

**Effectiveness of the Missouri College Preparatory Studies Certificate and the
Liberty Public School's Afterhours ACT Preparation Course in Improving ACT
Composite Scores**

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Abstract

The purpose of this study was to determine if two independent variables, participation in an afterhours ACT Preparation course and attainment of the Missouri College Preparatory Studies Certificate, led to a significant difference in the dependent variable, composite score change when comparing student scores on the PLAN[®] assessment and the ACT assessment. This researcher utilized a quantitative, quasi-experimental research design. The sample of the study included 1,212 students with identifiable PLAN[®] and ACT scores from the Liberty Public Schools graduating classes of 2008, 2009, and 2010.

A two-factor analysis of variance was utilized for hypothesis testing to determine if either independent variable had an effect on the dependent variable and if there was an interaction between the two independent variables which affected the dependent variable. Analysis of the data indicated that participation in an afterhours ACT Preparation course had a statistically significant positive effect on the change in composite scores between the PLAN[®] and the ACT assessments. The analysis also indicated that attainment of the Missouri College Preparatory Studies Certificate had a statistically significant positive effect on the change in composite scores between the PLAN[®] and the ACT assessments. The results of two-factor ANOVA indicated that there was not a statistically significant interaction effect for the independent variables. Recommendations for further research included replicating the study at LPS with additional graduating classes and subgroups as well as conducting follow-up studies to determine if certificate status or participation status lower the chances students must enroll in remedial courses in college.

Dedication

I dedicate this work to the following people:

To my mom and dad. Your love, guidance, and support have made me the person I am today. I can never express the awe I feel when I consider the sacrifices you have made that allowed me to be where I am today. Through you, I learned the importance of hard work, education, and having fun. Your encouragement and support have been invaluable. I love you both and know that I would not have been able to attain this accomplishment without you.

To my patient and witty wife. We both know that without you I would be hopelessly lost. Your love, support, and encouragement have made this accomplishment possible. You have sacrificed so much so that I could pursue this dream. More importantly, when I have been down you have always been there to lift my spirits and make me smile. I could not have dreamt of a more perfect person to share my life with, I love you.

To my children Nate and Paige. You have supported me in ways I am sure you cannot understand at your young age. Watching you grow and learn inspires me every day. I only hope that I can inspire you in the same way. I love you both and am looking forward to seeing you continue to grow.

To my friends and colleagues. You have motivated me, encouraged me, and helped me maintain my sanity throughout this process. I will never forget your words of encouragement and support. I only hope you are as proud of me as I am proud to call you all my friends.

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Chapter One

Introduction

Modern comprehensive high schools share a common goal: preparing all students for post-secondary education. “One of the most important goals of the modern American high school is to prepare students for college. In the knowledge-based economy of the 21st century, students need a postsecondary degree” (Strong American Schools, 2008, p. 5). Unfortunately, data have indicated that many students leave high school without the required knowledge and skills necessary to be successful in post-secondary endeavors. “Well over one third of all college students need remedial courses in order to acquire basic academic skills” (Strong American Schools, 2008, p. 3). In an effort to address issues related to poor student achievement, the Missouri Department of Elementary and Secondary Education (MO DESE) launched an initiative known as Top 10 by 20 with the ultimate goal of moving Missouri into the top 10 states as measured by student academic achievement by the year 2020 (MO DESE, 2011). This initiative compels Missouri school districts to develop and evaluate programs that lead toward increased student achievement, college readiness, and career readiness.

One achievement measure available to evaluate the effectiveness of a district’s ability to prepare students for post-secondary education is student performance on college entrance exams like the ACT. Nationwide, from 2005 to 2011, the percentage of graduates completing the ACT has risen from 38.2 to 49.5 (National Center for Education Statistics, 2012, p. 1). The ACT composite score for Missouri’s graduating class of 2011 ranked 27th nationally, which prompted one objective of Missouri’s Top 10 by 20 initiative: increasing the percentage of students scoring at or above the mean of the top 10

states on exams like the ACT (MO DESE, 2011). Missouri school districts must begin to evaluate programs designed to improve student achievement and increase ACT test scores for the goals of Top 10 by 20 to be realized. Furthermore, “The federal *No Child Left Behind Act of 2001*, and many federal K-12 grant programs, call on educational practitioners to use ‘scientifically-based research’ to guide their decisions about which interventions to implement” (U.S. Department of Education, 2003, p. iii). Evaluation of programs provides districts with valid and reliable information that can be used to advise students and design programs that allow them to achieve higher ACT test scores.

Conceptual Framework and Background

Located just northeast of Kansas City, Missouri, the Liberty Public School (LPS) District serves more than 11,000 students who live within an 85 square mile area of Clay County, MO (Liberty Public Schools, 2012b). Data retrieved from MO DESE shown in Figure 1 indicates that LPS is a growing district. According to MO DESE (2012b), LPS enrollment from 2007 to 2011 increased by an average of 391 students per year while expenditures per average daily attendance actually decreased from \$9,418.00 to \$9,129.00 (p. 1). Additionally, as student enrollment in LPS has increased, the assessed valuation of taxable property within the district has declined over \$22,000,000 from 2009 to 2011 (MO DESE, 2012b, p. 1).

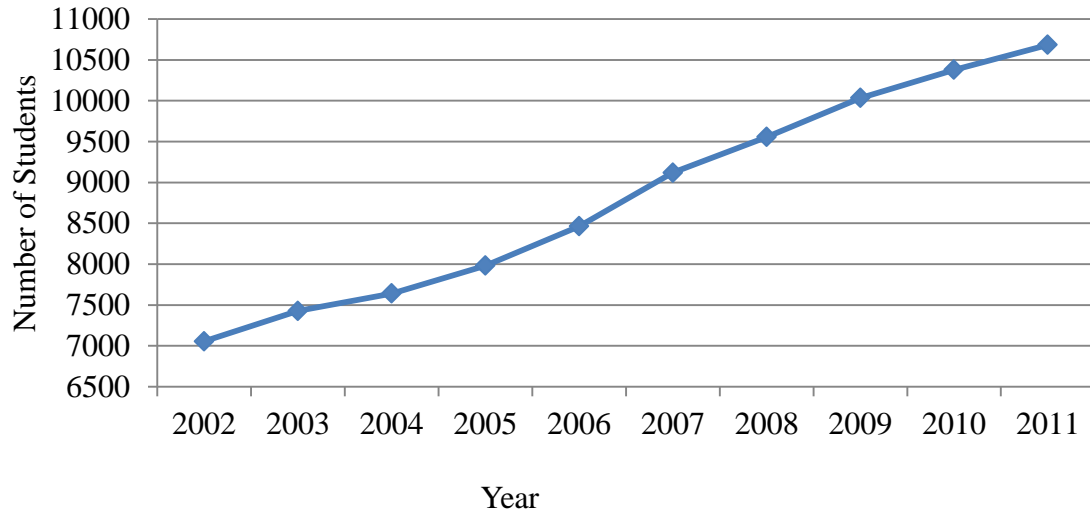


Figure 1. Liberty Public Schools Enrollment 2002 - 2011.

Note: Adapted from “Liberty 53 District Demographic Data,” by the Missouri Department of Elementary and Secondary Education, 2012a, p. 1. Retrieved from <http://mcds.dese.mo.gov/quickfacts/SitePages/DistrictInfo.aspx>.

Preparing students to be successful on standardized tests that are gateways to post-secondary education, as well as possible scholarships, must be a goal that helps drive decisions related to the comprehensive high school program. “College entrance exams, both the practice exams and actual exams, represent a potential barrier for students interested in a four-year college” (Tierney, Bailey, Constantine, Finkelstein, & Hurd, 2009, p. 32). One of the primary objectives of the Liberty 53 Public School District (LPS) is to prepare students to enter the work force or begin post-secondary education (Liberty Public Schools, 2012c). The primary standardized test that LPS students take for college admission is the ACT assessment. LPS provides two specific programs designed to prepare students for success on the ACT assessment. These programs include the ACT PLAN[®] assessment and an afterhours ACT Prep course. Furthermore, LPS students had the ability to exceed the minimum graduation

requirements and attain a Missouri College Preparatory Studies Certificate (MCPSC) until MO DESE cancelled the program in the summer of 2010 (B. A. Coffman, personal communication, August 10, 2010).

The ACT PLAN[®] assessment (PLAN[®]), a shortened version of the ACT assessment administered to all sophomores in the fall, provides students with a nationally normed composite score, a predictive composite score range on the ACT assessment, and a benchmark measurement of college readiness in four subject areas (B. A. Coffman, personal communication, August 10, 2010). LPS spends roughly \$8,000 administering the PLAN[®] yearly to approximately 800 sophomores (Liberty Public Schools, 2011c). Results of the PLAN[®] are communicated to the students and are used to identify students academically at risk.

In addition to the PLAN[®], LPS awarded the state-designated MCPSC to students who exceeded the state minimum graduation requirements and fulfilled other specific criteria until MO DESE discontinued the program in 2010. Table 1 displays a comparison of minimum credit requirements for graduation for the state of Missouri versus the credit requirements required to earn the MCPSC through 2010.

Table 1

State Minimum Graduation Requirements vs. MCPSC Requirements

Subject	State	MCPSC
Communication Arts	4	4
Mathematics	3	4
Science	3	3
Social Studies	3	3
Fine Arts	1	1
Practical Arts	0.5	0.5
Personal Finance	0.5	0.5
Health	0.5	0.5
Physical Education	1	1
Electives	7	7.5

Note. The data in column 1 are from “Graduation Requirements for Students in Missouri Public Schools: Effective for the class for Graduates of the Class of 2010,” by the Missouri Department of Elementary and Secondary Education (MO DESE), 2007, http://dese.mo.gov/divimprove/sia/Graduation_Handbook_2010.pdf. The data in column 2 are from MCPSC requirements from “Requirements & Guidelines: College Preparatory Studies Certificate,” by the MO DESE, 1996, <http://dese.mo.gov/divimprove/curriculum/collegeprep/guidelines.pdf>.

In addition to the expanded credit requirements, students earning a MCPSC had to meet other specific requirements that address grade point average (GPA), attendance, and composite scores on either the ACT assessment or the Scholastic Aptitude Test (SAT). Specifically, students had to maintain a 3.0 GPA in English, mathematics, social studies,

and science combined; maintain a 95% attendance rate in grades 9-12; and score above the national average on either the ACT assessment or the SAT (MO DESE, 1996).

Another key program available to students is an afterhours ACT Prep course. The LPS afterhours ACT Prep course is available to all students and is modeled after an expensive private ACT Prep course in the area. In order to make it available to all students, the nominal fee for materials is waived for students who qualify for free and reduced lunch services (E. C. Greely, personal communication, August 15, 2010). This practice addresses the concern of the National Association for College Admission Counseling regarding uneven preparation for tests (National Association, 2008). LPS operates the afterhours ACT Prep course at a loss for this reason and students who could afford other ACT Prep programs forgo those programs to participate in the LPS program. As such, it was critical to ascertain if the afterhours ACT Prep course was having a significant impact on student ACT assessment composite scores (E. C. Greely, personal communication, August 15, 2010).

Increasing enrollment, declining assessed valuation of property within the district, and lower per pupil expenditures have the potential to force LPS to make difficult decisions regarding academic programs and staffing. According to the U.S. Department of Education (2011), approximately 250,000 teaching jobs were lost nationwide between October 2008 and October 2011 as a result of the budgetary impact of the severe recession on state and local governments (p. 5). Exacerbating the issue for LPS is the fact that LPS had the 30th highest total adjusted operating tax rate out of 521 Missouri school districts for the 2011-2012 school year (MO DESE, 2012c). These circumstances make it difficult for LPS to maintain or increase revenues in the current economic

climate. Adding the necessity to address the requirements of NCLB and the goals and objectives of the Missouri Top 10 by 20 initiative requires LPS to evaluate its programs designed to improve students' achievement on the ACT. This requires an initial analysis of LPS completion and performance on the ACT. Table 2 displays the number of LPS graduates by graduation year as well as the number of graduates from each year who completed the ACT.

Table 2

Liberty Public School Analysis of ACT Completion by Graduates

Graduating Class	Number of Graduates	Graduates Who Took ACT
2006	486	344
2007	506	398
2008	520	416
2009	531	474
2010	594	483

Note: From "Liberty Public Schools ACT Data Set," 2011b, by Liberty Public Schools.

The data in Table 2 make it clear that a majority of LPS graduates participate in the ACT assessment and that the number of participants is growing. However, as displayed in Figure 2, from 2006 to 2010 the average ACT composite score for LPS graduates decreased from 23 to 22.5.

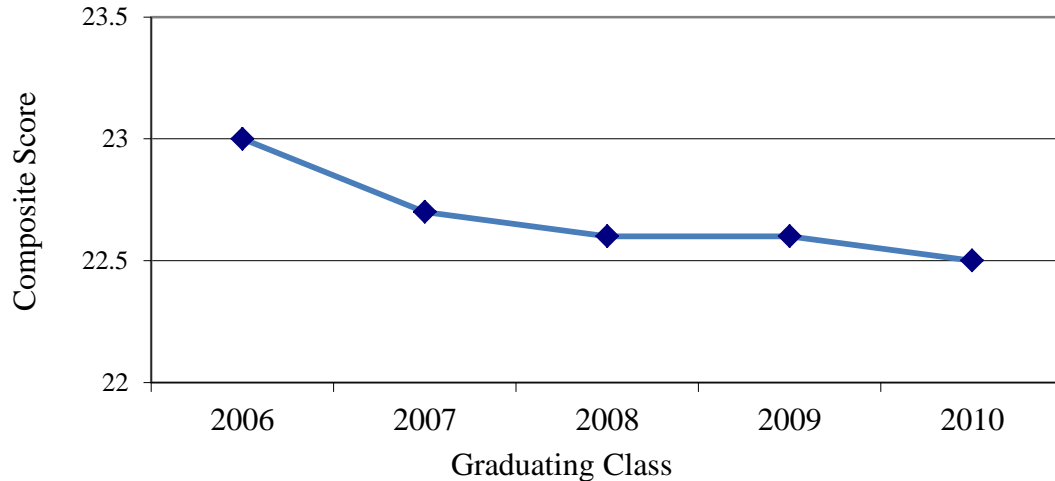


Figure 2. Liberty Public Schools Average ACT Composite Score by Graduating Class.

Note: From “Liberty Public Schools ACT Data Set,” by Liberty Public Schools, 2011b.

If LPS is to meet the demands of NCLB and Top 10 by 20, the trend in declining ACT composite scores must be addressed. The issues of increasing enrollment, decreasing assessed valuation, and decreasing expenditures per pupil, require LPS to evaluate the effectiveness of existing programs designed to improve ACT scores in order to justify the financial resources used to implement the programs.

Statement of the Problem

School improvement efforts in LPS have resulted in permission from ACT, Inc. to administer the ACT assessment to all students in grade 11 of a given graduating class on a nationally designated date as part of the ACT District Choice State Testing (DCST) program. The rationale for administering the ACT assessment to all juniors includes increasing student access to the test and utilizing ACT results as a measure in the school improvement process. Furthermore, this provides all students with information regarding their academic progress since taking the PLAN[®] during their sophomore year (Liberty Public Schools, 2010a).

Several concerns are associated with providing the ACT assessment to all students in a graduation class during their 11th grade year. The expense of the ACT assessment is a major concern for district leaders and teachers alike. LPS budgeted \$36,000 for the 2011-2012 school year to provide all 11th graders the ACT assessment during the spring DCST program of 2011 (Liberty Public Schools, 2011c). Along with adding the spring DCST administration of the ACT assessment, LPS has been considering implementing a credit bearing course specifically designed to prepare students for the ACT assessment similar to the current afterhours ACT Prep course. Implementation of these efforts creates an additional ongoing financial commitment by LPS in supplies, staffing, and fees.

An additional concern has been the possibility the DCST program would result in a decrease in the LPS average composite score on the ACT assessment. Approximately 80% of the LPS class of 2010 completed the ACT assessment (Liberty Public Schools, 2011b). In order to limit the effect adding ACT assessment composite scores for students who would not typically take the ACT to the district average, it is important to make sure the students are being prepared adequately. At the time this study was conducted, there had been little research in LPS to determine which programs or initiatives significantly affect LPS student performance on the ACT assessment. With this in mind, it was critical for LPS to use existing PLAN[®] and ACT assessment data to determine the effectiveness of key programs such as participation in the afterhours ACT Prep program and attainment of the MCPSC in terms of their impact on the change in composite scores between the PLAN[®] and the ACT assessments.

Significance of the Study

This study is significant to the research community in general and the Liberty 53 Public School District (LPS) in particular as this researcher analyzed the impact of Missouri College Preparatory Studies Certificate (MCPSC) attainment and the participation in the district's afterhours ACT Prep course on student growth between the PLAN[®] and the ACT assessment using statistically sound methods. While test preparation is likely to increase standardized admission test scores, empirical information regarding standardized test preparation programs is needed to ensure students and families are aware of the effectiveness of such programs (National Association, 2008). Liberty Public Schools collected and maintained data on students participating in the afterhours ACT Prep course; however, until this study, these data were never utilized to evaluate the program statistically. Prior to implementing a credit bearing ACT Prep course, district leaders may utilize the results of this study to determine if the afterhours program has made a statistically significant improvement in student ACT assessment achievement.

Additionally, LPS maintains a rich and diverse curriculum allowing students numerous avenues to meet either the minimum state graduation requirements or the MCPSC requirements. The curriculum is diverse enough that past students completed the MCPSC requirements while taking vastly different courses (Liberty Public Schools, 2012a). While LPS reported the number of graduates who completed and did not complete the MCPSC requirements each year, LPS has never undertaken a study to determine the effect earning the MCPSC had on its graduates in terms of improving assessment scores. Empirical data on the impact of meeting MCPSC requirements

represents statistically based information that can be utilized by school leaders to advise students seeking to maximize their academic achievement as measured by the ACT assessment. Furthermore, this data may be used by LPS as a rationale to develop a local version of the college preparatory studies certificate.

Purpose Statement

The purpose of this study was to determine the effectiveness of two factors utilized by LPS to improve student performance on the ACT assessment. Specifically, this researcher sought to determine if the LPS afterhours ACT Prep course and attainment of the MCPSC led to a significant difference in composite score change when comparing student scores on the PLAN[®] assessment and the ACT assessment. Statistical methods were utilized to determine if there was an interaction effect between participation in the afterhours ACT Prep course and completion of the MCPSC on growth in composite scores from the PLAN[®] assessment to the ACT assessment. Data from these student groups were evaluated: students who qualified for the MCPSC and took the afterhours ACT Prep course; students who qualified for the MCPSC and did not take the afterhours ACT Prep course; students who did not qualify for the MCPSC and took the afterhours ACT Prep course; and students who did not qualify for the MCPSC and did not take the afterhours ACT Prep course. These results would provide LPS staff with valid and reliable data that could be shared while providing recommendations to students seeking to improve their ACT composite score.

Delimitations

There were seven delimitations utilized in this study in order to evaluate the effectiveness of the Missouri College Preparatory Studies Certificate (MCPSC) and the

LPS afterhours ACT Prep course as they relate to specific student achievement as measured in the change in composite score from the PLAN[®] to the ACT assessment.

The delimitations were:

1. This study utilized archival data from the Liberty 53 Public School District graduating classes of 2008, 2009, and 2010.
2. The location of the study was the Liberty 53 Public School District.
3. The population for the study included Liberty Public School graduates.
4. The sample for the study was limited to students in the LPS graduating classes of 2008, 2009, and 2010 who completed the PLAN[®] test during their sophomore year in the Liberty 53 Public School District and had a subsequent ACT composite score prior to graduation.
5. The ACT composite score utilized for students who did not participate in the afterhours ACT Prep course was the highest ACT composite score attained by the student prior to graduation and reported to LPS.
6. The ACT composite score utilized for students who did participate in the afterhours ACT Prep course was the highest ACT composite score attained after completion of the afterhours ACT Prep course and reported to LPS.
7. Students earning a maximum score on either the PLAN[®] or the ACT were excluded from the study as this study utilized the change in score between the PLAN[®] and the ACT as the dependent variable. A maximum score on either assessment made it impossible to determine if the change in composite score between the PLAN[®] and the ACT assessments were due to the scale of the tests or student growth.

Assumptions

The compilation of data from two student information systems, rosters of student participation, and research data files from ACT, Inc. required certain assumptions.

The assumptions were:

1. The rosters of ACT Prep participants were accurate and complete.
2. The PLAN[®] research data files contained accurate composite scores.
3. The ACT composite scores were reported by ACT, Inc. accurately and were accurately entered into the LPS student information systems.
4. Evaluation of students to determine MCPSC status was completed accurately.
5. Compilation of data into one worksheet was completed accurately.

Research Questions

This study sought to determine if participation in the LPS afterhours ACT Prep course or attainment of MCPSC led to improved student achievement on the ACT assessment. The following research questions guided this study.

1. To what extent is there a significant difference in the change in composite scores from the PLAN[®] to the ACT between students who completed the Missouri College Preparatory Studies Certificate (MCPSC) and those who did not?
2. To what extent is there a significant difference in the change in composite scores from the PLAN[®] to the ACT between students who participated in the afterhours ACT Prep course and those who did not?
3. To what extent is there a significant difference in the change in composite scores from the PLAN[®] to the ACT between students who completed the

MCPSC and participated in the afterhours ACT Prep course as compared to students who participated in only one of the programs or neither of the programs?

Definition of Terms

The following terms were utilized within this study. Definitions are provided in this section to provide clarity for any terms that may be unfamiliar to the reader.

ACT and PLAN[®] composite scores. The composite scores for the ACT and PLAN[®] are determined by averaging the scale scores of each of the 4 subtests of each test and rounding to the nearest whole number (ACT, Inc., 2007, p. 16; ACT, Inc., 2011a, p. 12).

Afterhours ACT Prep course. The LPS afterhours ACT Prep course is designed to meet 1 day per week over 6 weeks, for 3.5 hours per day. The first session is used for pretesting to identify target areas for tutoring. Sessions two through five are used for tutoring in all four content areas of the ACT. During the final session, students complete a practice ACT assessment under normal ACT testing conditions (E. C. Greely, personal communication, September 29, 2012).

Missouri College Preparatory Studies Certificate (MCPSC). The MCPSC is a certificate designed in Missouri to recognize students who exceeded the state's minimum graduation requirements and demonstrated a commitment to good school attendance (MO DESE, 2007, p. 18).

Sheepskin effects. Sheepskin effects is a phrase that represents additional earnings realized by individuals with a degree compared to individuals without a degree with equivalent years of schooling (Jaeger & Page, 1996).

State minimum graduation requirements. For the purpose of this study, state minimum graduation requirements are the minimum number of credits required by MO DESE to graduate from high school. These requirements are designed to ensure graduates have taken courses from a variety of disciplines, which should result in the mastery of essential knowledge, skills, and competencies (MO DESE, 2007, p. 5).

Student information systems. Student information systems are databases designed to store information regarding students, courses, and grades (Nova Southeastern University, 2012).

Working-age adults. For the purpose of this study, working-age adults are defined as people between the ages of 25 and 49 (National Center for Public Policy and Higher Education, 2006).

Overview of Methodology

This study was a quantitative, quasi-experimental research design measuring the impact of attainment of the MCPSC and/or participation in the afterhours ACT Prep course on the change in the composite scores from the PLAN[®] to the ACT. The population of interest for the study was students in grades 10 through 12 in the Liberty 53 Public School District (LPS). The purposive sample included LPS graduates from 2008, 2009, and 2010 who had identifiable PLAN[®] and ACT composite scores. Historical data were collected from various LPS sources including student information systems and summary assessment reports. A two-factor ANOVA was completed once all data were collected.

Organization of the Study

This study is organized into five chapters. Chapter one includes the background, problem, significance, purpose, delimitations, assumptions, and research questions of the study. Chapter one also provides an overview of the methodology of the study and definition of terms. Chapter two presents a review of the literature. Topics of the literature review include the importance of college, the history of the collegiate selection process and college readiness, the development of college placement exams, the history of the ACT assessment, and preparing students for success on college admissions exams. Chapter three describes the methodology used in the study. This includes a description of the research design, identification of the population and sample, specific sampling procedures, a description of the instruments including their validity and reliability, data collection procedures, data analysis and hypothesis testing information, and the limitations of the study. Chapter four contains the results of this study. This includes descriptive statistics of the study and the results of the hypothesis tests. Finally, chapter five presents a summary of the study, its findings, implications for action, and recommendations for future research.

Chapter Two

Review of Literature

The following literature review provides background information regarding the economic costs and returns of post-secondary education, college readiness measures, the ACT assessment, college admissions and scholarship criteria at select schools in Missouri, and test preparation. The literature reviewed includes journal articles, dissertations, government reports, and research studies. The first section provides information concerning economic factors related to post-secondary education in terms of cost and expected returns. The second section explores measures of college readiness. The third section details the history and development of the ACT and the PLAN[®] assessments. The fourth section explores admissions and scholarship requirements of specific colleges/universities in Missouri. Finally, the fifth section addresses how to best prepare students for success on college admissions exams through test preparation and challenging curricula.

Economic Costs and Returns of Post-Secondary Education

In order to understand the importance of ACT Prep activities and college preparatory studies curricula as mechanisms to improve student opportunities for college admissions requires an understanding of the enrollment trends, costs, and benefits of post-secondary education. First, it is crucial that current students understand the trends in college enrollment. Between 1996 and 2006, the percentage chance of a 19 year-old Missouri resident enrolling in college increased by 8% compared to a nationwide decrease of 2%. In contrast, during the same period there was a 7% decrease in enrollment for working-age Missourians compared to a 12% decrease nationwide

(National Center for Public Policy and Higher Education, 2006, p. 7). These data provide a mixed message in terms of the total percentage of Missourians enrolling in college; however, the evidence that a higher percentage of Missouri high school graduates are entering college by age 19 is a compelling argument for college preparatory studies. Nationally, Hussar and Bailey (2011) reported that “Total enrollment in postsecondary degree-granting institutions is expected to increase 13 percent between fall of 2009, the last year of actual data, and fall 2020” (p. 19). Even though recent data indicate a decrease in working-age Missourians enrolling in college, based on these projections more working-age adults will have received at least some college education by 2020 increasing their employability.

Second, the rising cost of post-secondary education must be considered for individuals considering college enrollment.

Compared with top-performing states, families in Missouri devote a larger share of family income, even after financial aid, to attend public two-year colleges, and they devote a very large share of family income to attend public four-year colleges and universities in the state. (National Center for Public Policy and Higher Education, 2006, p. 8)

The data in Figure 3 illustrate the economic hardship that rising college costs have on family income, which may impact an individual’s decision to enroll in post-secondary education.

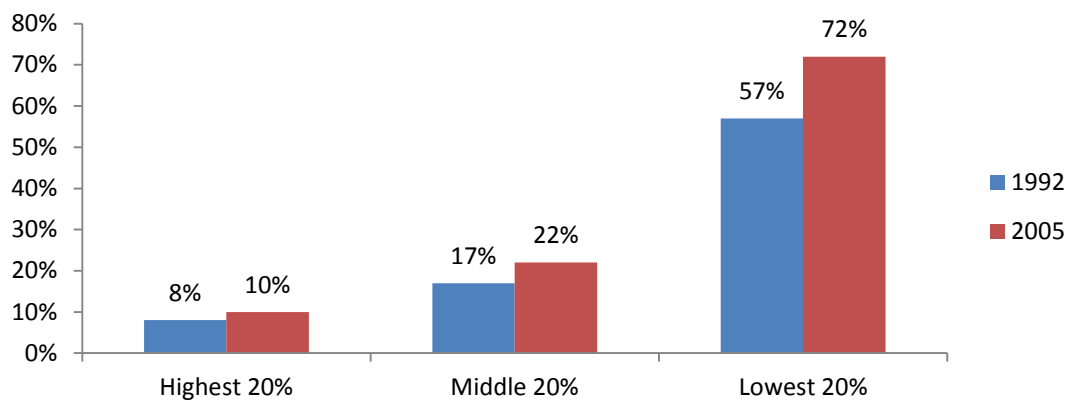


Figure 3. Percentage of Family Income Spent on Public 4-year Colleges by Income Level.

Note: Adapted from “Measuring Up 2006: The state report card on higher education. Missouri,” by the National Center for Public Policy and Higher Education, 2006, p. 9. Retrieved from <http://www.eric.ed.gov>.

The data presented make it clear that the cost of attending college is increasing, especially for those less able to afford it. Furthermore, in Missouri the rising cost of post-secondary education is exacerbated. “The state’s investment in needs-based financial aid is very low when compared with top-performing states, and Missouri does not offer low-priced college opportunities” (National Center for Public Policy and Higher Education, 2006, p. 8). In order to determine if the price of a college education is worthwhile requires further analysis focusing on the expected returns of post-secondary education.

The benefits of obtaining post-secondary education have been well researched. Evidence exists that suggests that earning college credits results in economic benefits even for students who do not earn a college degree. Using data from the National Longitudinal Study of the High School Class of 1972 (NLS-72), Kane and Rouse (1995) found, “... that the average person who attended a two-year college earned about 10

percent more than those without any college education, even without completing an associate's degree" (p. 601). Furthermore, Kane and Rouse (1995) reported that the returns to credit at two-year and four-year colleges equates to roughly 4-6 percent for every 30 credit hours completed. A more recent study, analyzing the data from the Census Bureau's March 1994 Current Population Survey (CPS), expanded on the findings of Kane and Rouse. Rupert and Schweitzer (1996) indicated an increase in the rate of return to education over time specifying that the return to one additional year of schooling rose from 6 percent in 1963 to 11 percent in 1993. Rupert and Schweitzer (1996) also reported that on average, higher levels of education not only lead to higher earnings but also that the return to a college degree, relative to high school, increases over time.

Additional evidence has suggested that there is a difference in returns to education between individuals earning a college degree compared to individuals who attend a post-secondary institution for an equivalent period of years but do not earn a degree. Data from the 1994 CPS study indicated that gross median earnings for college graduates is 60 percent higher than high school graduates, while high school graduates earn about 32 percent more than high school drop outs (Rupert & Schweitzer, 1996). Utilizing data from the 1991 and 1992 March CPS, Jaeger and Page (1996) stated that, "The estimates of sheepskin effects for high school diplomas and Bachelor's [*sic*] degrees using information on degrees received are more than twice as large as those which use only the information on completed years of education" (p. 733). Furthermore, when analyzing the data from the 1991 and 1992 March CPS, Jaeger and Page (1996) reported little

difference in sheepskin effects across different races and gender groups for those earning high school diplomas or college degrees.

The literature has consistently indicated a positive return to earning a college degree. Utilizing data from the March 1998, 1999, and 2000 CPS, Day and Newburger (2002) reported that between 1997 and 1999 high school dropouts, high school graduates, and college graduates earned an average of \$18,900, \$25,900, and \$45,400, respectively. The difference in average wages is substantial. Day and Newburger (2002) also reported that CPS data show that from 1975 to 1999 the relative earnings of full-time year-round workers with a bachelor's degree rose from 1.5 times the annual earnings of a high school graduate to 1.8 times annually while the relative earnings of the least educated fell. Trehan's (2002) analysis of Census Bureau data from 1975 to 1999 aligned with Day and Newburger's findings and indicated in the past 25 years the gap in annual earnings between high school graduates and non-graduates grew from 26 percent to 52 percent; the gap widened even more as the level of education increased. Studies that are more recent have confirmed there is still a benefit to earning a college degree. "In 2005, the median earnings of the full-time, year-round worker age 25 and older who held only a high school degree were \$37,100, while a bachelor's degree holder earned \$50,900" (McPherson & Shulenburger, 2008, p. 83). According to the U.S. Bureau of Labor Statistics (2011), in 2010 the median weekly earnings of individuals with a high school diploma was \$626 while the median weekly earnings of those with a bachelor's degree was \$1,038. The literature concerning the weekly and monthly returns of a bachelor's degree are supported by the findings of one research report in particular that analyzed data from the U.S. Department of Education's 2008 National Postsecondary Aid Study,

the U.S. Department of Education's Office of Federal Student Aid, the National Center for Education Statistics, and the Integrated Postsecondary Education Data System.

A bachelor's degree, whether from a public, a not-for-profit, or a for-profit institution, pays a handsome net financial reward in comparison to a high school diploma - a reward that over a lifetime can range, on average, from a net present value in 2010 dollars of more than \$230,000 at non/less selective not-for-profit colleges, to more than \$550,000 at the most competitive not-for-profit institutions. (de Alva & Schneider, 2011, p. 16)

While the literature reviewed thus far has presented the returns to education in terms of wages, there are returns other than wages associated with earning a college degree.

The literature also has indicated there are additional returns to education other than the estimated lifetime earnings for an individual. According to Baum and Payea (2005), in 2003 the benefits of earning a bachelor's degree or higher not only resulted in increased wages for the individual, but also resulted in benefits to society in terms of increased tax payments. "The typical college graduate working full-time year-round paid over 100 percent more in federal income taxes and about 82 percent more in total federal, state, and local taxes than the typical high school graduate" (Baum & Payea, 2005, p. 2). The findings of Baum and Payea are supported by de Alva and Schneider (2011): "The returns to taxpayers via additional tax receipts across the lifetime of bachelor's graduates range from \$52,000 at non/less competitive not-for-profit schools to nearly \$150,000 at the most competitive not-for-profit institutions" (p. 17).

More returns to post-secondary education can be found in the literature including employment/unemployment rates, access to health benefits, and voting practices. "High

school dropouts (65 percent) are less likely than people with bachelor's degrees (77 percent) to work full-time and year-round" (Day & Newburger, 2002, p. 2). Further, the U.S. Bureau of Labor Statistics (2011) reports that in 2010 the unemployment rate of individuals with a high school diploma was 10.3 percent while the unemployment rate of individuals with a bachelor's degree was 5.4 percent. Interestingly, Aliprantis and Zenker (2011) reported that labor force participation of individuals with at least a high school diploma or higher have seen declining participation in the labor market; however, individuals with a college degree have the lowest unemployment rates over time and as educational attainment decreases unemployment rates increase. McPherson and Shulenburg (2008) note that "College graduates also experience lower rates of unemployment, are healthier and more likely to receive employer-paid benefits" (p. 84). This is supported by Baum and Payea (2005) who indicate, "Only one-third of entry-level high school graduates enjoyed health benefits, compared to two-thirds of entry-level college graduates" (p. 4). The National Center for Public Policy and Higher Education (2006) reports that as the percent of Missouri residents completing a bachelor's degree has increased the percentage of residents voting has also increased.

A thorough understanding of the costs and benefits associated with post-secondary education set the stage for staff and student understanding of the importance of ACT Prep activities and college preparatory studies.

Currently, almost 90 percent of young adults graduate from high school and about 60 percent of high school seniors continue on to college the following year.

People decide to go to college for many reasons. One of the most compelling is

the expectation of future economic success based on educational attainment. (Day & Newburger, 2002, p. 1)

With the knowledge of the benefits that come with a college education, educators must help students identify critical factors that impact the accessibility and affordability of college. In order to do this requires an understanding of college readiness as well as collegiate admissions requirements and scholarship requirements.

College Readiness Measures

In order to reap the returns associated with post-secondary education students are required to be ready to be successful in post-secondary endeavors. Kazis (2006) reported that “The percentage of college students actually completing a two- or four-year degree has not increased significantly in more than 30 years” (p.13). Furthermore, “The message that isn’t yet getting through to students, their parents, and their schools is that to succeed in college, you need to be academically ready to do college-level work” (Kazis, 2006, p. 13). This fact is not lost on secondary and post-secondary schools, which has prompted extensive research into measures that are believed to be related to college readiness such as high school grade-point averages, high school coursework, and standardized tests.

ACT has long defined college and career readiness as the acquisition of the knowledge and skills a student needs to enroll and succeed in credit-bearing first-year courses at a postsecondary institution (such as a two- or four-year college, trade school, or technical school) without the need for remediation. (ACT, Inc., 2011b, p. 3)

The traditional view of identifying students who are college ready emphasizes academic achievement based on student grades in college-preparatory subjects while the alternative view focuses not only on academic achievement but also on utilizing tests, such as the SAT, that measure the ability of a student to learn (Geiser, 2008).

Two different types of tests to measure college readiness dominate the literature: achievement tests and aptitude tests. Geiser (2008) reported that “Whereas the older ‘College Boards’ had tested knowledge of college-preparatory subjects, the ‘Scholastic Aptitude Test,’ introduced in 1926, purported to measure a student’s capacity for learning” (p. 1). If, as believed, the SAT could reliably measure aptitude for learning, it would provide a means for colleges to identify promising students from disadvantaged backgrounds with inferior academic performance, who were nevertheless deserving of admission (Geiser, 2008). In contrast, the ACT assessment is based on periodic national curriculum surveys and reviews of state standards making it more like an achievement test than the SAT (Geiser, 2008). Geiser (2008) also claimed “The ACT appears less coachable than the SAT, and the consensus of students who have taken both tests is that the ACT places less of a premium on test-taking skills and more on content mastery” (p. 6). According to Geiser and Santelices (2007), if standardized tests are to be used, “A strong case can be made for curriculum-based, achievement-type tests, since those tests not only have predictive value but also measure knowledge and skills that are unquestionably important in college” (p.26).

Concerns exist regarding the efficacy of using standardized tests like the SAT and ACT to determine college readiness or to predict future college success. The SAT is a relatively poor predictor of college success compared to achievement tests, like the SAT

II subject tests and Advanced Placement (AP) exams, which measure curriculum mastery (Geiser, 2008). Geiser (2008) also noted, “The ACT is scored in a manner that reproduces the same bell-shaped curve distribution as the SAT, and colleges use the ACT scores primarily to compare students against one another rather than to assess curriculum mastery or proficiency” (p. 6). Popham (2006) indicated that ACT and SAT test scores and college grades hover around a statistically significant correlation coefficient of .50; he further contends that statistical considerations require one to square this value to determine the predictive validity of these scores, which comes out to only .25 or 25 percent (p. 87). While ACT and SAT scores are somewhat predictive of academic success in college, variables other than test scores have three times as much impact on a student’s college performance (Popham, 2006, p. 87).

High school academic performance as measured by GPA and high school coursework are two additional variables that have been researched to determine their effectiveness in determining college readiness based on college outcomes.

The superiority of HSGPA [high school grade-point average] over standardized tests has been established in literally hundreds of ‘predictive validity’ studies undertaken by colleges and universities to examine the relationship between their admissions criteria and college outcomes such as freshman grades” (Geiser & Santelices, 2007, p. 4)

Geiser (2008) noted that high-school grades were the superior predictive measure for all entering classes, academic disciplines, and campuses in the University of California system.

One hypothesis that may account for the power of high-school grades to predict cumulative college GPA may be ‘method covariance,’ or the methodological similarity in the way these academic indicators are constructed. That is, both HSGPA and cumulative college GPA reflect student performance in a large number of courses taken over a period of several years. (Geiser & Santelices, 2007, p. 16)

ACT, Inc. found that students who complete a recommended core curriculum consisting of four years of English and three years each of mathematics, science, and social studies are more likely to be college and career ready than those who do not (ACT, Inc., 2011b). Finally, participation in AP courses have been proven to be a poor predictor of student success in college as secondary schools vary a great deal in terms of the number of AP courses offered, and because many students take AP courses to earn bonus GPA points by simply taking the course without having to take the AP test to demonstrate achievement (Geiser & Santelices, 2007). Geiser and Santelices (2007) reported that “Standardized test scores do add a statistically significant increment to the prediction [of freshman grades], so that the combination of HSGPA and test scores predict better than HSGPA alone” (p. 4). While college readiness can be difficult to measure, previous research has indicated that a combination of HSGPA, completion of a rigorous curriculum, and scores on college entrance exams are statistically significant predictors of college success. Considering the ACT is the predominant college admissions test taken by LPS students, it is important for LPS to understand the history and development of the ACT in order to advise students and design programs that allow them to achieve higher ACT test scores (Liberty Public Schools, 2011b).

History and Development of ACT Assessments

Dissatisfied with the existing system of college admissions tests, University of Iowa professor Lindquist presented a paper critical of said admissions tests at an Educational Testing Service (ETS) conference in November 1958 (ACT, Inc., 2009a, pp. 9-10). By 1958, after establishing numerous testing programs within the state of Iowa as well as the Armed Forces tests of General Educational Development (GED), Lindquist, along with cofounder McCarrel, developed the national stature, research base, and organizational structures necessary to found a new admissions test in 1959 (ACT, Inc., 2009a). “The ACT, formerly the American College Testing Program, was introduced in 1959 by University of Iowa professor E. F. Lindquist” (Popham, 2006, p. 86). The first ACT test was administered on November 7, 1959 to 75,460 students (ACT, Inc., 2009a, p. 14). The ACT experienced early success and the number of students taking the ACT rose from 132,963 during the 1959 testing year to 961,184 during the 1967 testing year; the number of participating colleges during the same time period rose from 299 in 1959 to 1,425 in 1967 (ACT, Inc., 2009a, p. 15).

When launched in 1959, the ACT was introduced as a competitor to the then established college admissions test known as the Scholastic Aptitude Test (SAT), which purported to measure students’ general aptitude for learning (Atkinson & Geiser, 2009). According to Popham (2006), “Lindquist and his colleagues regarded the SAT as an entrance exam designed primarily for elite universities in the Northeast. Accordingly, rather than assessing students’ inborn aptitudes, the ACT was intended from the get-go to be an *achievement test*” (p. 86). The ACT is more closely tied to high school curricula than the SAT and its earliest forms consisted of four sections including English,

mathematics, social-sciences reading, and natural-sciences reading which closely related to the Iowa high-school curricula (Atkinson & Geiser, 2009).

In 1976, to ensure the continued relevance of assessment content to high school and college curricula, ACT began a series of surveys of teachers and assessment item writers, in addition to assembling educators from across the United States for curriculum study conferences. (ACT, Inc., 2009a, p. 36)

ACT, Inc. has continued to conduct the ACT National Curriculum Survey® every 3 to 4 years, asking more than 20,000 educators nationwide to identify the knowledge and skills necessary for students in grades 7 through 14 to be ready to perform college-level work (ACT, Inc., 2009c). However, the ACT falls short of being a true achievement test in several ways: it is still norm-referenced, its scores produce an almost SAT-like bell-shaped curve, and it lacks depth of subject-matter coverage compared to SAT subject tests or AP exams (Atkinson & Geiser, 2009). According to Atkinson and Geiser (2009), “...another fundamental problem for the ACT – or for any test that aspires to serve as the nation’s achievement test – is the absence of national curriculum standards in the U.S.” (p. 9).

While the ACT strives to be an achievement test, despite the obstacles that make development of a national achievement test difficult, the program was developed to be more than simply a college admissions assessment. From the beginning, the purpose of the ACT testing program went beyond simply constructing and administering a test; service to students, high schools, and colleges in the form of student reports and research services was, and remains to this day, a prominent theme in the development of the program (ACT, Inc., 2009a). “As part of its College Readiness System, ACT offers the

PLAN[®] program as a way for tenth-grade students to review their progress toward college readiness while there is still time to make necessary interventions” (ACT, Inc., 2009d, p. 1). In 1985 the ACT’s Board of Trustees approved the development of a pre-college assessment for 9th- and 10th-grade students focusing on education and career planning; this assessment, known as the P-ACT+, was first administered in October 1987 to 151,000 students (ACT, Inc., 2009a, pp. 61-62). The P-ACT+ was scored on a 32-point scale and was designed to be predictive of future ACT performance; it was renamed PLAN[®] in February 1992 in order to better represent its purpose of helping students make post-high school plans (ACT, Inc., 2009a, p. 96).

Over time, the ACT program has undergone revisions to improve the information and services it provides to students and schools. “In 1989 the test [ACT] underwent a major revision and the current four subject areas were introduced (English, mathematics, reading, and science), and in 2005 the ACT added an optional writing exam...” (Atkinson & Geiser, 2009, p. 8). The 1989 release of the Enhanced ACT assessment included the following changes: the Reading subtest replaced the social-sciences reading subtest and the Science Reasoning subtest replaced the natural-science reading subtest (ACT, Inc., 2009a, p. 64). “To assist in identifying students who are ready for entry-level college course work, ACT has established *college readiness benchmarks*” (ACT, Inc., 2005a, p. 1). “ACT’s College Readiness Benchmarks are the minimum ACT test scores required for students to have a high probability of success in credit-bearing college courses – English Composition, social science courses, College Algebra, or Biology” (ACT, Inc., 2010, p. 1). Meeting an ACT subtest benchmark indicates that a student has a 50 percent chance of earning a B or higher and a 75-80 percent chance of earning a C or

higher in entry-level college courses related to the subtest (ACT, Inc., 2005a, p. 1). Table 3 displays the College Readiness Benchmarks as determined by ACT, Inc.

Table 3

ACT Inc.'s College Readiness Benchmarks

College Course/Course Area	Test	Plan® Score	ACT Score
English Composition	English	15	18
Social Sciences	Reading	17	21
College Algebra	Mathematics	19	22
Biology	Science	21	24

Note: Adapted from “What are ACT’s college readiness benchmarks?,” by ACT, Inc., 2010, p. 1. Retrieved <http://www.eric.gov>.

As evidenced above, the ACT has continued to evolve based on perceived needs of students and the educational landscape. State testing requirements of high school students mandated by the federal No Child Left Behind Act (NCLB) have resulted in numerous states adopting the ACT as part of their statewide assessment programs (ACT, Inc., 2006b). As a result of partnerships developed with 10 states and many different school districts across the nation, the ACT has experienced unprecedented growth in the number of students tested (ACT, Inc., 2011b). “EXPLORE®, PLAN®, and the ACT are based on the same score scale and thereby provide an articulated, systematic approach for intervention, progress monitoring, and evaluation” (ACT, Inc., 2006b, p. 2). Systemic utilization of the PLAN® and ACT assessments provides school districts with information on how their students are progressing in terms of college readiness. Furthermore, student performance on these assessments may aid schools in determining if their academic and

test preparation programs are preparing students for the colleges most often attended by their graduates.

Admissions/Tuition/Scholarship Requirements of Specific Missouri Universities

In order to understand and be able to explain the relative importance of improving ACT composite scores prior to matriculation requires a district to determine the admissions and scholarship requirements of the colleges and universities a majority of its students attend post-graduation. According to the annual *Liberty High School Post-Secondary Survey* (Liberty Public Schools, 2010b; Liberty Public Schools, 2011a), 55.7% of all graduates from 2010 and 2011 who enrolled in a 4-year institution enrolled in one of five universities in the University of Missouri system. Table 4 displays the relative enrollment percentages of LHS graduates attending each of the 4-year universities.

Table 4

Relative Matriculation Percentages for the Top Five 4-Year Colleges/Universities

Selected by LHS 2010-11 Graduates

College/University	Class of 2010	Class of 2011	Combined Classes
University of Missouri, Columbia (MU)	20	14.7	17.5
Northwest Missouri State University (NWMSU)	15.7	16.9	16.2
Missouri State University (MSU)	10.7	8.9	9.9
University of Missouri, Kansas City (UMKC)	6.1	7.6	6.8
University of Central Missouri (UCM)	4.6	6	5.3

Note. From “*Liberty High School Post-Secondary Survey*,” 2010b, 2011a.

This analysis of matriculation rates allows LPS staff to identify and communicate the admissions criteria of the colleges and universities most often attended by LPS graduates.

Since the early 1990s [*sic*], the Missouri Department of Higher Education has required public four-year colleges and universities to adopt an appropriate level of admissions selectivity from a tiered system of four categories: Highly Selective, Selective, Moderately Selective, and Open Enrollment (in descending order of rigor). (Marble & Stick, 2004, p. 354)

Students entering the University of Missouri system receive a combined percentile rank score, which is calculated by adding their high school percentile class rank and the percentile rank attained on a nationally normed test like the ACT (Marble & Stick, 2004). “To remain in compliance with the requirements of self-determined selectivity category, an institution cannot have more than 10% of those admitted fall below the established percentile rank threshold” (Marble & Stick, 2004, p. 355). Truman State University is the only public 4-year college or university in the Missouri system that chose to become Highly Selectivity; subsequently, Truman State University has become a premier institution but has difficulty maintaining high admissions standards and enrollment totals (Marble & Stick, 2004). According to Marble and Stick (2004), MU chose the Selective tier in order to balance academic rigor with access. Table 5 displays general information regarding ACT composite scores and combined percentile ranks associated with each level of Selectivity for Missouri Public 4-year institutions.

Table 5

Admissions Criteria by Level of Admissions Selectivity in Missouri

Level of Selectivity	ACT Composite (Guaranteed Admission)	Combined Percentile Rank	Percent Allowable Below Threshold
Highly Selective	27	140	10
Selective	24	120	10
Moderately Selective	21	100	10
Open Enrollment	NA	NA	NA

Note. Adapted from “Admissions Selectivity Categories,” by the Missouri Department of Higher Education (MO DHE), 2012a. Retrieved from <http://www.dhe.mo.gov/policies/admissions-selectivity.php>.

Of the five public 4-year institutions most frequently attended by LPS graduates, the MO DHE lists MU, MSU, and UMKC as Selective institutions while NWMSU and UCM are listed as Moderately Selective (MO DHE, 2012a).

While data in Table 4 provide general admissions information based on selectivity level, each of the five public 4-year schools most attended by LPS graduates maintains an admissions website that provides schools, parents, and students with more detailed admissions requirements. In order for a student who has an ACT score between 17 and 23 to qualify for admissions to MU, the student must meet specific criteria regarding class rank and GPA (MU Admissions, 2011b). “The Office of Admissions considers your highest composite score (or the combined math and critical reading score from the SAT I) for admissions and scholarship [*sic*] qualification” (MU Admissions, 2011b). When considering ACT scores, MU indicates “The composite or the combined score is used for admissions and scholarship purposes; sub-scores are used primarily for English and math placement” (MU Admissions, 2011b).

The remaining four Missouri universities most often attended by LPS students provide similar information regarding test score and combined percentile rank requirements as well as high school curricular requirements necessary for matriculation. Missouri State University guarantees admission to a student who earns (a) an ACT score of 24 or higher, (b) a GPA of 3.5 or higher on a 4.0 scale, or (c) a class rank in the top 25 percent (MSU Admissions, 2012). A student who applies to UMKC will be automatically admitted, regardless of ACT score, if the student's class rank is in the top 10 percent; students who do not meet admissions requirements are reviewed individually for trial admissions (UMKC Admissions, 2012). Northwest Missouri State University indicates applicants must have a minimum GPA of 2.0 on a 4.0 scale regardless of ACT score or combined percentile rank (NWMSU Admissions, 2012). Finally, a student can qualify for the UCM entrance requirements by meeting one of the following criteria: (a) a score of 21 on the ACT and a 2.0 GPA, (b) a score of 20 on the ACT and a 2.9 GPA, (c) a score of 19 on the ACT and a 3.0 GPA, or (d) have a combined percentile rank that is equal to or exceeds 100 (UCM Admissions, 2011). The high school curriculum requirements for all five universities are the same in the areas of English, social studies, and science. The University of Missouri and UMKC require 4 mathematics courses compared to 3 mathematics courses at the other universities; Missouri State University and the University of Central Missouri both require 4 additional core courses compared to 3 additional core courses at the other universities (MSU Admissions, 2012; MU Admissions, 2011b; NWMSU Admissions, 2012; UCM Admissions, 2011; UMKC Admissions, 2012). Table 6 presents the high school curriculum required for admission at all five universities.

Table 6

High School Core Curriculum Requirements for Admission at Select Missouri Universities.

College/University	English	Social Studies	Math	Science	Additional Core
MU ^a	4	3	4	3	3
NWMSU ^b	4	3	3	3	3
MSU ^c	4	3	3	3	4
UMKC ^d	4	3	4	3	3
UCM ^e	4	3	3	3	4

Note. Adapted from: ^a“Missouri University Admissions,” by Missouri University, (2011a). Retrieved from <http://admissions.missouri.edu/apply/freshmen/requirements/high-school-coursework.php>. ^b“Northwest Missouri State University Admissions,” by Northwest Missouri State University, (2012). Retrieved from <http://www.nwmissouri.edu/admissions/apply/criteria.htm>. ^c“Missouri State University Admissions,” by Missouri State University, 2012. Retrieved from <http://missouristate.edu/admissions/admpolicy.htm>. ^d“University of Missouri Kansas City Admissions,” by University of Missouri Kansas City, (2012). Retrieved from <http://umkc.edu/admissions/freshman-requirements.asp>. ^e“University of Central Missouri Admissions,” by University of Central Missouri, (2011). Retrieved from <http://www.ucmo.edu/undergrad/fresh/require>.

Admissions requirements, while critical, are not the only aspect of matriculation that must be considered by prospective students. According to Baum and Ma (2011), “From 2001-02 to 2011-12, published tuition and fees for in-state students at public four-year colleges and universities increased at an average rate of 5.6% per year beyond the rate of general inflation” (p.3). Furthermore, when factoring in inflation adjusted dollars, state funding per full time student for higher education was 23% lower in 2010-11 than it had been a decade earlier (Baum & Ma, 2011, p. 4).

College prices continue to rise more rapidly than the amount institutions spend to educate students, with tuition carrying a growing share of the financing of postsecondary education at a time when students and families are ill-equipped to manage additional expenses. (Baum & Ma, 2011, p. 7)

Tuition and fees at the top five Missouri public 4-year institutions attended by LPS graduates ranges from a low of \$6,558 at MSU to a high of \$9,029 at UMKC for a typical full-time student who is a resident of Missouri (MO DHE, 2012c). Of the five schools evaluated, tuition and fees at NWMSU represent the median at a cost of \$7,434 (MO DHE, 2012c).

Scholarships provide an avenue for students and families to deal with the increasing cost of a college education and as such, parents and students must be aware of the requirements for common scholarships at specific institutions. A recent study of four-year public universities in Kansas and its neighboring states indicated that the three most important variables in the scholarship application process were GPA, ACT/SAT scores, and class rank (Rapp, 2005). Each of the top five public 4-year universities attended by LPS graduates offer scholarships for which all students are automatically considered that include specific requirements regarding minimum ACT composite scores. Table 7 presents information on these scholarships at each university.

Table 7

Automatic Scholarships Based on ACT Composite Score for Select Missouri Universities

College/University	Number	Smallest Award		Largest Award	
		ACT Score	Yearly Amount	ACT Score	Yearly Amount
MU ^a	2	27	1,000-2,000	28	3,500
NWMSU ^b	4	21	500	28	2,500
MSU ^c	3	24	1,500	28	5,000
UMKC ^d	2	23	2,500	28	3,500
UCM ^e	4	17	500	26	4,000

Note. Adapted from: ^a“Missouri University Financial,” by Missouri University, (2011). Retrieved from <http://financialaid.missouri.edu/types-of-aid/scholarships/first-time-college-students-missouri.php>.

^b“Northwest Missouri State University Financial,” by Northwest Missouri State University, (2012).

Retrieved from <http://www.nwmissouri.edu/financial/Freshman2.htm>. ^c“Missouri State University Financial,” by Missouri State University, 2012. Retrieved from

<http://missouristate.edu/FinancialAid/schoalrships/freshmanscholarshipprograms.html>. ^d“University of

Missouri Kansas City Financial,” by University of Missouri Kansas City, (2012). Retrieved from

<http://www.sfa.umkc.edu/site2/scholarships.cfm>. ^e“University of Central Missouri Student,” by University of Central Missouri, (2011). Retrieved from http://www.ucmo.edu/sfs/explore/documents/scholarship_chart_1213.pdf.

In addition to admissions-based scholarships at each specific Missouri Public 4-year institution, each school participates in the Bright Flight scholarship program administered by the MO DHE in an effort to encourage high achieving Missouri students to attend an approved Missouri post-secondary institution (MO DHE, 2012b). Graduates from the class of 2012 in Missouri earning an ACT score of 31 or higher by the June

administration of the ACT and meeting admissions requirements and deadlines automatically qualified for the award, which has a maximum benefit of \$3,000 (MO DHE, 2012b). These scholarships and their impact on the total cost of a college education underscore the importance of achieving the highest ACT score possible prior to graduation.

Preparing for College Admissions Exams: Test Preparation and Curriculum

The benefits of a college education, the role of standardized tests in admission practices, the rising cost of attending college, and the fact that ACT scores can be directly related to merit-based scholarships require schools to provide students with programs that not only prepare them for the rigors of college, but also prepare them for success on standardized college admissions tests.

By the 1980s [*sic*], gaining entrance to the college of one's choice, acceptance into a desired major, and financial aid had become an increasingly high-stakes game. In turn, then, the crucial importance of admissions test scores spurred a flourishing test preparation industry built around students' desires to optimize their test scores. (ACT, Inc., 2009a, p. 58)

Nationally, Kaplan and The Princeton Review are two major test preparation companies, offering multiple options for ACT preparation with courses ranging in price from \$299 to \$2,769 (Kaplan, 2012; Princeton, 2012). Focus on Learning is a Missouri test company offering ACT preparation courses that range in price from \$395 to \$775 and are offered in Columbia, Missouri (Focus on Learning, 2012). It is important to analyze the pros and cons of test preparation programs and to determine if they are worth the time and expense.

When considering test preparation programs, it is critical to determine if they have the ability to affect student achievement on standardized college admissions tests like the ACT.

After a decades-long debate about whether standardized admissions tests can be “coached,” college admission counseling professionals, test preparation companies, and the test agencies are all in agreement that students’ scores can be improved at least to some extent by participation in activities designed to prepare students for the tests. (National Association, 2008, p. 25)

Being unfamiliar with the format and scoring of a standardized test may lead to test anxiety, which may be alleviated to some degree through test preparation. “When test anxiety is severe, it can have significant negative effects on a student’s ability to perform at an optimal level” (Huberty, 2009, p. 12). Teaching effective and efficient study methods along with appropriate test-taking strategies can help alleviate the anxiety and tension related to testing (Salend, 2012). While these methods may improve student performance on standardized tests like the ACT, it is important to investigate to what degree test preparation activities ultimately have on improving test scores.

Several recent studies have provided mixed results regarding the effectiveness of school based ACT preparation programs. In the first study, Keltner (2004) sought to measure the effectiveness of a 7-week after school ACT preparation course. Keltner (2004) found the ACT preparation course did not lead to significant differences in ACT composite scores between students who participated in the ACT preparation course and students who did not participate in the course. In a second study, Justus (2010) investigated the effectiveness of a school-based semester-long ACT preparation course

intended to improve student performance on the mathematics subtest of the ACT.

Results of the study indicated that the mathematics ACT preparation course resulted in statistically significant gains on the mathematics subtest of the ACT for students with a PLAN[®] mathematics scores between 17 and 18 (Justus, 2010). Justus (2010) further reported that students with PLAN[®] mathematics scores between 12 and 16 showed positive gains, but the gains were not statistically significant. In a third study, Donen (2012) investigated the effectiveness of an ACT preparation course that met 50 minutes per day from August to the middle of March and utilized a differentiated instructional model on improving ACT composite scores. Donen (2012) reported that formal individualized teaching within an ACT preparation course led to statistically significant gains in ACT composite scores for students of all ability levels in the study.

“As yet, there is insufficient research to assess fully the effect of the many different types of test preparation on standardized admission test scores” (National Association, 2008, p. 24). Briggs (2001) indicated that when rounding the estimated effect of coaching on the ACT Math, Reading, and English subtests, the absolute value of the effect is never more than a single point (p. 17). “The average score increase on the ACT math section probably lies within the range of 0 to 0.4 points, while the coaching effect on the English section is about 0.3 to 0.6 points” (Briggs, 2001, p. 18). However, Briggs (2001) stated, “The widespread perception remains that students participating in commercial test preparation programs will improve their test scores dramatically rather than marginally” (p. 11).

Briggs (2001) indicated that if short term test preparation activities prior to taking the ACT significantly boosts the scores of test preparation participants over those

students who do not participate, the validity and reliability of the test's ability to predict future college success might be called into question. Standardized test manufacturers argue that spending more than a little time engaging in test preparation focused on the format of the test neglects the subject matter itself and can hurt learning and test performance (Phelps, 2011). According to the National Association for College Admission Counseling (2008), "Due to the lack of alignment with K-12 subject matter, preparation for standardized admission tests in the high school classroom detracts from the most important element of a student's college preparation-understanding core subject matter" (p. 27). Furthermore, the National Association for College Admission Counseling (2008) indicates that focusing on core content knowledge and the skills necessary to meet future academic demands is the best form of test preparation.

ACT, Inc. (2009a) contended that while short test preparation programs aimed at increased familiarity with the test format, procedures, and test-taking skills help improve test performance based on capability, such programs cannot supply skills and content knowledge acquired over an extended period of time. The four subtests of the ACT and PLAN[®] (English, mathematics, reading, and science) are designed to measure curriculum-related knowledge (ACT, Inc., 2009d). "Given the content and philosophy of the ACT, the approach that is most likely to increase ACT scores is high school coursework, because much of the knowledge and skills that are taught in high school are being measured on the ACT" (ACT, Inc., 2005b, p. 1). According to ACT, Inc. (2005b), "Increases in ACT Composite score associated with high school coursework are substantially larger than those associated with these short-term test preparation activities, regardless of the type of activity" (p. 1). Completing a rigorous core curriculum

increases ACT composite scores more than any short-term preparation activity; furthermore, completing specific courses above the core can lead to increases in ACT composite scores by up to 5.8 points (ACT, Inc., 2005b).

The importance of completing a college preparatory curriculum appears to be critical for improving performance on standardized college admission tests. Attwell and Domina (2008) indicated, “Completing relatively demanding coursework with greater curricular intensity compared to a standard curriculum has been associated with higher ACT scores of up to $.17 SD$ ” (pp. 63-64). A recent study by Hichens (2009) reported that students who enroll in the most rigorous courses score between 1.01 and 1.16 points higher on a 4-point college readiness scale derived from the ACT college readiness benchmarks than students who enroll in the next most rigorous courses. Furthermore, Hichens (2009) reported that students enrolled in the most rigorous courses score between 2.28 and 2.67 points higher than students enrolled in the least-rigorous courses on the same college readiness scale.

ACT research shows that rigor pays off. We analyzed close to 400 schools across the country that are offering rigorous courses to *all [sic]* their students – and teaching them well – and found that their students are outpacing the national averages in college and career readiness across the board. (ACT, Inc., 2009b, p. 14)

Students completing a rigorous core curriculum earn higher scores on the ACT and are better prepared for credit bearing college courses (ACT, Inc., 2006a). “Taking the right kind of courses – rigorous courses – matters as much as, if not more than, taking the right number of courses” (ACT, Inc., 2009b, p. 13). A recent study by Pound (2011) supports

the importance of rigor as the study reported that students taking classes identified as college preparatory had more ACT scores that fell below their previous PLAN[®] scores as compared to students taking more rigorous honors and AP courses.

Completing challenging courses in high school expands options for further education and employment (Creech, 1997). “ACT defines the high school core curriculum as at least four years of English and at least three years each of mathematics, social studies, and natural sciences (4-3-3-3)” (ACT, Inc., 2009b, p. 12). According to Creech (1997), “...states that had the most increases in average scores on college admissions also had increases in the percentage of students completing a core of academic courses” (p. 7). College admissions officers have indicated that challenging courses in high school and the grades earned in those courses are the best indicators of success in college (Creech, 1997). According to Tierney et al. (2009), “High schools should offer, as a default, a college-*ready* [*sic*] curriculum that includes specific courses in key subjects” (p. 12). “For students who wish to enroll in a four-year institution, their high school curriculum should include options that prepare students for the more rigorous academic requirements of four-year institutions” (Tierney et al., 2009, p. 7). Specifically relating to mathematics, students should complete Algebra I no later than the end of their 9th-grade year (Tierney et al., 2009).

Summary

The preceding literature review provided background information on the economic costs and returns of post-secondary education, college readiness measures, the ACT assessment, college admissions and scholarship criteria at select schools in Missouri and methods of preparing for college admissions testing. The research provides clear

evidence that while the cost of post-secondary education can be high, the returns outweigh the cost. The research provided a historical perspective regarding the development of college readiness measures in terms of achievement tests in general as well as the development and philosophy of the ACT in particular. Data regarding the matriculation patterns of LPS graduates from 2010 and 2011 were used to determine the top five four-year institutions most frequently attended by LPS graduates in order to determine how ACT scores are utilized in the admissions and scholarship processes. The research also showed that while short-term test preparation has the ability to improve student achievement as measured by standardized college admission tests, a rigorous college preparatory curriculum is the best method of test preparation. Students are best served by the development of a culture of achievement through a college preparatory curriculum and a culture of evidence based on adequate assessment measures (Tierney et al., 2009). The following chapter provides a detailed overview of the methodology used in this study.

Chapter Three

Methods

The primary purpose of this research was to determine if the LPS afterhours ACT Prep course and attainment of the MCPSC led to statistically significant change in student scores between the PLAN[®] and the ACT. This study was conducted using quantitative archival data for the LPS graduating classes of 2008, 2009, and 2010. The study focused on students who had verifiable PLAN[®] composite scores, reported ACT composite scores, and who graduated from LPS. This chapter presents the methodology utilized for this study. The methodology includes information regarding the research design, population and sample, and sampling procedures. Furthermore, detailed information regarding instrumentation, validity and reliability, data collection and analysis, and limitations are presented.

Research Design

The design of this study was quantitative, quasi-experimental research, with two independent variables. The independent variables included Attainment of MCPSC Status and ACT Prep Participation Status. The dependent variable for this research was the change in composite scores between the ACT PLAN[®] assessment (PLAN[®]) and the ACT assessment as specified in the delimitations section of chapter one of this study.

Population and Sample

The population for this study was all LPS students in grades 10 through 12. The sample was limited to students who had verifiable composite scores for both the PLAN[®] assessment and the ACT assessment. Furthermore, the sample was limited to students

who had successfully graduated from LPS because attainment of the MCPSC was determined for each student after they graduated.

Sampling Procedures

Utilizing the LPS student information system, PLAN[®] research files, and historical LPS afterhours ACT Prep course rosters allowed the use of purposive sampling. The student information system indicates whether all graduates attained the MCPSC and provides all ACT composite scores reported to the school district. The LPS afterhours ACT Prep course rosters contain the names of all students who participated in each semester of the afterhours ACT Prep course. ACT, Inc. provided PLAN[®] research files each year that LPS administered the PLAN[®] assessment. These files contain the PLAN[®] composite score for all students who completed the PLAN[®]. Students who had a PLAN[®] composite score, an ACT composite score, and had graduated from LPS were selected for the study.

Instrumentation

This study utilized the results of the PLAN[®] assessment and the ACT assessment for each student in the sample. The first composite score was from the PLAN[®] assessment administered to all LPS students during the fall of their sophomore year. The PLAN[®] is essentially a shortened and less difficult version of the ACT assessment and provides students with a predictive composite score range on the ACT (ACT, Inc., 2011a).

PLAN contains four multiple-choice tests – English, Mathematics, Reading, and Science. These tests are designed to measure students' curriculum-related knowledge and the complex cognitive skills important for future education and

careers. PLAN results provide 10th-grade students with the information they need to continue making plans for high school and beyond. (ACT, Inc., 2011a, p. 5)

Table 8 provides details regarding the number of items and time limits for each subtest of the PLAN[®] assessment.

Table 8

PLAN[®] Assessment Subtest Information

PLAN [®] Subtest	# of Items	Time Limit (minutes)
English	50	30
Mathematics	40	40
Reading	25	20
Science	30	25

Note. Adapted from “PLAN Technical Manual,” by ACT, Inc., 2011a, pp. 5-6. Retrieved from <http://www.act.org/research/researchers/index.html>.

The second score was the highest attained ACT composite score as defined in the delimitations section of this study. “The ACT contains four multiple-choice tests – English, Mathematics, Reading, and Science – and an optional Writing Test. These tests are designed to measure skills that are most important for success in postsecondary education and that are acquired in secondary education” (ACT, Inc., 2007, p. 5).

Details regarding the number of items and time limits for each subtest that makes up the ACT assessment are displayed in Table 9.

Table 9

ACT Assessment Subtest Information

ACT Subtest	# of Items	Time Limit (minutes)
English	75	45
Mathematics	60	60
Reading	40	35
Science	40	35

Note. Adapted from “ACT Technical Manual,” by ACT, Inc., 2007, pp. 5-6. Retrieved from <http://www.act.org/research/researchers/index.html>.

Measurement. According to ACT, Inc. (2011a), the raw scores earned on each subtest of the PLAN[®] are converted to scale scores ranging from 1 to 32, which are averaged to determine a composite score ranging from a low of 1 to a high of 32. Similarly, the raw scores earned on each subtest of the ACT are converted to scale scores ranging from 1 to 36 which are averaged to determine a composite score ranging from a low of 1 to a high of 36 (ACT, Inc., 2007). For both assessments, the composite score is rounded to the nearest whole number (ACT, Inc., 2007; ACT, Inc., 2011a). Prior to hypothesis testing, the PLAN[®] and ACT composite scores were standardized for comparison. Each score was divided by its respective total of 32 or 36 to create a percentage. This research study utilized the change in the percentage of the composite score between the PLAN[®] and ACT for each student included in the sample.

Validity and Reliability. According to ACT, Inc. (2007), “The potential interpretations and uses of ACT scores are numerous and diverse, and each needs to be justified by a validity argument” (p. 62). ACT, Inc. (2007) conducted validity studies on

the use of ACT and PLAN[®] scores to evaluate programs and concluded that the tests are conceptually and psychometrically linked (p. 127). One study utilized linked PLAN[®] and ACT data for 403,381 students in the graduating class of 2003 and found the PLAN[®] and ACT composite scores to have a Pearson correlation coefficient of 0.88 (ACT, Inc., 2007, p. 69).

The PLAN[®] and ACT assessments measure educational development in the same curricular areas; performance on the PLAN[®] should be directly related to performance on the ACT (ACT, Inc., 2011a). Furthermore, ACT, Inc. (2010) indicated that benchmarks for college readiness are established for the PLAN[®] assessment by evaluating records of approximately 150,000 students who had taken the ACT EXPLPORE, PLAN[®], and ACT assessments and determining scores that correspond to a fifty percent probability of meeting the four subject-specific benchmarks established for the ACT. According to ACT, Inc. (2007; 2011a), reliability coefficients estimate the consistency of test scores; values range from 0 to 1 with values closer to 1 indicating greater consistency. ACT, Inc. (2011a) reported the reliability coefficient of the PLAN[®] composite score to be 0.95 (p. 37). ACT, Inc. (2007) reported the reliability of the ACT composite score to be a minimum of 0.95 and a maximum of 0.96 (p. 59). Therefore, calculating the mean change in composite score between the PLAN[®] assessment and the ACT assessment is a valid and reliable measure when assessing the impact of various college preparatory and test preparatory programs on improving ACT composite scores.

Data Collection Procedures

Permission to conduct research in the Liberty 53 Public School District was requested in the fall of 2012 (see Appendix A). Upon approval to conduct research (see

Appendix B) utilizing LPS data and adviser approval of chapters 1, 2, and 3 of this study, an IRB (Institutional Review Board) Proposal to Conduct Research was submitted to the Baker University IRB on September 4, 2012 (see Appendix C). Permission was granted by the Baker University IRB in September 2012 to begin data collection (see Appendix D). Data for this study were collected in September 2012. The first step of data collection consisted of creating an Excel spreadsheet with the following column headings: student number, Missouri College Preparatory Studies Certificate (MCPSC) status, afterhours ACT Prep course participation date, PLAN[®] composite score, and highest ACT composite score.

Once the worksheet was created, MCPSC attainment status was determined for each graduate from the years 2008 to 2010 by exporting the relevant field from both SASI (LPS student information system from the 2007-08 school year through the 2008-09 school year) and PowerSchool (LPS student information system from the 2009-10 school year to the present) into the Excel worksheet. Students who did not attain the MCPSC were coded with a 1 while students who did attain the MCPSC were coded with a 2. Next, the afterhours ACT Prep course Excel rosters were used to identify students who participated in the afterhours ACT Prep course. Students who did not participate were coded with a 1 while students who did participate were coded with a 2. Subsequently, PLAN[®] composite scores were exported for each graduating class from the PLAN[®] data disks for the graduation classes of 2008, 2009, and 2010 and added to the worksheet. Next, ACT composite scores were exported for 2008, 2009, and 2010 graduates from the corresponding student information system and added to the worksheet following the delimitations of the study. Once all data were compiled, each student

number was replaced in the Excel worksheet with an arbitrary number ordered from 1 to 1,212 in order to protect student anonymity. Finally, all documents utilized to compile the data were returned to LPS or destroyed as appropriate.

Data Analysis and Hypothesis Testing

After collection and compilation of the archival data, hypothesis tests were conducted for each research question utilizing a two-factor analysis of variance (ANOVA) within the Statistical Package for the Social Sciences (SPSS) software program, version 19.0. The two-way ANOVA was conducted to determine if MCPSC Status or ACT Prep Participation Status led to a statistically significant main effect on the difference in the mean composite score change. Furthermore, the two-way ANOVA was conducted to determine if there was a statistically significant interaction effect between Attainment of MCPSC Status and ACT Prep Participation Status on the difference in the mean composite score change. Significance was set at $\alpha = 0.05$ level for all hypothesis tests. Each research question and its corresponding hypothesis are listed below.

Research Question 1: To what extent is there a significant difference in the change in composite scores from the PLAN[®] to the ACT between students who completed the Missouri College Preparatory Studies Certificate (MCPSC) and those who did not?

Hypothesis 1: There is a statistically significant difference in the mean change in composite scores from the PLAN[®] to the ACT between students who completed the MCPSC and those who did not.

Research Question 2: To what extent is there a significant difference in the change in composite scores from the PLAN[®] to the ACT between students who participated in the afterhours ACT Prep course and those who did not?

Hypothesis 2: There is a statistically significant difference in the mean change in composite scores from the PLAN[®] to the ACT between students who participated in the afterhours ACT Prep course and those who did not.

Research Question 3: To what extent is there a significant difference in the change in composite scores from the PLAN[®] to the ACT among students who completed the MCPSC and participated in the afterhours ACT Prep course as compared to students who participated in only one of the programs or neither of the programs?

Hypothesis 3: There is a statistically significant difference in the change in composite scores from the PLAN[®] to the ACT between students who completed the MCPSC and participated in the afterhours ACT Prep course as compared to students who participated in only one of the programs or neither program.

Limitations

Limitations existed in this study that could impact the ability to generalize the results of this study and may negatively affect the results. The limitations were:

1. Fewer than one hundred percent of graduates completed an ACT assessment.
2. Fewer than one hundred percent of the graduates completed the PLAN[®].

Both of the identified limitations could impact the ability to generalize the study because they represent student data that is missing for each graduating class.

Summary

This chapter provided a review of the research goals including the primary purpose of the study as well as the details concerning the methodology of the study. The experimental design was specified as quantitative, quasi-experimental. The population and sample were identified, as were the sampling procedures. The instruments were described and information was presented regarding the instruments' validity and reliability. Procedures for data collection, analysis, and hypothesis testing were also presented along with limitations that may affect the ability to generalize the study. Chapter four presents the results of hypothesis testing including the descriptive statistics.

Chapter Four

Results

The purpose of this research study was to determine if attainment of the Missouri College Preparatory Studies Certificate (MCPSC) and the Liberty Public Schools (LPS) afterhours ACT Prep course led to statistically significant growth as measured by the change in composite scores from the PLAN[®] assessment to the ACT assessment. Furthermore, the researcher sought to determine if an interaction effect was present between both attainment of the MCPSC and participation in the ACT Prep course. The preceding chapters presented an introduction to the problem addressed by the study, a review of the literature related to the study, and the methodology used in the study. Quantitative data were collected from LPS graduates in the 2008, 2009, and 2010 academic years, and a two-way ANOVA was used to address all three research questions. The following chapter summarizes the descriptive statistics, test statistics, and the results of hypothesis testing for all three research questions.

Hypothesis Testing

A two-factor analysis of variance (ANOVA) was conducted to address research questions 1, 2, and 3. The two categorical variables used to group the students' change from the PLAN[®] to the ACT were Certificate Status and Participation Status. The two-factor ANOVA was used to test three hypotheses including a main effect for Certificate Status, a main effect for Participation Status, and a two-way interaction effect (Certificate Status x Participation Status).

Research Question 1: To what extent is there a significant difference in the change in composite scores from the PLAN[®] to the ACT between students who

completed the Missouri College Prep Studies Certificate (MCPSC) and those who did not?

H1: Change in composite scores for students attaining the MCPSC did not equal change in composite scores for students not attaining the MCPSC.

The main effect for Certificate Status was used to test hypothesis 1. The results of the analysis indicated a statistically significant difference between the two means: $F(1,1212) = 158.862, p < .01$. The mean change in composite scores for students who attained the MCPSC was an increase of 5.12% compared to an increase of 0.93% for students who had not attained the MCPSC. This difference of 4.19% between the means equates to 1.5 composite scale points on the ACT assessment. Table 10 presents descriptive statistics for the change between the PLAN[®] and ACT composite scores for students who attained the MCPSC.

Table 10

Change in Percentage Composite Score for Students who did or did not Attain the MCPSC

	<i>N</i>	<i>M</i>	<i>SD</i>
Yes	610	.0512	.05595
No	602	.0093	.05880

Note. Percentages are listed in decimal form.

Research Question 2: To what extent is there a significant difference in the change in composite scores from the PLAN[®] to the ACT between students who participated in the afterhours ACT Prep course and those who did not?

H2: Change in composite scores for students participating in the afterhours ACT Prep course did not equal change in composite scores for students not participating in the afterhours ACT Prep course.

The main effect for Participation Status was used to test hypothesis 2. The results of the analysis indicated a statistically significant difference between the two means: $F(1,1212) = 7.041, p < .01$. The mean change in composite scores for students participating in the ACT Prep course was an increase of 3.58% compared to an increase of 2.77% for students who had not participated in the ACT Prep course. This difference of 0.81% between the means equates to 0.3 composite scale points on the ACT assessment. Table 11 presents descriptive statistics for the change between the PLAN[®] and ACT composite scores for students who participated in the LPS afterhours ACT Prep course.

Table 11

Change in Percentage Composite Score for Students who did or did not Participate in the Afterhours ACT Prep Course

	<i>N</i>	<i>M</i>	<i>SD</i>
Yes	409	.0358	.05849
No	803	.0277	.06221

Note. Percentages are listed in decimal form.

Research Question 3: To what extent is there a significant difference in the change in composite scores from the PLAN[®] to the ACT between students who completed the MCPSC and participated in the afterhours ACT Prep course as compared to students who participated in only one of the programs or neither of the programs?

H3: Change in composite scores for students participating in the afterhours ACT Prep course and attaining the MCPSC did not equal change in composite scores for students not participating in the afterhours ACT Prep course or attaining the MCPSC.

The interaction effect (Certificate Status x Participation Status) was used to test hypothesis 3. The results of the analysis indicated there is not a statistically significant difference between at least two of the means: $F(1,1212) = 2.183, p > .05$. Table 12 presents descriptive statistics for the interaction effect between Certificate Status and Participation Status as measured by change in percentage composite score.

Table 12

Change in Percentage Composite Score by Certificate Status and Participation Status

Certificate Status / Participation Status	<i>N</i>	<i>M</i>	<i>SD</i>
CS Yes/PS Yes	199	.0609	.05749
CS Yes/PS No	411	.0465	.05464
CS No/PS Yes	210	.0120	.04875
CS No/PS No	392	.0079	.06355

Note. Percentages are listed in decimal form. CS = Certificate Status. PS = Participation Status.

Table 13 presents the results of the two-way ANOVA for all hypothesis tests.

Table 13

ANOVA Results

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P</i>
Certificate Status	.520	1	.520	158.862	.000
Participation Status	.023	1	.023	7.041	.008
Certificate Status x Participation Status	.007	1	.007	2.183	.140
Error	3.954	1208	0.3		
Total	5.637	1212			

Note: Certificate Status = Attained MCPSC/Did not attain MCPSC; Participation Status = Participated in afterhours ACT Prep course/Did not participate in afterhours ACT Prep course.

Summary

This chapter presented the results of the two-way ANOVA used to analyze the data collected in this study. These results of the statistical analysis were utilized to answer research questions 1, 2, and 3. The results of the hypothesis tests indicated statistically significant differences in the means for both Certificate Status and Participation Status. The results also indicated that the interaction effect between the Certificate Status and Participation Status variables was not statistically significant. Chapter five presents a summary of the study, research findings, how the findings relate to the literature, implications for action, and recommendations for further research.

Chapter Five

Interpretation and Recommendations

The preceding four chapters have presented the background, problem, significance, purpose, and research questions of this study. Next, a review of the literature related to the costs and benefits of postsecondary education, measures of college readiness, the development of the PLAN[®] and ACT, admissions and scholarship requirements for select Missouri colleges/universities, and methods to prepare students for college admissions exams was presented. Finally, the research methodology of the study and the resulting hypothesis tests and statistical analysis of the data collected during the study were presented. The fifth chapter presents a summary of the study including an overview of the problem, the purpose statement and research questions, a review of the methodology, and the major findings of the study. Finally, chapter five concludes with implications for action and recommendations for further research.

Study Summary

This study was conducted to determine the impact attainment of the MCPSC and/or participation in the LPS afterhours ACT Prep course had on the change in composite scores between the PLAN[®] and the ACT. The study took place in the Liberty Public School (LPS) District in Liberty, Missouri. The sample consisted of 1,212 students from the graduating classes of 2008, 2009, and 2010 who had identifiable PLAN[®] and ACT composite scores.

Overview of the Problem. School improvement initiatives in LPS have resulted in permission from ACT, Inc. to participate in the ACT DCST program to increase access to the test for students who may not otherwise take it and to utilize the results in the

school improvement process. Several concerns are associated with participating in the ACT DCST program including the expense of participation, the desire to rush to implement programs to improve student ACT scores, and the impact testing one-hundred percent of LPS students will have on the LPS ACT assessment composite score. With these concerns in mind, it was critical for LPS to determine if the two existing programs focusing on college preparation and ACT test preparation, the MCPSC and the afterhours ACT Prep course, led to statistically significant differences in the change in composite scores from the PLAN[®] to the ACT.

Purpose Statement and Research Questions. The purpose of this study was to determine the effectiveness of two factors utilized by LPS to improve student performance on the ACT assessment. Specifically, this researcher sought to determine if the LPS afterhours ACT Prep course and attainment of the MCPSC led to a significant difference in composite score change between the PLAN[®] and the ACT assessments. The first independent variable utilized in this study, certificate status, indicated the MCPSC attainment status of all students in the sample. The second independent variable utilized in this study, participation status, indicated LPS ACT Prep participation status of all students in the sample. The dependent variable utilized in this study was the percentage change in composite scores between the PLAN[®] and the ACT assessment.

Review of the Methodology. A quantitative, quasi-experimental design was utilized in this study. Archival data were collected for LPS graduates from the classes of 2008, 2009, and 2010. The purposive sample consisted of LPS graduates from these classes who had identifiable PLAN[®] and ACT composite scores. Students in grades 10

through 12 attending LPS represented the population of the study. A two-factor ANOVA was utilized to analyze the data once it was collected.

Major Findings. The researcher investigated the extent to which two factors, MCPSC attainment and LPS afterhours ACT Prep course participation, effected the growth in composite scores between the PLAN[®] and ACT assessments for LPS graduates. Results of hypothesis testing indicated that each factor had a statistically significant main effect on the dependent variable. However, hypothesis testing indicated there was not a statistically significant interaction effect between at least two of the means. Findings related to each research question are present below.

Research question 1 focused on the MCPSC, which was a set of requirements that exceeded Missouri's minimum graduation requirements. It was hypothesized that attaining a MCPSC would have a positive impact on student achievement as measured by the growth in composite scores between the PLAN[®] and ACT assessments. The results of the hypothesis test provided evidence supporting the hypothesis that students who completed the MCPSC had statistically significant positive growth in their composite scores between the PLAN[®] and the ACT. Specifically, the mean percentage growth in composite scores of students who attained the MCPSC was 4.19% higher than the mean percentage growth in composite scores of students who had not attained the MCPSC.

Research question 2 focused on participation in the LPS afterhours ACT Prep course, which is a course that meets 1 day a week, for 3.5 hours per day. It was hypothesized that participation in the ACT Prep course would have a positive impact on student achievement as measured by the change in composite scores between the PLAN[®] and the ACT assessments. The results of the hypothesis test provided evidence

supporting the hypothesis that students who participated in the LPS afterhours ACT Prep course had statistically significant positive growth in their composite scores between the PLAN[®] and the ACT. Specifically, the mean percentage growth in composite scores of students who participated in the LPS afterhours ACT Prep course was 0.81% higher than the mean percentage growth in composite scores of students who did not participate in the LPS afterhours ACT Prep course.

Research question 3 focused on the possible interaction effect between attainment of the MCPSC and participation in the ACT Prep course. It was hypothesized that attainment of the MCPSC along with participation in the ACT Prep course would have a positive impact on student achievement as measured by the change in composite scores between the PLAN[®] and the ACT assessments. Hypothesis test results did not support the hypothesis that an interaction effect existed between MCPSC attainment status and LPS afterhours ACT Prep course participation status. The lack of a statistically significant interaction effect between the independent variables of this study indicates that the effects of certificate status are independent of participation status and the effects of participation status are independent of certificate status.

Findings Related to the Literature

This section connects the findings of the hypothesis tests of this study with the literature reviewed in chapter two. While there is some disparity, the findings of this study closely match the theory and studies from the literature review that focus on student achievement growth as measured by standardized tests like the ACT. The discussion focuses on MCPSC attainment and its relation to a rigorous curriculum, participation in the ACT Prep course and its relation to other test preparation programs, and the possible

interaction effects present between MCPSC attainment and participation in the ACT Prep course as they relate to the literature. Finally, the results of this study are discussed in terms of their potential impact on students in terms of enrollment opportunities and finances.

The results of this study indicate that meeting the requirements to attain the MCPSC results in statistically significant growth in composite scores between the PLAN[®] and the ACT assessments. These results correspond to research by ACT, Inc. (2005b; 2006a; 2009b) that indicated students who complete or exceed a recommended core high school curriculum are more likely to increase their ACT scores and be college and career ready. Additionally, the results of this study support the National Association for College Admission Counseling's theory that focusing on core content knowledge and skills necessary to meet future academic needs is the best form of test preparation as compared to short term ACT preparation activities. Finally, the findings of Attwell and Domina (2008), Hichens (2009), and Pound (2011) that as coursework rigor increases ACT achievement increases, are supported by this study's finding that attainment of the MCPSC leads to statistically significant growth in composite scores between the PLAN[®] and the ACT assessments.

The results of this study also indicate participation in the LPS afterhours ACT Prep course leads to statistically significant growth in composite scores between the PLAN[®] and the ACT assessments. This result supports the statement by the National Association for College Admission Counseling (2008) that college admissions professionals, test preparation companies, and test agencies all agree that test scores can be increased by participating in activities designed to prepare for tests. The current

study's results support Donen's (2012) findings that an ACT preparation course can lead to statistically significant gains. Similarly, Justus (2010) found that students with PLAN[®] mathematics scores between 17 and 18 who took a mathematics ACT preparation course made statistically significant gains on the math subtest of the ACT while students with PLAN[®] mathematics scores between 12 and 16 made gains that were not statistically significant. Justus' findings are supported in part by this study's results that ACT preparation led to statistically significant composite score change between the PLAN[®] and the ACT; however, the current study did not differentiate the effect based on initial PLAN[®] scores. Furthermore, the difference between the means in the current study between students who participated in the ACT Prep course and those who do not is 0.81% or approximately 0.3 composite score points on the ACT which support statements by Briggs (2001) that indicated the effect of coaching on ACT math, reading, and English subtests is never more than a single point. The current study's results are consistent with ACT, Inc.'s (2005b; 2009a) contention that test preparation programs focused on test-taking skills help improve test performance, but such programs cannot supply the skills and knowledge needed to see the score increases associated with skills and content knowledge acquired in high school coursework over extended periods of time.

Finally, the current study's results contrast with those of Keltner (2004) who found that a 7-week ACT preparation course did not lead to significant differences in ACT composite scores between those who did or did not participate in the course. However, Keltner (2004) analyzed ACT composite scores without a measurement of student performance prior to participating in the ACT preparation course. The current study measured the change in composite scores between the PLAN[®] and the ACT after

participation in the LPS afterhours ACT Prep course, which could explain the difference in results.

Conclusions

Results of the two-way ANOVA revealed a statistically significant main effect for attainment of the MCPSC on the change in composite scores between the PLAN[®] and the ACT. Results also revealed a statistically significant main effect for participation in the afterhours ACT Prep course on the change in composite scores between the PLAN[®] and the ACT. However, the study did not find a statistically significant interaction effect between MCPSC attainment and ACT Prep course participation on the change in composite scores between the PLAN[®] and the ACT. This section provides implications for actions, recommendations for further research, and concluding remarks based on these findings.

Implications for Action. The findings of this study have profound implications for schools and students alike. First, this study found a statistically significant relationship between attainment of the MCPSC and the change in composite scores between the PLAN[®] and the ACT assessments. This finding provides evidence for students to enroll in challenging courses and for teachers to increase the rigor of their courses. Considering Missouri has discontinued the MCPSC, these results would also support the development and promotion of a local college preparatory studies certificate or diploma. Moreover, these results provide the evidence to support the revision and expansion of curriculum as needed to ensure all students are enrolled in rigorous college preparatory high school courses. Specifically, roadblocks to enrollment in rigorous courses such as prerequisites must be removed if they are preventing students from

challenging themselves academically. In addition, this study provides the faculty and staff of LPS with statistically sound data that can be used to advise students and parents.

Second, this study found a statistically significant relationship between participation in the LPS afterhours ACT Prep course and the change in composite scores between the PLAN[®] and the ACT assessments. This finding supports the development of a credit based ACT Prep course or possible ACT Subtest Prep courses. However, the results of the study indicate that any ACT Prep course should focus on skills and content knowledge and not simply test-taking strategies. Continued analysis of the effectiveness of any ACT Prep course should be conducted to ensure it is having a statistically significant positive impact on composite ACT scores.

Finally, the results of this study indicate that students can engage in programs or activities that improve their composite ACT score. Between LPS participating in the ACT DCST program, the rising cost of college tuition, the number of achievement-based scholarships at Missouri 4-year universities, and the economic returns to education, it is apparent that any improvement on the change in composite scores between the PLAN[®] and the ACT assessments has the potential to benefit LPS and students.

Recommendations for Future Research. The results of the current study indicated that attainment of the MCPSC or participation in the LPS afterhours ACT Prep class led to statistically significant changes between the average composite scores of the PLAN[®] and the ACT assessments for LPS graduates. However, this study focused on both attainment of the MCPSC and participation in the LPS afterhours ACT Prep class for the total population of LPS only. The following recommendations for future research will allow replication of this study, expansion of this study to include special populations,

expansion of this study to other schools, and expansion of this study to other programs/courses.

1. Replicate this study at the district level for the LPS graduating classes of 2011 and 2012 after a transcript review to determine which students would have earned an MCPSC.
2. Replicate this study at LPS while adding ethnicity, IEP status, and 504 status, as factors in the ANOVA to determine if the results are different among various subgroups.
3. Replicate this study at LPS utilizing PLAN[®] and ACT subtest scores in addition to the composite scores.
4. Replicate the current study in other school districts that have an ACT Prep course and compare the findings with this study.
5. Conduct a follow up study to determine the extent to which certificate status and preparation status led to increased college enrollment, increased scholarship opportunities, and persistence to graduation.
6. Conduct a follow-up study focusing on course enrollment patterns, specifically looking at course rigor, and their impact on the growth in composite scores between the PLAN[®] and the ACT assessments.
7. Conduct a follow up study to determine if certificate status and participation status lower the chances a student will have to take remedial coursework at the collegiate level.

Concluding Remarks. The purpose of this study was to determine if participation in the LPS afterhours ACT Prep course (participation status) and/or

attainment of the MCPSC (certificate status) led to a significant difference in composite score change when comparing student scores on the PLAN[®] and ACT assessments. Analysis of certificate status revealed that certificate status did have a statistically significant effect on the change in the percentage of the composite scores between the PLAN[®] and ACT assessments. Additionally, the analysis revealed that participation status also led to a statistically significant effect on the change in the percentage of the composite scores between the PLAN[®] and ACT assessments. Further, the results of the two-factor ANOVA (see Table 13) indicated there was not a statistically significant interaction effect between certificate status and participation status on the change in composite scores. Information presented in chapters one and two of this study regarding the necessity, benefits, and costs of postsecondary education make it clear that preparing students for postsecondary education is a critical goal for the modern comprehensive high school. Furthermore, the results of this study can be used by LPS administrators, counselors, and teachers when advising students seeking to improve their academic achievement as measured by performance on the ACT. However, this study only measured two factors that impact composite score growth between the PLAN[®] and the ACT. Continued research in the area of student achievement as measured by ACT performance, persistence to graduation at the collegiate level, and other dependent variables is critical if we wish to ensure that we are both providing students with, and advising students to take appropriate programs that lead to increased student achievement.

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Appendices

Appendix A: LPS Request to Conduct Research

July 1, 2012
 Mr. Christopher Hand
 Director of Assessment, Evaluation, and Testing: Liberty Public Schools
 650 Conistor
 Liberty, MO 64068

RE: Permission to Conduct Research Study

Dear Mr. Hand,

In order to complete the requirements for the dissertation in my doctoral program through Baker University, I am requesting permission to access and utilize the following academic data for students in the graduating classes of 2008, 2009, and 2010: 1) Individual and District ACT Plan score data, 2) Individual and District ACT score data, 3) Individual Liberty Public School graduate Missouri College Preparatory Studies Certificate Status, and 4) Rosters of students participating in the LPS ACT Prep course.

The proposed title of my dissertation is: Effectiveness of the Missouri College Preparatory Studies Certificate and the Liberty Public School's Afterhours ACT Preparation Course in Improving ACT Composite Scores in the Liberty 53 Public School District. The data needed for the study must be obtained as soon as possible after receiving IRB approval for the study. Tentatively, the data will be compiled and analyzed by August of 2012 and the final dissertation submitted during the fall of 2012.

The data will be utilized to determine whether participation in the LPS ACT Prep course and/or attainment of the Missouri College Preparatory Studies Certificate significantly improves student success on the ACT as measured by the difference between the student's ACT Plan composite score and their ACT composite score. I will be completing a two-way ANOVA to determine if either variable results in a main effect on the change in score between the ACT Plan composite score and the ACT composite score and to determine if both variables have an interaction effect on the composite score difference.

This study will benefit Liberty Public Schools as it will provide a statistical analysis of existing programs that are being promoted to students. This analysis may be utilized to determine future initiatives related to preparing students for the ACT assessment. The study poses little to no risk to students and staff as the data is historical and will be stripped of all identifying information. There is a slight risk to the District in terms of public exposure if the data indicates that the programs have no statistical impact on student ACT achievement. However, the mission of Liberty Public Schools can only be achieved with detailed analysis of its educational programs.

All of the data used in this study are historical and at no time will students, staff, or parents be involved in the study. Collection of the data will require little to no time for Liberty Public School staff. Furthermore, at no time during the research or subsequent publication of the study will any student names or identifying information be released or published. Additionally, standard LPS confidentiality practices will be employed at all times while the data is being collected, compiled, and analyzed.

Your approval to conduct this study will be greatly appreciated. I will follow up with a telephone call in order to answer any questions and address any concerns you may have at that time. You may contact me at my email address at any time: kellymsaluri@stu.bakeru.edu.

Sincerely,



Kelly Saluri
 Baker University Doctoral Student

LIBERTY PUBLIC SCHOOLS

cc: Dr. Harold Frye, Research Advisor, Baker University



Appendix B: LPS Approval to Conduct Research



Research Checklist and Approval

Date: **July 1, 2012**

Submitted to: **Christopher B. Hand - Director of Assessment, Evaluation, and Testing**

Submitted by: **Kelly Saluri - Baker University Doctoral Student**

Research Proposal Title: **Effectiveness of the Missouri College Preparatory Studies Certificate and the Liberty Public School's Afterhours ACT Preparation Course in Improving ACT Composite Scores in the Liberty 53 Public School District**

Principal Investigator(s): **Kelly Saluri - Baker University Doctoral Student**

Checklist

- Completed "Application to Conduct Research in Liberty Public Schools"
- Copy of "Informed consent" letter to study population/parents
- Copies of measurement instruments *(Letter 6/30/12) CBH*
- Approval from university human subjects committee (IRB) if applicable *(Semester Fall 2012) CBH*
- Three (3) copies of your complete application package

Approval of this research is contingent on adherence to district procedures as outlined in the document entitled "Application to Conduct Research" and the information provided with the application. The district must be notified of any substantive changes to the information contained in the application. The district reserves the right to withdraw approval of research if the research is deemed to no longer be in the best interests of the Liberty Public Schools students, staff, or the district.

Research Application: Approved Denied Date: 8/2/12

Signatures

Christopher B. Hand
Director of Assessment, Evaluation, and Testing

N/A
Principal

N/A
Principal

LIBERTY PUBLIC SCHOOLS
CBH 8/12



Appendix C: IRB Application



SCHOOL OF EDUCATION
GRADUATE DEPARTMENT

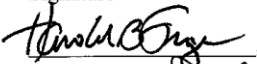
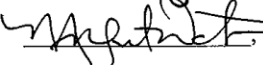
Date: 9/4/2012

IRB PROTOCOL NUMBER _____
(IRB USE ONLY)

IRB REQUEST
Proposal for Research
Submitted to the Baker University Institutional Review Board

I. Research Investigator(s) (Students must list faculty sponsor first)

Department(s) School of Education Graduate Department

Name	Signature	
1. Harold Frye		Major Advisor
2. Margaret Waterman		Research Analyst
Principal Investigator:	Kelly Saluri	_____
Phone:	816-781-7262	
Email:	kellymsaluri@stu.bakeru.edu	
Mailing address:	720 Plum Rose Dr. Liberty, MO 64068	
Faculty sponsor:	Dr. Harold Frye	
Phone:		
Email:	Hfrye@bakeru.edu	

Expected Category of Review: Exempt Expedited Full

II: Protocol: The Impact of the Missouri College Preparatory Studies Certificate and the Liberty Public School's Afterhours ACT Preparation Course in Improving ACT Composite Scores in the Liberty 53 Public School District

Summary

In a sentence or two, please describe the background and purpose of the research.

The purpose of this study is to evaluate the effectiveness of the Liberty Public Schools (LPS) ACT Prep Program and the Missouri College Prep Studies Certificate. Currently, the State of Missouri has dropped the College Prep Studies Certificate program and LPS has become an ACT District Choice testing District. Results from this study will help LPS administrators and staff determine if existing programs meet the needs of students and the school District in terms of preparing students for the ACT exam. The LPS District is located in northwestern Missouri as a suburb of the Greater Kansas City metro area. The district is largely middle class and is comprised of approximately 11,300 students.

Briefly describe each condition or manipulation to be included within the study.

There is no condition or manipulation in this study. The research sample will consist of Liberty Public School graduates in the following years: 2008, 2009, and 2010. The researcher will compile ACT Plan scores, ACT scores, ACT Prep Participation Status, and MO College Prep Studies Certificate completion status for each graduate and compile this data via Microsoft Excel. After completing the data compilation, all identifiable student information will be removed from the spreadsheet.

What measures or observations will be taken in the study? If any questionnaire or other instruments are used, provide a brief description and attach a copy.

Will the subjects encounter the risk of psychological, social, physical or legal risk? If so, please describe the nature of the risk and any measures designed to mitigate that risk.

Historical data will be collected in this study. There will be no questionnaires or other instruments. Subjects will encounter no psychological, social, physical, or legal risk in the study.

Will any stress to subjects be involved? If so, please describe.

Subjects will not be exposed to stress as the research involves historical data only.

Will the subjects be deceived or misled in any way? If so, include an outline or script of the debriefing.

Subjects will not be deceived or misled in any way.

Will there be a request for information which subjects might consider to be personal or sensitive? If so, please include a description.

No information will be requested as all data used is archival. The research will be utilizing historical data involving ACT Plan scores, ACT scores, ACT prep participation, and Missouri College Prep Studies Certificate Completion Status as reported to Liberty Public Schools.

Will the subjects be presented with materials which might be considered to be offensive, threatening, or degrading? If so, please describe.

Subjects will not be presented with any materials in this study.

Approximately how much time will be demanded of each subject?

Subjects will not actively participate in this study. All data will come from historical records.

Who will be the subjects in this study? How will they be solicited or contacted? Provide an outline or script of the information which will be provided to subjects prior to their volunteering to participate. Include a copy of any written solicitation as well as an outline of any oral solicitation.

Subjects in the study will not be contacted. The data used in the study is historical and has already been reported to the Liberty Public School District.

What steps will be taken to insure that each subject's participation is voluntary? What if any inducements will be offered to the subjects for their participation?

Subjects will not participate in the study. The data used in the study is historical and has already been reported to the Liberty Public School District.

How will you insure that the subjects give their consent prior to participating? Will a written consent form be used? If so, include the form. If not, explain why not.

Consent for the study is not necessary. The researcher will be utilizing historical data that has been reported to the Liberty Public School District.

Will any aspect of the data be made a part of any permanent record that can be identified with the subject? If so, please explain the necessity.

No aspect of the data analysis will be made a part of a permanent record that can be identified with the subject. The researcher will temporarily use student names to compile data that currently exists within the Liberty Public School system. After compilation of the data, the student names will be removed from all Excel documents created as part of this study.

Will the fact that a subject did or did not participate in a specific experiment or study be made part of any permanent record available to a supervisor, teacher or employer? If so, explain.

Archival data will be used and no subject will be identified. Participation is not required and, therefore, data regarding specific subjects will not be made a part of any permanent record.

What steps will be taken to insure the confidentiality of the data?

Confidentiality will be kept secure as the researcher alone will compile the data from various historical sources within the Liberty Public School System. After the data has been compiled, the researcher will delete all identifiable information from compiled data.

If there are any risks involved in the study, are there any offsetting benefits that might accrue to either the subjects or society?

There are no risks involved with this study.

Will any data from files or archival data be used? If so, please describe.

This study is based solely on data from archival files. These files include: ACT PLAN score data discs, ACT scores reported to LPS and stored in Student Information Systems, ACT Prep Attendance Rosters, and finally, Missouri College Prep Studies Completion Status as stored in LPS Student Information Systems.

Appendix D: IRB Approval

September 21, 2012

Mr. Kelly Saluri
720 Plum Rose Drive
Liberty, MO 64068



Dear Mr. Saluri:

The Baker University IRB has reviewed your research project application (M-0148-0910-0921-G) and approved this project under Exempt Review. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

The Baker University IRB requires that your consent form must include the date of approval and expiration date (one year from today). Please be aware of the following:

1. At designated intervals (usually annually) until the project is completed, a Project Status Report must be returned to the IRB.
2. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
3. Notify the OIR about any new investigators not named in original application.
4. Any injury to a subject because of the research procedure must be reported to the IRB Chair or representative immediately.
5. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity. If you use a signed consent form, provide a copy of the consent form to subjects at the time of consent.
6. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.

Please inform Office of Institutional Research (OIR) or myself when this project is terminated. As noted above, you must also provide OIR with an annual status report and receive approval for maintaining your status. If your project receives funding which requests an annual update approval, you must request this from the IRB one month prior to the annual update. Thanks for your cooperation. If you have any questions, please contact me.

Sincerely,

A handwritten signature in black ink that reads 'Carolyn Doolittle'.

Carolyn Doolittle, EdD
Chair, Baker University IRB