domain/172/Supt%20Dorns%20Policy%20Priorities.pdf>
- Escobedo, G. (2007). A retention / persistence intervention model : Improving success across cultures. *Journal of Developmental Education*, 31(1), 12-37.
- Estell, D. B., & Perdue, N. H. (2013). Social support and behavioral and affective school engagement: The effects of peers, parents and teachers. *Psychology in the Schools*, 50(4), 325-339. doi: 10.1002/pits.21681
- Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Keyes, T. S., Johnson, D. W., & Beechum, N. O. (2012). *Teaching adolescents to become learners. The role of noncognitive factors in shaping school performance: A critical literature review*. Chicago, IL: University of Chicago Consortium on Chicago School Research. Retrieved from: <https://ccsr.uchicago.edu/sites/default/files/publications/>

Noncognitive%20Report.pdf

- Feilzer, M. Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4(1), 6-16. doi: 10.1177/1558689809349691
- Field, A. (2009). *Discovering statistics using SPSS*. London, England: Sage Publications.
- Finn, J. D. (1989). Withdrawing from school. *Review of Educational Research*, 59(2), 117-142.
- Finn, J. D. (2006). *The adult lives of at-risk students: The roles of attainment and engagement in high school*. (NCES 2006-328). U.S. Department of Education, Washington, DC: National Center for Education Statistics.
- Finn, J. D., & Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter? In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 97-131). New York: Springer.
doi: 10.1007/978-1-4614-2018-7
- Fitz-Gibbon, T. C., & Lyons, M. L. (1996). Theory-based evaluation. *American Journal of Evaluation*, 17(2), 177-184.
- Flanagan, C., & Levine, P. (2010). Civic engagement and the transition to adulthood. *The Future of Children*, 20(1), 159-179.
- Fleischman, S., & Heppen, J. (2009). Improving low-performing high schools: Searching for evidence of promise. *The Future of Children*, 19(1), 105-133.
- Flum, H., & Kaplan, A. (2006). Exploratory orientation as an educational goal. *Educational Psychologist*, 41(2), 99-110.
- Foote, E. (1997). *Collaborative learning in community college*. Retrieved from ERIC database. (ED411023).

- Fraenkel, J. R., & Wallen, N. E. (2006). *How to design and evaluate research in education* (6th ed.). Boston: McGraw Hill.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59-109.
- Fredricks, J., McColskey, W., Meli, J., Mordica, J., Montrosse, B., and Mooney, K. (2011). *Measuring student engagement in upper elementary through high school: a description of 21 instruments*. (Issues & Answers Report, REL 2011–No. 098). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southeast. Retrieved from <http://ies.ed.gov/ncee/edlabs>.
- Freire, P. (1974). *Education for critical consciousness*. London, England: Continuum.
- Ferguson, C. J. (2009). An effect size primer: A guide for clinicians and researchers. *Professional Psychology: Research and Practice*, 40(5). doi: 10.1037/a0015808
- Furlong, M. J., & Christenson, S. L. (2008). Engaging students at school and with learning: A relevant construct for all students. *Psychology in the Schools*, 45(5), 365-368. doi: 10.1002/pits.20302
- Galyon, C. E., Blondin, C. A., Yaw, J. S., Nalls, M. L., & Williams, R. L. (2012). Relationship of academic self-efficacy to class participation and exam performance. *Social Psychology of Education*, 15(2), 233-249. doi: 10.1007/s11218-011-9175-x
- Gateway to College National Network. (2013) *Ten years of impact: 2013 Annual report*. Retrieved from http://www.gatewaytocollege.org/pdf/GTCNN_AnnualReport2013_10_years_of_impact.pdf

- Gateway to College National Network. (2015). *Building futures: A policy agenda to improve educational outcomes for young adults*. Retrieved from http://www.gatewaytocollege.org/pdf/GTC_Policy%20Agenda_long.pdf
- Gay, L. R., Mills, G. E., & Airasian, P. W. (2009). *Educational research: Competencies for analysis and applications*. Upper Saddle River, N.J: Merrill/Pearson.
- Ginsberg, M. B. & Wlodkowski, R. J. (2009). *Diversity and motivation: Culturally responsive teaching in college*. San Francisco, CA: Jossey-Bass.
- Gleason, P., & Dynarski M. (2002). Do we know whom to serve? Issues in using risk factors to identify dropouts. *Journal of Education for Students Placed at Risk*, 7(1), 25-41.
- Goldberger, S. (2007). Doing the math: What it means to double the numbers of low-income college graduates. In N. Hoffman, J. Vargas, A. Venezia, & M. Miller (Eds.), *Minding the gap: Why integrating high school with college makes sense and how to do it* (pp. 27–42). Cambridge, MA: Harvard Education Press.
- Goldschmidt, P., & Wang, J. (1999). When can schools affect dropout behavior? A longitudinal multilevel analysis. *American Educational Research Journal*, 36(4), 715-738.
- Goldrick-Rab, S. (2010). Challenges and opportunities for improving community college student success. *Review of Educational Research*, 80(3), 437-469.
doi: 10.3102/0034654310370163
- Graunke, S. S. & Woosley, S. A. (2005). An exploration of the factors that affect the academic success of college sophomores. *College Student Journal*, 39(2), 367-376.
- Greenwood, C. R., Horton, B. T., & Utley, C. A. (2002). Academic engagement: Current perspectives on research and practice. *School Psychology Review*, 31(3), 328-349.
- Greeno, J. G. (1994). Gibson's affordances. *Psychological Review*, 101(2), 336-342.

- Habley, W.R., Bloom, J.L., & Robbins, S. (2012). *Increasing persistence: Research-based strategies for college student success*. San Francisco, CA: Jossey-Bass.
- Hagedorn, L. S. (2005). Transcript analyses as a tool to understand community college student academic behaviors. *Journal of Applied Research in the Community College*, 13(1), 45-57.
- Hagedorn, L. S. (2005). How to define retention: A new look at an old problem. In A. Seidman (Ed.), *College student retention: Formula for student success* (pp. 89-105). Westport, CT: Praeger.
- Hammond, C., Linton, D., Smink, J. & Drew, S. (2007). *Dropout risk factors and exemplary programs: A technical report*. Retrieved from National Dropout Prevention Center: <http://www.dropoutprevention.org/major-research-reports/dropout-risk-factors-exemplary-programs-technical-report>
- Hamrick, F. A., Evans, N. J., & Schuh, J. H. (2002). *Foundations of students affairs practice: How philosophy, theory and research strengthen educational outcomes*. San Francisco, CA: Jossey-Bass.
- Hulleman, C. S., & Harackiewicz, J. M. (2009). Promoting interest and performance in high school science classes. *Science*, 326(5958), 1410-1412.
- Harper, S. R., & Quaye, S. J. (Eds.). (2009). *Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations*. New York: Routledge.
- Harper, S. R., Davis, R. J., Jones, D. E., McGowan, B. L., Ingram, T. N., & Platt, C. S. (2011). Race and racism in the experiences of Black male resident assistants at predominantly

- white universities. *Journal of College Student Development*, 52(2), 180-200. doi:
10.1353/csd.2011.0025
- Heckman, J. J., Lafontaine, P. A. (2010). The American high school graduation rate: Trends and levels. *Review of Economics and Statistics*, 92(2), 244– 262.
- Herrera, C., DuBois, D. L., & Grossman, J. B. (2013). *The role of risk: Mentoring experiences and outcomes for youth with varying risk profiles*. New York, NY: MDRC.
- Hess, R. S. & Copeland, E. P. (2001). Students' stress, coping strategies, and school completion: A longitudinal perspective. *School Psychology Quarterly*, 16(4), 389-405.
- Hickman, G. P., Bartholomew, M., Mathwig, J., & Heinrich, R. S. (2008). Differential developmental pathways of high school dropouts and graduates. *Journal of Educational Research*, 102(1), 3-14.
- Hirschy, A. S., Bremer, C. D., & Castellano, M. (2011). Career and technical education (CTE) student success in community colleges: A conceptual model. *Community College Review*, 39(3), 296-318. doi:10.1177/0991552111416349
- Hoffman, N. (2003). College credit in high school. *Change*, 35(4), 42-48.
- Hoffman, N. (2005). *Add and subtract: Dual enrollment as a state strategy to increase postsecondary success for underrepresented students*. Boston, MA: Jobs for the Future.
- Hoffman, J. L., & Lowitzki, K. E. (2007) Predicting college success with high school grades and test scores: Limitations for minority students. *The Review of Higher Education*, 28(4), 455-474.

- Hoffman, N., Vargas, J., Venezia, A. & Miller, M. S. (2007). *Minding the Gap: Why integrating high school with college makes sense and how to do it*. Massachusetts: Harvard Education Press.
- Hoffman, N., Vargas, J., & Santos, J. (2008). *On ramp to college: A state policymaker's guide to dual enrollment*. Retrieved from <http://www.jff.org/sites/default/files/OnRamp.pdf>
- Hoffman, N., Vargas, J., & Santos, J. (2009). New directions for dual enrollment: Creating stronger pathways from high school through college. *New Directions for Community Colleges, 145*, 43-58.
- Hooker, S., & Brand, B. (2010). College knowledge: A critical component of college and career readiness. *New Directions for Youth Development, 127*, 75-86. doi:10.1002/yd
- Horn, S.K. (1997). Ideas in practice: Extending collaboration beyond the developmental classroom. *Journal of Developmental Education, 21*(2), 26-33.
- Hosch, B. (2008). *Institutional and student characteristics that predict graduation and retention rates*. North East Association for Institutional Research Annual Meeting. Retrieved from:
http://web.ccsu.edu/uploaded/departments/AdministrativeDepartments/Institutional_Research_and_Assessment/Research/20081104a.pdf
- Hosmer, D. W., & Lemeshow, S. (2000). *Applied logistic regression (Wiley series in probability and statistics)*. New York, NY: John Wiley & Sons.
- Hu, S., & Kuh, G. D. (2002). Being (dis)engaged in educationally purposeful activities: The influences of student and institutional characteristics. *Research in Higher Education, 43*(5), 555-575.

- Hubert, M. (2012). Report to the Legislature: Dual credit programs 2012. Retrieved from <https://www.k12.wa.us/LegisGov/2013documents/DualCreditPrograms.pdf>
- Hughes, K. L. (2010). Dual Enrollment: Postsecondary/Secondary partnerships to prepare Students. *Journal of College Science Teaching*, 39(6), 12-13.
- Hughes, K. L., Karp, M., Fermin, & Bailey, B. J. (2006). *Pathways to college access and success*. Community College Research Center, Teachers College, Columbia University.
- Hughes, K. L., Rodriguez, O., Edwards, L., & Belfield, C. (2012). *Broadening the benefits of dual enrollment: Reaching underachieving and underrepresented students with career-focused programs*. New York: Community College Research Center, Teachers College, Columbia University.
- Hurtado, S., and Carter, D. F. (1997). Effects of college transition and perceptions of the campus racial climate on Latino college students' sense of belonging. *Sociology of Education*, 70(4), 324–345.
- Hurtado, S., Alvarez, C. L., Guillermo-Wann, C., Cuellar, M., & Arellano, L. (2012). A model for diverse learning environments: The scholarship on creating and assessing conditions for student success. In J. C. Smart, & M. B. Paulsen (Eds.), *Higher education: Handbook of theory and research*, Volume 27 [E-reader version] (pp.41-122). doi: 10.1007/978-94-007-2950-6
- Hurtado, S., & Guillermo-Wann, C. (2013). *Diverse Learning Environments: Assessing and Creating Conditions for Student Success – Final Report to the Ford Foundation*. University of California, Los Angeles: Higher Education Research Institute.
- Ikomi, P. A. (2010). Juvenile violent felony referrals and high school dropouts: Is there a relationship? *International Journal of Academic Research*, 2(4), 379-384.

- Ingels, S. J., Curtin, T. R., Kaufman, P., Alt, M. N., & Chen, X. (2002). *Coming of age in the 1990s: The Eighth-grade class of 1988 12 Years Later*. NCES 2002-321. Washington, D.C.: U.S. Department of Education, National Center for Education Statistics.
- Ishitani, T. T. (2003). A longitudinal approach to assessing attrition behavior among first-generation students: Time-varying effects of pre-college characteristics. *Research in Higher Education, 44*(4), 433-449.
- Jacobson, J. (2005). The early college experiment. *Chronicle of Higher Education, 51*(27), 36-38.
- Jenkins, D., & Rodriguez, O. (2013). Access and success with less: Improving productivity in broad-access postsecondary institutions. *The Future of Children, 23*(1), 187-209.
- Jenkins, D. & Cho, S. (2012). *Get with the program: Accelerating community college students' entry into and completion of programs of study*. (CCRC Working Paper No. 32). New York, NY: Columbia University, Teachers College, Community College Research Center. Retrieved from <http://ccrc.tc.columbia.edu/Publication.asp?UID=885>
- Jenkins, D., Wachen, J., Kerrigan, M. R., & Mayer, A. K. (2012). *Progress in the first five years: An evaluation of Achieving the Dream colleges in Washington State*. Retrieved from <http://sparkaction.org/resources/124456>
- Jensen, M., Johnson, D. W., & Johnson, R. T. (2002). Impact of positive interdependence during electronic quizzes on discourse and achievement. *The Journal of Educational Research, 95*(3), 161-166. Retrieved from: <http://www.jstor.org/stable/27542374>
- Jimerson, S. R., Campos, E., & Greif, J. L. (2003). Toward an understanding of definitions and

- measures of school engagement and related terms. *California School Psychologist*, 8(1), 7-27.
- Jimerson, S. R., Egeland, B., Sroufe, L. A., & Carlson, B. (2000). A prospective longitudinal study of high school dropouts: Examining multiple predictors across development. *Journal of School Psychology*, 38(6), 525–549. doi:10.1016/S0022-4405(00)00051-0
- Johnson, T. E., Hickman, M., & Hulst, T. (2009). *Technical high school feasibility report: Final report to the Legislature Second Substitute Senate Bill 6377 Section 308* (Report No. 09-Pub010). Retrieved from Office of Superintendent of Public Instruction: <http://www.k12.wa.us/LegisGov/2009documents/TechnicalHighSchoolFeasibilityStudySeptember2009.pdf>
- Jordan, W. A., Lara, J., & McPartland, J. M. (1996). Exploring the causes of early dropout among race-ethnic and gender groups. *Youth & Society*, 28(1), 62-94. doi: 10.1177/0044118X96028001003
- Karp, M., Bailey, T., Hughes, K., & Fermin, B. (2004). *State dual enrollment policies: Addressing access and quality*. U.S. Department of Education. Washington, DC: Office of Adult and Vocational Education.
- Karp, M. M., Calcagno, J. C., Hughes, K. L., Jeong, D. W., & Bailey, T. R. (2007). *The postsecondary achievement of participants in dual enrollment: An analysis of student outcomes in two states*. National Research Center for Career and Technical Education. Retrieved from Community College Research Center <http://ccrc.tc.columbia.edu/media/k2/attachments/dual-enrollment-student-outcomes.pdf>

- Kezar, A. J., & Kinzie, J. L. (2006). Examining the ways institutions create student engagement: The role of mission. *Journal of College Student Development*, 42(2), 149-172. doi: 10.1353/csd.2006.0018
- Kleiner, B. & Lewis, L. (2005). *Dual enrollment of high school students at postsecondary institutions: 2002-03* (NCES 2005-008). Retrieved from National Center for Education Statistics: <http://nces.ed.gov/pubs2005/2005008.pdf>
- Kirsch, I. S., Braun, H. I., Yamamoto, K., & Sum, A. (2007). *America's perfect storm: Three forces changing our nation's future*. Retrieved from Educational Testing Service: http://www.ets.org/Media/Education_Topics/pdf/AmericasPerfectStorm.pdf
- Kitchener, K. S. (1983). Cognition, metacognition, and epistemic cognition: A three-level model of cognitive processing. *Human Development*, 26, 222–232.
- Knapp, L.G., Kelly-Reid, J. E., and Ginder, S. A. (2011). Enrollment in Postsecondary Institutions, Fall 2009; Graduation Rates, 2003 & 2006 Cohorts; and Financial Statistics, Fiscal Year 2009 (NCES 2011-230). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from <http://nces.ed.gov/pubsearch>
- Knapp, L. G., Kelly-Reid, J. E., and Ginder, S. A. (2012). *Enrollment in Postsecondary Institutions, Fall 2011; Financial Statistics, Fiscal Year 2011; and Graduation Rates, Selected Cohorts, 2003–2008: First Look (Provisional Data)* (NCES 2012-174rev). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from: <http://nces.ed.gov/pubsearch>
- Kortering, L. J., & Braziel, P. (2008). Engaging youth in school and learning: The emerging key to school success and completion. *Psychology in the Schools*, 45(5), 461–465. doi: 10.1002/pits.20309

- Kortering, L. J., & Christenson, S. (2009). Engaging students in school and learning: The real deal for school completion. *Exceptionality, 17*(1), 5-15.
- Kuh, G. D. (2001). Organizational culture and student persistence: Prospects and puzzles. *Journal of College Student Retention, 3*(1), 23-39.
- Kuh, G. D. (2003). What we're learning about student engagement from NSSE: Benchmarks for effective educational practice. *Change, 35*(2), 24-32.
- Kuh, G. D. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter*. Washington, DC: Association of American Colleges and Universities.
- Kuh, G. D., Kinzie, J., Cruce, T., Shoup, R., & Gonyea, R. M. (2007). *Connecting the dots: Multi-faceted analysis of the relationships between students engagement results from the NSSE, and the institutional practices and conditions that foster student success*. Retrieved from the Center for Postsecondary Research,
- Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on first-year college grades and persistence. *The Journal of Higher Education, 79*(5), 540-563.
- Lake Washington School District History of our Schools: Honoring the past, imagining the future* (2005). Retrieved <http://www.lwsd.org/SiteCollectionDocuments/About-Us/HistoryofLWSD.pdf>
- Lardner, E., & Malnarich, G. (2008). A new era in learning community work: Why the pedagogy of intentional integration matters. *Change, 40*(4), 30-37.
- Lee, H. and Munk, T. (2008). Using regression discontinuity design for program evaluation.

- Section on Survey Research Methods, 1675-1682*. Retrieved from <https://www.amstat.org/sections/srms/proceedings/y2008/Files/301149.pdf>
- Lee, V. E., & Burkam, D. T. (2003). Dropping out of high school: The role of school organization and structure. *American Educational Research Journal*, 40(2), 353-393.
- Lee, J. M., Edwards, K., Menson, R., & Rawls, A. (2011). *The college completion agenda: 2011 progress report*. Retrieved from <http://eric.ed.gov/ERICWebPortal/recordDetail?accno=ED524574>
- Lehr, C. A., Hansen, A., Sinclair, M. F., Christenson, S. L. (2003). Moving beyond dropout towards school completion: An integrative review of data-based interventions. *School Psychology Review*, 32(3), 342-364.
- Lehr, C. A., Johnson, D. R., Bremer, C. D., Cosio, A., & Thompson, M. (2004). *Essential tools: Increasing rates of school completion: Moving from policy and research to practice*. Retrieved from National Center on Secondary Education and Transition <http://www.ncset.org/publications/essentialtools/dropout/dropout.pdf>
- Lerner, R. M. (2002). *Concepts and theories of human development* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lochner, L., & Moretti, E. (2004). The effect of education on crime: Evidence from prison inmates, arrests and self-reports. *American Economic Review*, 94(1), 155-89.
- Locks, A. M., Hurtado, S., Bowman, N. A., & Oseguera, L. (2008). Extending notions of campus climate and diversity to students' transition to college. *The Review of Higher Education*, 31(3), 257-285.

- Losen, D. J. (2011). *Discipline policies, successful schools, and racial justice*. Boulder, CO: National Education Policy Center. Retrieved from <http://nepc.colorado.edu/publication/discipline-policies> ,
- Lotkowski, V. A., Robbins, S. B., Noeth, R. J. (2004). *The role of academic and non-academic factors in improving college retention*. ACT Policy Report: Retrieved from http://www.act.org/research/policymakers/pdf/college_retention.pdf
- Lumina Foundation. (2013). *Lumina Foundation Strategic Plan 2013 to 2016*, Retrieved from http://www.luminafoundation.org/advantage/document/goal_2025/2013-Lumina_Strategic_Plan.pdf
- Malka, A. & Covington, M. V. (2005). Perceiving school performance as instrumental to future goal attainment: Effects on graded performance. *Contemporary Educational Psychology*, 30(1), 60-80. doi: 10.1016/j.cedpsych.2004.04.001
- Marken, S., Gray, L., & Lewis, L. (2013). *Dual enrollment programs and courses for high school students at postsecondary institutions: 2010–11 (NCES 2013-002)*. U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved [date] from <http://nces.ed.gov/pubsearch>.
- Matthews, D. (2013). *A stronger nation through higher education: Visualizing data to help us achieve a big goal for college attainment*. Lumina Foundation. Retrieved from http://www.luminafoundation.org/publications/A_stronger_nation_through_higher_education-2013.pdf
- Meacham, J. A., & Emont, N. M. (1989). The interpersonal basis of everyday problem solving. In Sinnott, J.D. (Ed.), *Everyday problem solving: Theory and applications* (pp. 7–23). New York: Praeger.

- Mehta, S., Newbold, & O'Rourke, M. A. (2011). Why do first generation students fail? *College Student Journal*, 45(1), 20-35.
- Meyers, L. S., Gamst, G., & Guarino, A. J. (2006). *Applied multivariate research: design and interpretation*. Thousand Oaks: Sage Publications.
- Moore, C. & Shulock, N. (2011). *Sense of direction: The importance of helping community college students select and enter a program of study*. Institute for Higher Education Leadership and Policy, California State University, Sacramento, CA. Retrieved from: http://www.csus.edu/ihelp/PDFs/R_Sense_of_Direction.pdf
- National Research Council and Institute of Medicine. (2004). *Engaging schools: Fostering high school students motivation to learn*. Washington, DC: The National Academies Press.
- Neild, R. C., Stoner-Eby, S., & Furstenberg, F. (2008). Connecting entrance and departure. *Education and Urban Society*, 40(5), 543-569.
- Newman, F. M., Wehlage, G. G., & Lamborn, S. D. (1992). The significance and sources of student engagement. In F.M. Newmann (Ed.), *Student engagement and achievement in American secondary schools* (pp. 11-39). New York Teachers College Press.
- No Child Left Behind. (2008). High School Graduation Rate: *Non-Regulatory Guidance*. Retrieved from U.S. Department of Education: <http://www2.ed.gov/policy/elsec/guid/hsgrguidance.pdf>
- Noble, J., & Sawyer, R. (2004). Is high school gpa better than admission test scores for predicting academic success in college?. *College and University*, 79(4), 17-22.
- Nodine, T. (2009). *Innovations in college readiness: How Early College schools are preparing students underrepresented in higher education for college success*. Retrieved from Jobs for the Future: <http://www.jff.org/sites/default/files/publications/>

Innovations_in_College_Readiness_PDFVersion_102909.pdf

- Noel-Levitz. (2013). *2013 student retention indicators benchmark report for four-year and two-year institutions*. Retrieved from https://www.noellevitz.com/documents/gated/Papers_and_Research/2013/2013_Retention_Indicators.pdf?code=4221481220201361
- Nora, A., & Cabrera, A. F. (1996). The role of perceptions of prejudice and discrimination on the adjustment of minority students to college. *The Journal of Higher Education*, 67(2), 119-148.
- Obama, B. Remarks of President Barak Obama-Address to joint session of Congress. (2009) http://www.whitehouse.gov/the_press_office/Remarks-of-President-Barack-Obama-Address-to-Joint-Session-of-Congress/
- Office of the Press Secretary. (2012, February 13). *Fact sheet: A blueprint to train two million workers for high-demand industries through a community college to career fund*. [Press release]. Retrieved from <http://www.whitehouse.gov/the-press-office/2012/02/13/fact-sheet-blueprint-train-two-million-workers-high-demand-industries>
- O’Gara, L., Karp, M. M., & Hughes, K. L. (2009). Student success courses in the community college: An exploratory study of student perspectives. *Community College Review*, 36(3), 195-218. doi: 10.1177/0091552108327186
- Oregon Revised Statutes Volume 9, Section 336.615-665. Retrieved from: <http://www.leg.state.or.us/ors/336.html>
- Oseguera, L., & Rhee, B. S. (2009). The influence of institutional retention climates on student persistence to degree completion: A multilevel approach. *Research in Higher Education*, 50(6), 545-569. doi:10.1007/s11162-009-9134-y

- Ozer, E. J., Wolf, J. P., & Kong, C. (2008). Sources of perceived school connection among ethnically-diverse urban adolescents. *Journal of Adolescent Research, 23*(4), 438–470. doi:10.1177/0743558408316725
- Pace, C. R., & Stern, G. G. (1958). An approach to the measurement of psychological characteristics of college environments. *Journal of Educational Psychology, 49*(5), 269-277. Retrieved from <http://dx.doi.org/10.1037/h0047828>
- Pajares, F. & Schunk, D.H. (2001). Self-beliefs and school success: Self-efficacy, Self- concept, and school achievement. In R.Riding & S.Rayner (Eds.), *Perception* (pp. 239-266).London: Ablex Publishing.
- Pascarella, E. T. (1980). Student-faculty informal contact and college outcomes. *Review of Educational Research, 50*(4), 545-595.
- Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students*. San Francisco, CA: Jossey-Bass.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* (Vol. 2). San Francisco, CA: Jossey-Bass.
- Pallant, J. (2010). *SPSS survival manual: A step by step guide to data analysis using SPSS* (4th ed.). Maidenhead: Open University Press/McGraw-Hill.
- Patterson, M., Zhang, J., Song, W., & Guison-Dowdy, A. (2010). *Crossing the bridge: GED credentials and postsecondary educational outcomes year one report*. Washington, DC: American Council on Education.
- Patton, M.Q. (1997). *Utilization-focused evaluation* (3rd ed.) , Thousand Oaks, CA: Sage.
- Patton, M. Q. (2008). *Utilization-focused evaluation*. (4th ed.). Los Angeles, CA: Sage.

- Peng, C., Lee, K., & Ingersoll, G. (2002). An introduction to logistic regression analysis and reporting. *Journal of Educational Research, 96*(1), 3-13.
- Perry, J. C. (2008). School engagement among urban youth of color: Criterion pattern effects of vocational exploration and racial identity. *Journal of Career Development, 34*(4), 397-422. doi: 10.1177/0894845308316293
- Phillippe, K. A., & Valiga, M. J. (2000). Faces of the future: A portrait of America's community college students. Summary findings. Washington, DC: American Association of Community Colleges. (ERIC Document Reproduction Service No. ED439760)
- Pittman, L. D., & Richmond, A. (2007). Academic and psychological functioning in late adolescence: The importance of school belonging. *The Journal of Experimental Education, 75*(4), 270-290. doi:10.3200/JEXE.75.4.270-292
- Rassen, E., Chaplot, P., Jenkins, D., and Johnstone, R. (2013). *Understanding the student experience through the loss-momentum framework: clearing the path to completion*. Berkeley, CA: The Research and Planning Group for California Community Colleges. Retrieved from: www.rpgroup.org/sites/default/files/CbD-Understanding.pdf
- Reardon, S. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In G. Duncan, & R. Murnane (Eds.), *Whither opportunity?. Rising inequality, schools, and children's life chances* (pp. 91-116). New York, NY: Russell Foundation.
- Reason, R. D. (2003). Student variables that predict retention: Recent research and new developments. *NASPA Journal, 40*, 172-191.
- Reason, R. D. (2009a). An examination of persistence research through the lens of a comprehensive conceptual framework. *Journal of College Student Development, 50*(6),

- 659-682. Retrieved from
<http://muse.jhu.edu/journals/csd/summary/v050/50.6.reason.html>
doi: 10.1353/csd.0.0098
- Reason, R. D. (2009b). Student variables that predict retention: Recent research and new developments. *NASPA Journal*, 46(3), 482-501.
- Rendón, L. I. (1994). Validating culturally diverse students: Toward a new model of learning and student development. *Innovative Higher Education*, 19(1), 33-51.
- Rendón, L. I. (2006). *Reconceptualizing success for underserved students in higher education*. National Postsecondary Education Cooperative: Retrieved from
http://nces.ed.gov/npec/pdf/resp_Rendon.pdf
- Rendón, L. I., Jalomo, R., E., & Nora, A. (2000). Theoretical considerations in the study of minority student retention in higher education. In J. M. Braxton (Ed.), *Reworking the student departure puzzle* (pp. 127–156). Nashville, TN: Vanderbilt University Press.
- Reschly, A. L. & Christenson, S. L. (2012). Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construct . In S. L. Christenson, A. L. Reschly, and C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 3-19). New York: Springer.
- Reynolds, A. L., Sneva, J. N., & Beehler, G. P. (2010). The influence of racism-related stress on the academic motivation of black and Latino/a students. *Journal of College Student Development*, 51(2), 135-149.
- Rhee, B. S. (2008). Institutional climate and student departure: A multinomial multilevel modeling approach. *The Review of Higher Education*, 31(2), 161–183.
- Rider, S., Winters, K., & Neilson, T. (2012). *Gateway to College: Evaluation of post-secondary attainment graduates*. Pacific Research & Evaluation.

- Robbins, S., Allen, J., Casillas, A., Peterson, C., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. *Journal of Educational Psychology, 98*(3), 598-616. doi: 10.1037/0022-0663.98.3.598
- Roderick, M. (2006). *Closing the aspirations-attainment gap: Implications for high school reform a commentary from Chicago*. Retrieved from http://www.mdrc.org/sites/default/files/full_59.pdf
- Rodriguez, L. F., & Conchas, G. Q. (2008). Preventing truancy and dropout among urban middle school youth: Understanding community-based action from the student's perspective. *Education and Urban Society, 41*(2), 216-247. doi:10.1177/0013124508325681
- Rogers, P. J. (2008). Using programme theory to evaluate complicated and complex aspects of interventions. *Evaluation, 14*(1), 29-48. doi: 10.1177/1356389007084674
- Rosenbaum, J. (2012). Degrees of health disparities: Health status disparities between young adults with high school diplomas, sub-baccalaureate degrees, and baccalaureate degrees. *Health Services Outcomes and Research Methodology, 12*(2-3), 156–168. doi:10.1007/s10742-012-0094-x.
- Rosenbaum, J. E., & Rosenbaum, J. (2015). *The new forgotten half and research directions to support them*. William T. Grant Foundation: Retrieved from <http://wtgrantfoundation.org/newforgottenhalf>
- Roseth, C. J., Johnson, D. W., & Johnson, R. T. (2008). Promoting early adolescents' achievement and peer relationships: The effects of cooperative, competitive, and individualistic goal structures. *Psychological Bulletin, 134*(2), 223-246. doi:10.1037/0033-2909.134.2.223

- Ross, T., Kena, G., Rathbun, A., KewalRamani, A., Zhang, J., Kristapovich, P., & Manning, E. (2012). *Higher education: Gaps in access and persistence study* (NCES 2012-046). U.S. Department of Education, National Center for Education Statistics. Washington, DC: Government Printing Office.
- Rotermund, S. (2007). *Why students drop out of high school: Comparisons from three national surveys* (Statistical Brief No. 2). Santa Barbara: California Dropout Research Project, Linguistic Minority Research Institute. Retrieved from http://www.hewlett.org/uploads/files/CDRP_WhyStudentsDropOutofHighSchool.pdf
- Rudas, T. (1998). *Odds ratio in the analysis of contingency tables*. Sage Universities Paper Series on Quantitative Applications in Social Sciences, 07-119. Sage Publications: Thousand Oaks: CA.
- Rumberger, R. W. (1987). High school dropouts: A review of issues and evidence. *Review of Educational Research*, 57(2), 101-121.
- Rumberger, R. W. (2004). Why students drop out of school. In G. Orfield (Ed.), *Dropouts in America: Confronting the graduation rate crisis* (pp.243-254). Cambridge, MA: Harvard Education Press.
- Rumberger, R. W. (2011). *Dropping out. Why students drop out of high school and what can be done about it*. Boston: Harvard University Press. Retrieved from <http://www.degruyter.com/view/product/184591>
- Rumberger, R. W. & Lim, S. A. (2008). *Why students drop out of school: A review of 25 years of research*. Retrieved from California Dropout Research Project: http://www.cdrp.ucsb.edu/pubs_reports.htm

- Rumberger, R. W. & Thomas, S. L. (2000). The distribution of dropout rates among urban and suburban high schools, *Sociology of Education*, 73(1), 39-67. Retrieved from <http://www.jstor.org/stable/2673198>
- Rumrill, P. D., Cook, B. G., & Wiley, A. L. (2011). *Research in special education: Designs, methods, and applications* (2nd ed.). Springfield, IL: Charles C. Thomas Publisher.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78. doi: 10.1037/110003-066X.55.1.68
- Sampson, J. P., Jr., Reardon, R. C., Peterson, G. W., & Lenz, J. G. (2004). *Career counseling and services: A cognitive information processing approach*. Pacific Grove, CA: Brooks/Cole.
- Schlossberg, N. K. (1981). A model for analyzing human adaptation to transition. *The Counseling Psychologist*, 9(2), 2-18.
- Schneider, M. & Yin, L. (2011). *The hidden costs of community colleges*. American Institutes for Research, Retrieved from <http://www.air.org>
- Schuh, J. (2005). Finances and retention: Trends and potential implications. In A. Seidman (Ed.), *College student retention: Formula for student success* (pp. 277–294). Westport, CT: Praeger.
- Schunk, D. H., & Mullen, C. A. (2012). Self-efficacy as an engaged learner. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 219-235). New York: Springer.

- Scott-Clayton, J. (2012). *Do high-stakes placement exams predict college success?* Community College Research Center. Retrieved from: <http://ccrc.tc.columbia.edu/publications/high-stakes-placement-exams-predict.html>
- Scrivener, S., Sommo, C., & Collado, H. (2009). *Getting back on track: Effects of a community college program for probationary students*. New York: MDRC. Retrieved from <http://files.eric.ed.gov/fulltext/ED507795.pdf>
- Scrivener, S., & Weiss, M. J. (2009). *More guidance, better results? Three-year effects of an enhanced student services program at two community colleges*. New York, NY: MDRC. Retrieved from http://www.mdrc.org/sites/default/files/More%20Guidance%20ES_1.pdf
- Seidman, A. (2005). Where do we go from here: a retention formula for student success. In A. Seidman (Ed.), *College student retention* (pp. 295-316). Westport: Praeger Publishers.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin.
- Shapiro, D., Dundar, A., Yuan, X., Harrell, A. & Wakhungu, P. K. (2014). *Completing College: A National View of Student Attainment Rates – Fall 2008 Cohort* (Signature Report No. 8). Herndon, VA: National Student Clearinghouse Research Center.
- Shin, R. Q., & Kendall, M. A. (2013). Dropout prevention: A (re)conceptualization through the lens of social justice. In E.M. Vera (Ed.), *The Oxford handbook of prevention in counseling psychology* (pp. 213-225). New York, NY: Oxford University Press.
- Skinner, E. A., & Kindermann, T. A. (2009). A Motivational perspective on engagement and disaffection conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and*

- Psychological Measurement*, 69(3), 493-525. doi 10.1177/0013164408323233
- Smith, D. (2007). Why expand dual-credit programs? *Community College Journal of Research and Practice*, 31(5), 371-387.
- Smith, B. L., MacGregor, J., Matthews, R. S., & Gabelnick, F. (2004). *Learning communities: Reforming undergraduate education*. San Francisco, CA: Jossey-Bass.
- Solberg, V. S., Howard, K., Blustein, D. L., & Close, W. (2002). Career development in the schools: Connecting school-to-work-to-life. *The Counseling Psychologist*, 30(5), 705-725. doi: 10.1177/0011000002305003
- Solórzano, D. G., Ceja, M., & Yosso, T. J. (2000). Critical race theory, racial microaggressions, and campus racial climate: The experiences of African American college students, *Journal of Negro Education*, 69(2), 60-73.
- Sommo, C., Mayer, A. K., Rudd, T., & Cullinan, D. (2012). *Commencement day: Six-year effects of a freshman learning community program at Kingsborough Community College*. Retrieved from MDRC
<http://www.mdrc.org/sites/default/files/Commencement%20Day%20FR.pdf>
- St. John, E. P., Hu, S., Simmons, A., & Musoba, G. D. (2001). Aptitude vs. merit: What matters in persistence? *Review of Higher Education*, 24(2), 131-152.
- St. John, E. P., Hu, S., Simmons, A., Carter, D. F., & Weber, J. (2004). What difference does a major make? The influence of college major field on persistence by African American and White students. *Research in Higher Education*, 45(3), 209-232.
- Stearns, E., & Glennie, E. J. (2006). When and why dropouts leave high school. *Youth & Society*, 38(1), 29-57. doi: 10.1177/0044118X05282764

- Steinberg, A., & Almeida, C. A. (2007). Creating pathways for struggling students with a 9-14 system. In Hoffman, N., Vargas, J., Venezia, A., & Miller, M.S. (Eds.). *Minding the gap* (pp. 167-173). Cambridge, MA: Harvard Education Press.
- Stetser, M., and Stillwell, R. (2014). *Public High School Four-Year On-Time Graduation Rates and Event Dropout Rates: School Years 2010–11 and 2011–12*. First Look (NCES 2014-391). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from <http://nces.ed.gov/pubsearch>.
- Stillwell, R., & Sable, J. (2013). *Public School Graduates and Dropouts from the Common Core of Data: School Year 2009–10: First Look (Provisional Data)* (NCES 2013-309rev). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from <http://nces.ed.gov/pubsearch>.
- Struhl, B. & Vargas, J. (2012). *Taking college courses in high school: The college outcomes of dual enrollment in Texas*. Retrieved from http://www.earlycolleges.org/Downloads/TakingCollegeCourses_101712.pdf
- Substitute House Bill 1758, Chapter 524, Laws of 2009, 61st Legislature, Washington State, 2009 Regular Session. Retrieved from Washington State Legislature: <http://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bills/Session%20Law%202010/1418-S2.SL.pdf>
- Sudetic, C. (2012). *Gateway to College: A second chance for young men and women*. Retrieved from Open Society Foundations: <http://www.opensocietyfoundations.org/voices/gateway-college-second-chance-young-men-and-women>
- Swail, W. S., Redd, K. E., & Perna, L. W. (2003). *Retaining minority students in higher education: A framework for success*. San Francisco, CA: Jossey-Bass.

- Symonds, W. C., Schwartz, R. B., & Ferguson, R. (2011). *Pathways to prosperity: Meeting the challenge of preparing young Americans for the 21st century*. Retrieved from Harvard Graduate School of Education:
http://www.gse.harvard.edu/news_events/features/2011/Pathways_to_Prospersity_Feb2011.pdf
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics, 6th ed.* Boston: Pearson Education.
- Tierney, W. G., Corwin, Z. B. & Coylar, J. E. (2005). *Preparing for college: Nine elements of effective outreach*. Albany, NY: SUNY Press.
- Ting, S. (2003). A longitudinal study of non-cognitive variables in predicting academic success of first-generation college students. *College & University Journal*, 78(4), 27-31.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Higher Education*, 45(1), 89-125.
- Tinto, V. (1988). Stages of student departure: Reflections on the longitudinal character of student living. *Journal of Higher Education* 59(4), 438-455.
- Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition (2nd ed.)*. Chicago: The University of Chicago Press.
- Tinto, V. (2000). Linking learning and leaving: Exploring the role of the college classroom in student departure. In J. M. Braxton (Ed.), *Reworking the student departure puzzle* (pp. 81-94). Nashville: Vanderbilt University Press.
- Tinto, V. (2000). What have we learned about the impact of learning communities on students? *Assessment Update*, 12(2), 1-2.
- Tinto, V. (2004). *Student retention and graduation: Facing the truth, living with the consequences*. Washington, DC: The Pell Institute.

- Tinto, V. (2005). Epilogue: Moving from theory to action. In A. Seidman (Ed.), *College student retention: Formula for student success* (pp. 317-333). Westport, CT: Praeger.
- Tinto, V. (2012). *Completing college: Rethinking institutional action*. Chicago: The University of Chicago Press.
- Tinto, V., & Pusser, B. (2006). *Moving from theory to action: Building a model of institutional action for student success*. Retrieved from The National Postsecondary Education Cooperative: <http://nces.ed.gov/npec/papers.asp>
- Tuttle, K. N. (2000). Academic advising. *New Directions for Higher Education*, 111, 15-25. doi: 10.1002/he.11102
- U.S. Department of Education. (1983). *A nation at risk: The imperative for educational reform*.
- U.S. Department of Education. (March, 2011). *Meeting the nation's 2020 Goal: State targets for increasing the number and percentage of college graduates with degrees*. Retrieved from: <https://www2.ed.gov/policy/highered/guid/secletter/110323insert.pdf>
- U.S. Government Accountability Office. (2009). *Program Evaluation: A variety of rigorous methods can help identify effective interventions*. (Publication No. GAO-10-30). Retrieved from: <http://www.gao.gov/assets/300/298911.html>
- Upcraft, M. L., & Farnsworth, W. E. (1984). Orientation programs and activities. In M.L. Upcraft (Ed.), *New directions for student services: Orienting students to college* (pp. 27-37). San Francisco, CA: Jossey-Bass.
- Valentine, J. C., Hirschy, A. S., Bremer, C. D., Novillo, W., Castellano, M., & Banister, A. (2011). Keeping at-risk students in school: A systematic review of college retention

- programs. *Educational Evaluation and Policy Analysis*, 33(2), 214-234. doi:
10.3102/0162373711398126
- Vedder, R., Gillen, A., Bennett, D., Denhart, M., Robe, J., Holbrook, T., ... & Malesick, M. (2010). *25 ways to reduce the cost of college*. Center for College Affordability and Productivity. Retrieved from: <http://centerforcollegeaffordability.org/>
- Vuong, M., Brown-Welty, S., & Tacz, S. (2010). The effects of self-efficacy on academic success of first-generation college sophomore students. *Journal of College Student Development*, 51(1), 50-64.
- Walters, P. B., Lareau, A., & Ranis, S. H. (2009). *Education research on trial: Policy reform and the call for scientific rigor*. New York, NY: Routledge.
- Wang, X. (2009). Baccalaureate attainment and college persistence of community college transfer students at four-year institutions. *Research in Higher Education*, 50(6), 570-588.
- Webb, M., & Gerwin, C. (2014). *Early college expansion: Propelling students to postsecondary success, at a school near you*. Washington, DC: Jobs for the Future: Retrieved from http://www.jff.org/sites/default/files/publications/materials/Early-College-Expansion_031714.pdf
- Weeter, C. & Martin, N. (2011). *Building roads to success: Key considerations for communities and states reconnecting youth to education*. Washington, DC: National Youth Employment Coalition.
- Weidman, J. C. (1989). Undergraduate socialization: a conceptual approach. In J. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 5), pp.289-322. New York: Agathon Press.

- Weiss, C. H. (1998). *Evaluation: Methods for studying programs and policies* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.
- Whiston, S. C., Brecheisen, B. K. & Stephens, J. (2003). Does treatment modality affect career counseling effectiveness? *Journal of Vocational Behavior*, 62(3), 390-410.
- Wintre, M. G., & Bowers, C. D. (2007). Predictors of persistence to graduation: Extending a model and data on the transition to university model. *Canadian Journal of Behavioural Science*, 39(3), 220-234.
- Wraight, S. E., & Best, J. R. (2009). *Strategies for improving graduation outcomes: Policy considerations for Illinois*. Retrieved from Regional Educational Laboratory Midwest. http://www.isbe.net/SPEC-ED/pdfs/imp_grad_outcomes.pdf
- Yates, J. A. (2005). The transition from school to work: Education and work experiences. *Monthly Labor Review*, 128(2), 21-32. Retrieved from Bureau of Labor Statistics: <http://www.bls.gov/opub/mlr/2005/02/art4full.pdf>
- Yarbrough, D. (2002). The engagement model for effective academic advising with undergraduate college students and student organizations. *Journal of Humanistic Counseling, Education & Development*, 41(1), 61-69. doi: 10.1002/j.2164-490X.2002.tb00130.x
- Yazzie-Mintz, E. (2007). *Voices of students on engagement: A report on the 2006 high school survey of school engagement*. Bloomington, IN: Center for Evaluation & Ed Policy.
- Zhang, J., Guison-Dowdy, A, Patterson, M., & Song, W. (2011). *Year two report: Crossing the bridge: GED credentials and postsecondary educational outcomes*. Washington, DC: American Council on Education.

- Zeidenberg, M., Jenkins, D., & Calcagno, J. C. (2007). *Do student success courses actually help community college students succeed?* (CCRC Brief No. 36). New York, NY: Columbia University, Teachers College, Community College Research Center. doi: 10.3102/0034654310370163
- Zhao, C. M., & Kuh, G. D. (2004). Adding value: Learning communities and student engagement. *Research in Higher Education*, 45(2), 115-138.
- Zvoch, K. (2006). Freshman year dropouts: Interactions between student and school characteristics and student dropout status. *Journal for Education of Students Placed At Risk*, 11(1), 97-116.

APPENDIX A

Letter from Dr. Amy Goings, President, Lake Washington Institute of Technology



LAKE WASHINGTON INSTITUTE OF TECHNOLOGY

11605 132ND AVENUE NE • KIRKLAND, WASHINGTON 98034-8506 • (425)739-8100 FAX(425)739-8298

January 28, 2014

Human Subjects Review Committee
University of Washington

To Whom It May Concern:

Kim Infinger, Dean of High School Programs and Principal of our on-campus high school Lake Washington Technical Academy (LWTA), has requested permission to collect archival data regarding students at LWTA for purposes of dissertation research. I have been informed of the purposes of the study and the nature of the research procedures. I have also been given an opportunity to ask questions of the researcher.

As President, I am authorized to grant permission for Ms. Infinger to utilize this archival data for secondary analysis. This data is previously collected transcript data which will be coded to protect student identity. After initial collection of data for the years 2006-2011, any personally identifiable information will be removed and replaced with codes that cannot be linked back to identify the student.

We will look forward to receiving the results of the study, when it is published. If you have any questions, please contact me at 425-739-8200.

Sincerely,

A handwritten signature in black ink, appearing to read "Amy Morrison Goings".

Amy Morrison Goings, Ed.D. | President
11605 132nd Avenue NE | Kirkland, WA 98034
Email amy.goings@lwtech.edu | Phone 425.739.8200 | Fax 425.739.8299

APPENDIX B



Date: 4/7/2014
PI: Ms. Kim Infinger
Graduate Student
College of Education
CC: Joe Lott
RE: Human Subjects Application #46847, "Dissertation for Doctor of Education (COE)"

Dear Ms. Infinger,

Human Subjects application #46847, "Dissertation for Doctor of Education (COE)" has been approved by the University of Washington IRB in Subcommittee EC under Expedited Category 5. The Subcommittee has determined that this research meets all the requirements for approval outlined in 45 CFR 46.111. In addition, the following waivers and determinations apply:

The subcommittee has approved your request to waive the requirement to obtain consent per 45 CFR 46.116(d).

Please note that you have been granted a waiver of consent requirements to access information placed in records between 2006 and 2011. The waiver is for the retrospective review of education records; that is, information that exists at this time. In the event you request to add cohort(s) of prospective data (information placed in the records after the date of this application), you will need to obtain the subjects' written consent.

This research was reviewed for engagement of the University of Washington only. Activities being performed by agents of other institutions are not covered by this approval unless otherwise noted. UW IRB approval does not eliminate the need to obtain other applicable approvals or permissions.

The approval is valid from 4/7/2014 through 4/6/2015. If you have completed the study, including all data analysis, by 4/6/2015 you will need to close out the application. If you have not completed the project by that date, you will need to submit a Status Report requesting continuing approval six weeks before the expiration date. The Status Report to renew or close your study can be found on the HSD website.

The subcommittee has not approved a specific number of subjects for this study. However, you will still be asked to report on subject numbers during the annual status report.


Any revisions that need to be made to the IRB-approved protocol must be reviewed and approved by the IRB before they are implemented. This review can be requested by submitting a Modification form, which can be found on the HSD website. Non adherence to the IRB-approved protocol may be considered non-compliance and must be reported to the IRB as soon as it is discovered.

If at any time during your study an adverse event occurs, contact HSD immediately.

Please use the IRB application number listed above on any forms submitted which relate to this research, or on any correspondence with the HSD office.

If we can be of further assistance, please contact us at (206) 543-0098 or via email at hsdinfo@uw.edu. Thank you for your cooperation, and good luck in your research.

Sincerely,



Bailey Bell
Human Subjects Review Administrator
(206) 221-7918
bbell3@u.washington.edu

4333 Brooklyn Ave. NE, Box 359470 Seattle, WA 98195-9470

main 206.543.0098 fax 206.543.9218 hsdinfo@u.washington.edu www.washington.edu/research/hsd