ACADEMIC COLLEGE READINESS INDICATORS OF SENIORS ENROLLED IN UNIVERSITY-MODEL SCHOOLS® AND TRADITIONAL, COMPREHENSIVE CHRISTIAN SCHOOLS

by

Sharon Christian Brobst

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

This correlational study examined the relationship between type of high school a senior attends (University-Model School® (UMS®) or traditional, comprehensive Christian) and academic college readiness, when controlling for prior academic achievement and gender. The study compared archival data from Christian school graduates from six schools located near Dallas, TX. Each took the Stanford-10 in their seventh, eighth, or ninth-grade years, which controlled for prior academic achievement. SAT and ACT scores measured academic college readiness. Results of three sequential multiple regressions, controlling for confounding, showed that prior academic achievement was significant in predicting SAT Composite, SAT Writing, and ACT Composite scores. Prior academic achievement and gender were statistically significant for the same three predictions. Gender was found to be a predictor of academic college readiness for SAT Writing. School type was found to be a statistically significant predictor for SAT Composite. The model that includes school type, while controlling for gender and prior academic achievement, was found to be significant for predicting academic college readiness for all three exams. The unstandardized regression coefficient for the SAT Composite yielded statistically significant results showing that UMS® seniors averaged higher scores on the SAT Composite exam than traditional, comprehensive Christian school seniors; however, the standardized regression coefficient did not find practical significance for the relationship between school type and academic college readiness.

Keywords: academic college readiness; University-Model School®; traditional, comprehensive, Christian school; SAT; ACT; prior academic achievement

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My entire doctoral journey has been an act of worship to the almighty God who created me to love learning and whose source of strength allowed me to finish the race. To God be all the glory!

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List of Abbreviations

AAC - Achievement/Ability Comparisons

AACS - American Association of Christian Schools

AAD – Academic Achievement Discourse

ACE - Accelerated Christian Education

ACSI - Association of Christian Schools International

ADP - American Diploma Project

ANCOVA - Analysis of Covariance

AP – Advanced Placement

AYP – Adequate Yearly Progress

BSCS - Biological Sciences Curriculum Study

BJU - Bob Jones University

CAMS - California Academy of Mathematics and Science

CEM – Coarsened Exact Matching

CSRD - Comprehensive School Reform Demonstration Program

DOE – Department of Education

ECHSI - Early College High School Initiative

EPIC - Educational Policy Improvement Center

GPA – Grade-Point Average

HDD – Human Development Discourse

IRB – Institutional Review Board

MACSA - Mid-Atlantic Christian School Association

MANCOVA – Multivariate Analysis of Covariance

NACS – National Association of Christian Schools

NAUMS - National Association of University-Model Schools

NCE – Normal Curve Equivalent

NCEA - National Center for Educational Achievement

NCLB - *No Child Left Behind Act*

PLP - Personalized Learning Plan

PBL - Project Based Learning

S4S - Standards for Success

SACS - Southern Association of Colleges and Schools

SAT-10 - Stanford Achievement Test-10

SCCT - Social Cognitive Career Theory

SIP - *Standards in Practice*™

SPLO - Secondary-Postsecondary Learning Options

SRI - Student Readiness Inventory

STEM - Science, Technology, Engineering, and Math

UMS® – University-Model School®

CHAPTER ONE: INTRODUCTION

In President Obama's State of the Union address in January, 2010, he stated, "In this economy, a high school diploma no longer guarantees a good job" (as cited in Bushaw & Lopez, 2010, p. 19). Findings of the forty-second annual Phi Delta Kappa/Gallup Poll that year backed up his statement. In 1978, only 36% of those interviewed said that a college education was essential for success. In 1983, the percentage had risen to 58%, and by 2010, 75% of Americans agreed that a college education was necessary to be successful in today's changing world. In addition, 91% stated that all high school students should graduate being prepared for post-secondary education and career. Unfortunately, Americans believe that high school graduates are less prepared for college success today than when they graduated from high school, even though 92% of respondents said that their own children would go to college (p. 20).

Numerous reform models are being implemented at the high school level with the goal of better preparing high school seniors for success in college. A unique model that was started in December of 1992 as a test school in the Christian school community is the University-Model School® (UMS®). Proponents of this model emphasize the importance of rigorous academics and character development. Classes are scheduled using a university-type schedule, with students attending classes whenever their courses are held. This model provides parents and children more time to spend as a family, thus increasing the parents' influence in their child's academic and character development.

The purpose of this correlational study was to expand on previously conducted research concerning the relationship of high school reform models to college readiness (O'Connor & Justice, 2008; Thompson & Ongaga, 2011; Hoxby, Murarka, & Kang,

2009; Booker, Sass, Gill & Zimmer, 2008; Miron, Nelson, & Risley, 2002; Smith, Clark & Blomeye, 2005). The study desired to determine if enrollment in a UMS® at the high school level has a statistically significant relationship to academic college readiness as compared to enrollment in a traditional, comprehensive Christian high school, controlling for prior academic achievement and other school and individual characteristics. This chapter begins with providing background to the study, followed by the problem statement, and the statement of the purpose. It continues with the research questions to be answered and with a statement of the hypotheses. It concludes with identification of the variables and definition of terms pertinent to the study.

Background

Educators do not agree on the best way to prepare high school students for college. Most attempts to hold schools accountable for increased student achievement fall under the theoretical framework of Academic Achievement Discourse (AAD). AAD is a term coined by Thomas Armstrong (2006) that refers to the current educational movement spurred on by Public Law 107-110, also known as the *No Child Left Behind Act of 2001* that includes high-stakes testing and adequate yearly progress (p. 3). AAD did not begin, however, in the twentieth century. In fact, one of the most significant historical events in favor of AAD was the Committee of Ten's report that was written in 1893. The committee's goal was to standardize high school curriculum so that all students who entered college would have received the same college-preparatory curriculum (pp. 16-18).

Another prevalent framework upon which high school reforms are built is Human Development Discourse (HDD). HDD promotes educating the whole child, including his

or her "cognitive, emotional, social, ethical, creative, and spiritual" aspects in the educational equation (Armstrong, 2006, p. 39). Educators who promote humanism or creativity would fall into this camp. A key component of this school of thought is that education should be individualized to the needs and interests of the students, thus developing within each student a passion for lifelong learning.

The first round of high school reform took place between 1890 and 1920, resulting in a "college-prep for all" mindset that did not produce the desired results (Murphy, 2006). Today's effort at high school reform is built upon the consensus of current researchers that an effective high school is a combination of a "rigorous and relevant curricula for all students in a personalized and responsive learning community with strong relations between teacher and student and between school and parents" (Fleishman & Heppen, 2009; Gordon, 2003; Oxley, 2008, as cited in Armstead, Bessell, Sembiante, & Plaza, 2010, p. 365).

Numerous high school reform models now exist in order to address the growing concern that students must graduate from high school prepared for college success. Smaller learning communities, secondary-postsecondary learning options (SPLOs), charter schools and education management organizations, cyber schools, blended learning, and year-round schooling are examples of reform-based high schools that are in practice today.

Smaller learning communities follow three guiding principles: "small supportive structures; strong academic rigor; and effective, accountable instruction and leadership" (Smerdon & Cohen, 2009, p. 239). Secondary-postsecondary learning options include providing high school students with the opportunity to enroll in college courses while still

in high school. High schools that have an arrangement with a college provide dual-enrollment opportunities, either on the college campus or at the high school (Jordan, Cavalluzzo, & Corallo, 2006). Charter schools and education management organizations are usually the result of a failing public school based upon adequate yearly progress (AYP). Researchers have not been able to attribute increased academic achievement completely to the establishment of charter schools; however, certain characteristics found in charter schools have led to higher achievement (Hoxby, Murarka, & Kang, 2009, p. 70). Cyber schools and schools that utilize blended learning (a combination of online and face-to-face learning) offer academic instruction in an online format (Olthouse, 2011).

Year-round schooling is being implemented in order to off-set the result of summer learning loss. Year-round schooling includes increasing the amount of time in the classroom or maintaining the 180-day schedule but reducing the length of the long summer vacation and scheduling more frequent shorter breaks throughout the school year (Mendrala, 2010).

A significant reform model within the Christian school community is the UMS®. The first UMS® test school opened for its first full year in Texas in the fall of 1993, with the organization of the National Association of University-Model Schools (NAUMS) being formed in 2002. The UMS® model is based on the premise that parents are ultimately responsible for their child's education. In order to provide parents with a more direct influence in their child's life and allow them the time to have this influence, UMS® schools partner directly with parents, sharing the responsibilities for the child's education. At the elementary level, certified teachers direct the education of the children in the central classroom, where they attend either two or three days a week. Parents serve

as teachers in the satellite classroom located in the home on the other days. In high school, students attend classes on Monday-Wednesday-Friday or Tuesday-Thursday, depending upon when their classes are held. This schedule is similar to a college schedule, thus the name that compares its model with the university model of scheduling. This model seems to be in direct opposition to the extended school day or year concept that is being emphasized in today's educational circles.

The UMS® model is firmly based upon increased parental involvement in the life of the student. According to the 2010 Phi Delta Kappa/Gallup Poll, 76% of Americans stated that it is the student's parents, and not the school, that is "the more important factor in determining whether students learn in school" (Bushaw & Lopez, 2010, p.19). Research studies have noted a positive correlation between parental involvement and student achievement (Lloyd-Smith & Baron, 2010).

Problem Statement

Most reform models are utilized within the public school sector; however, they are also beginning to infiltrate the private Christian school population. According to the 2011 Cardus Education Survey, one reason parents choose to send their children to a private, Christian school is their desire to educate their children from a biblical perspective. Of great concern is the spiritual formation and character development of their children (Pennings, Seel, Van Pelt, Sikkink, & Wiens, 2011). Unfortunately, there is a "growing tension between academic rigor and discipleship in Protestant Christian schools" (Pennings et al., 2011, p. 11). The Cardus Education Survey (2011) found that in many circumstances, it seems that Christian parents must choose between a school that provides a rigorous academic curriculum and a school that nurtures their child's Christian

faith. Parents should not be faced with such a decision. In a recent Association of Christian Schools International (ACSI) Administrator and Board Conference, Simon Jeynes (2012), from Independent School Management (ISM), addressed the issue of whether Christian schools can meet their students' needs for academic development, spiritual formation, and cultural engagement. He asked if academic excellence might not be a spiritual virtue. In other words, he questioned whether academic excellence is also an act of worship, and thus a spiritual activity, not just an intellectual one. This idea might lead one to believe that all schools, and particularly those of a religious nature, must provide a sound academic program that ultimately prepares students for success in their post-secondary endeavors, as academic achievement is not in conflict with spiritual formation.

UMS® schools have been in operation for almost twenty years; however, until the completion of a recent dissertation that studied the role of parental involvement in the UMS® model, there has been no published research to back NAUMS' claims that the UMS® high schools prepare students academically for success in college. This particular study compared academic college readiness indicators of high school seniors in traditional, comprehensive Christian high schools with high school seniors in UMS® in order to test the claims of academic preparedness for this reform model.

Statement of the Purpose

The purpose of this correlational study was to determine if there is a statistically significant relationship between the type of school a high school senior attends (University Model School® or traditional, comprehensive Christian) and academic college readiness, when controlling for prior academic achievement, gender, and ethnicity. The

data were collected from schools located within a 175-mile radius of Dallas, Texas for the graduating classes of 2009, 2010, and 2011. The predictor variable was type of high school: UMS® or traditional, comprehensive Christian. The criterion variable was academic college readiness as measured by SAT and ACT exam scores. The control variables were prior academic achievement and gender.

Significance of the Study

Educational reform is often implemented without the support of sound academic research. Proponents of the UMS® would state that schools that follow their model are providing students with a rigorous academic program that prepares them for success in college. NAUMS has been documenting test scores; however the association has not utilized those scores in scholarly research. Without the backing of research, their premise is not based upon statistical reasoning or repeatable observation. The researcher acknowledges that it is difficult to conduct research using a true experimental design in the field of education; however, this does not preclude the need for collection and analysis of data to determine the effectiveness of a new educational reform model.

This study is significant because it was the first to be conducted using reliable and valid achievement test scores to determine how UMS® high school seniors perform academically on exams that predict college readiness in comparison to traditional, comprehensive Christian school seniors. Results may be utilized to further promote the UMS® model or to suggest changes to the model to better prepare students for higher education. Results may also be helpful to traditional, comprehensive Christian school administrators in order to improve the ways they prepare graduates for success in higher education.

Research Questions and Hypotheses

The following questions and hypotheses guided the researcher in this project:

Research Question 1: Is there a statistically significant relationship between SAT Composite (Reading and Math) scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 1a, Ho: There is no statistically significant relationship between SAT Composite scores and gender.

Null Hypothesis 1b, Ho: There is no statistically significant relationship between SAT Composite scores and prior academic achievement, controlling for gender.

Null Hypothesis 1c, Ho: There is no statistically significant relationship between SAT Composite scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Research Question 2: Is there a statistically significant relationship between SAT Writing scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 2a, Ho: There is no statistically significant relationship between SAT Writing scores and gender.

Null Hypothesis 2b, Ho: There is no statistically significant relationship between SAT Writing scores and prior academic achievement, controlling for gender.

Null Hypothesis 2c, Ho: There is no statistically significant relationship between SAT Writing scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender

Research Question 3: Is there a statistically significant relationship between ACT Composite scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 3a, Ho: There is no statistically significant relationship between ACT Composite scores and gender.

Null Hypothesis 3b, Ho: There is no statistically significant relationship between ACT Composite scores and prior academic achievement, controlling for gender.

Null Hypothesis 3c, Ho: There is no statistically significant relationship between ACT Composite scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Identification of Variables

The predictor variable in this study is type of high school, whether traditional, comprehensive Christian or UMS®. The criterion variable is academic college readiness, as measured by SAT and ACT scores. The control variables are prior academic achievement, as measured by the Stanford Achievement Test-10, and gender.

Definitions

The researcher provides the following definitions in order to ensure full understanding of the research:

Academic Achievement Discourse (AAD): The theory that supports academic accountability by means of achievement testing and standardized testing and curriculum as a means of best preparing students for higher education (Armstrong, 2006).

Academic college readiness: The level of preparation that a college freshman needs in order to successfully complete an entry-level college course without the need for

remediation. The student must receive a grade high enough to continue on to the next level course (Conley, 2007).

Biblical worldview: the lens through which one interprets reality that includes the biblical principles of creation, the fall, redemption, and restoration (Schulz, 2002).

Carnegie units: Credits that are assigned to a high school course based upon the completion of 120 hours of coursework per credit. Students must accumulate a prescribed number of units in order to graduate (Kridel, 2010).

Christian schools: In this study, Christian schools are limited to private, Protestant schools that are either affiliated with a church or are non-denominational; private Catholic schools are not within the scope of this study (Schlapman, 1985).

Human Development Discourse (HDD): The theory that supports educating the whole child by facilitating their growth as a cognitive, emotional, and social individual (Armstrong, 2006)

Traditional, comprehensive Christian schools: Private, Christian day schools that offer a curriculum similar to the public schools where students study content organized by subject matter and earn Carnegie units in order to graduate; they follow a 180-day school year and employ teachers who provide instruction within the traditional classroom. It does not include classical Christian schools that offer a curriculum based on Sayers' "The Lost Tools of Learning" (www.accs.edu.org).

University Model Schools®: Private, Christian schools that follow a college-style schedule, where students attend on-campus classes either Monday-Wednesday-Friday or Tuesday-Thursday, whenever courses are offered; students work with their parents in home satellite classrooms when not attending classes on campus (www.naums.net).

Summary

Where most educational reformers have chosen to work within the traditional model of K-12 schooling that requires a 180 day school year, University Model Schools® have reworked how classes are scheduled and, in turn, have transformed traditional K-12 schooling. The first UMS® pilot school began in Texas in 1993 based upon the *GPA Project*, a project implemented in 1992 to test the educational theories of parental involvement and character development (Freeman, 2011, p. 6). The UMS® model has continued to spread throughout the United States, with schools now located in 18 states (http://naums.net/). The proposed research will serve to verify its claims of producing "college-worthy" graduates who are prepared for the rigors of university academics (p. 6).

CHAPTER TWO: LITERATURE REVIEW

Most high schools offer a college-preparatory program that claims to prepare their graduates for higher education. In order to advertise their successes, schools post their standardized test scores, list the number of students who enroll in AP level courses, compare their high school graduation rates with similar schools, and boast of their graduates who are accepted into Ivy League colleges. This desire for students to be college-ready is warranted. With the increased globalization that has taken place over the last two decades, "American high school graduates are expected to compete with their peers from abroad….Yesterday's luxury of an education beyond high school has become today's necessity" (National Commission on the High School Senior Year, 2001, p. 7). The Commission stated that a high school education is no longer sufficient for students to meet today's demands. At least two years of training after high school are necessary in some sort of postsecondary environment (p. 5). Corbett and Huebner (2007) affirmed this sentiment by stating that "the Bureau of Labor Statistics projects that, between 2004 and 2013, 80 percent of the fastest growing jobs will require some postsecondary education or advanced training. Giving every student the opportunity to excel in college and career is critical" (p. 1).

Even with high schools placing an emphasis upon a college preparatory program, statistics have shown that "only about 35 percent of students who entered four-year colleges…in 1998 had earned their degree four years later, and only 56 percent had graduated six years later (Knapp, Kelly-Reid, & Whitmore, as cited in Conley, 2007, pp. 1-2). In 2006, Conley, Aspengren, Stout, and Veach found that "one of the major reasons that students falter in college is the gap between their high school experiences and college

expectations" (as cited in Conley, 2007, p. 2). If high schools are to claim that they are preparing their graduates for success in college, then this gap must be bridged in order for them to truly be capable of doing college-level work in the college environment. The challenge for high school administrators is to determine what constitutes college preparedness and to effectively implement strategies that enable students to make the transition to college.

This chapter will focus on understanding the UMS® model within the context of past and current high school reform models and college readiness assessment. The chapter will begin with the presentation of two opposing theoretical frameworks upon which educators build their high school programs. It will continue with the history of high school curriculum reform models, followed by current models of reform, including the UMS® model. This will lead to a brief history of Christian school education in the United States in order to understand where UMS® fits into that movement. Since the study also includes predictors of college success and college readiness indicators, research that has been conducted in these two fields will be presented. The chapter will continue with research regarding suggestions for further means of closing the gap between high school and college. It will conclude with specifics about a reform model that presents promise, but is lacking in academic research to back its claims.

Theoretical Background

Academic Achievement Discourse

Most of the current attempts to standardize education and curriculum fall under what Thomas Armstrong (2006) called Academic Achievement Discourse (AAD). AAD is characterized by "accountability, standardized testing, adequate yearly progress, *No*

Child Left Behind, closing the achievement gap, and rigorous curriculum" (p. 3). It should be noted that Armstrong is not a proponent of the theory, but rather one who adheres to human development models of education; however, for purposes of this paper, AAD is a beneficial term to utilize when referring to this mindset. The history of AAD was also taken from Armstrong's book*, The Best Schools*, which was written to refute the overwhelming acceptance of AAD in political and educational circles today.

One of the most significant historical acts in favor of this approach was the 1893 report of the Committee on Secondary School Studies, more readily known as the Committee of Ten. The committee set out to standardize high school curriculum throughout the country so that students entering college would all receive similar preparation. According to Pulliam and Van Patten, although they acknowledged that not all students were college-bound, they determined that all high school students should follow the same college-preparatory format of academic study (as cited in Armstrong, 2006, pp. 16-18).

Armstrong (2006) stated that AAD views "the purpose of education primarily as supporting, encouraging, and facilitating a student's ability to obtain high grades and standardized test scores in school courses, especially in courses that are part of the core academic curriculum" (p. 10). AAD began with the Committee of Ten's report written in 1893 and has continued over the last hundred years, with the culmination of the *No Child Left Behind Act* (NCLB) that was signed in 2001. Important milestones along the way have been Binet's creation of the first intelligence test in 1905, Terman's writing of the first version of the Stanford Achievement Test in 1923, and Flesch's 1955 book, *Why Johnny Can't Read* (p. 17). The cornerstone of AAD is academic achievement.

One of the first educational psychologists, Edward L. Thorndike, "promoted the belief that science and only science would save education….His belief was that quantitative experiments were to be preferred over qualitative, clinical, or naturalistic observation" (Berliner, as cited in Armstrong, 2006, p. 18). His first-used standardized test, the Thorndike Handwriting Scale, and Terman's creation of the Stanford-Binet intelligence test, formed the foundation of today's educational system that relies on standardized testing to determine academic achievement. These two tests, and others like the Iowa Test of Basic Skills created in 1935, have been administered to school children ever since (p. 18).

Human Development Discourse

The majority of research on college readiness and effective high school curriculum models can be characterized by Academic Achievement Discourse; however, there are components of the developmental theories that are also prevalent in educational circles today. Armstrong (2006) called this line of thinking Human Development Discourse (HDD). HDD is most characterized by "inspiring children, unlocking potential, nurturing the development of young lives, making a difference in the lives of students, and ensuring student success in life" (p. 35). Those who hold to HDD oppose the *No Child Left Behind* mandates of raising standardized test scores as an indicator of student learning. Instead, they promote the approach of educating the whole child made up of cognitive, social, affective, moral, and spiritual aspects (p. 42).

Human Development Discourse is "rooted in the tradition of humanism, that stream of philosophical thought that affirms the dignity and worth of all people" (Armstrong, 2006, p. 44). This school of thinking can be traced back to Plato, attributed

to Western philosophers and writers of the Romantic period, and to the schools of phenomenology and existentialism. HDD is often embraced by thinkers who value creativity such as Rousseau, Montessori, Steiner, Dewey, and Piaget (p. 46). Imbedded in the very framework of HDD is the premise that "children are born with the natural inclination to learn and that a proper education should respect the child's instincts to grow and should shelter the child from societal restrictions" (p. 8). Rousseau's novel, *Emile,* was written from such an approach and "can be seen as the real initiator of Human Development Discourse in contemporary education" (p. 48).

In the 19th century, Pestalozzi expounded on Rousseau's ideas when he wrote *How Gertrude Teaches Her Children* in 1801. His writings influenced Froebel, who created the first kindergarten and wrote *The Education of Man* in 1887. Freud's work in psychoanalysis furthered the HDD theories, which were applied to education by such educators as Neill, Rogers, Bettelheim, and Glasser (Armstrong, 2006, pp. 48-52). Both the Montessori and Waldorf schools were founded upon the HDD tradition. Piaget's developmental stage theory is highly accepted in those educational circles; as are the multiple intelligences attributed to Gardner. Proponents of differentiated instruction are also linked to HDD thinking (pp. 52-55).

Related Literature

History of High School Curriculum Reform

Over 200 years of high school curriculum debate have focused on three primary issues: "what students should learn, whether all students should learn the same thing, and who should make decisions about such matters" (Lee & Ready, 2009, p. 137). In 1821, the Boston English classical school was established as the first "free, tax-supported

institution" (Turner, 2001, p. 289). By 1890, the public high school had become the dominant model used in secondary education, and an educational system based upon amount of time spent per academic year began to take root during. In 1893, the Committee on Secondary School Studies (Committee of Ten) recommended that specific subject areas be included in a typical high school course of studies, and that they include three- or four-year sequences of those courses (Bohan, 2003). They acknowledged that even though not all students were college-bound, they recommended that all students take the same college-preparatory courses based upon an AAD approach to education.

The opposite opinion was expressed in *Cardinal Principles of Secondary Education* that was published 25 years after the Committee of Ten's meeting. This writing, that proposed the social efficiency argument, recommended that students should take courses based upon their future plans. For the first half of the twentieth century, students were thus placed in tracks (vocational, general, and academic).

Americans began to see the need for higher standards in education after the Russian launching of Sputnik. In 1958 Congress passed the *National Defense Education Act* that allocated millions of dollars toward improving math and science education in the United States. Once federal funding was introduced into education, government mandates to assess the improvements made to the educational system followed. As higher standards in education took center stage in the 1960s, high schools began to offer more course options based upon student interests and future plans. Formal tracking ceased to operate; however, students still received differentiated curriculum, or comprehensive curriculum, because of their choices. The students basically tracked themselves.

In 1969 the *National Assessment of Educational Progress*, or the *Nation's Report Card*, was established with help from the Carnegie Foundation. By 1970 the term "accountability" was used in education in reference to teaching (Armstrong, 2006, pp. 20-21). In 1983 *A Nation at Risk* took center stage by establishing nationwide academic standards and a common core curriculum. It declared that "all, regardless of race or class or economic status, are entitled to a fair chance and to the tools for developing their individual powers of mind and spirit to the utmost" (National Commission on Excellence in Education, as cited in Armstrong, p. 21). Lee and Ready (2009) referred to this phase of contemporary reform as the Standards Movement, that began with the writing of the 1983 report *A Nation at Risk* that recommended that all high school students take "the New Basics": "a minimum of four years of English and three years each of mathematics, science and social studies" (Lee & Ready, 2009, p. 139). States assumed that by increasing the number of credits students needed to graduate, they were basically increasing the rigor of the curriculum. Schools were allowed the freedom to decide what those credits entailed, so non-college bound students wound up taking courses like business math instead of algebra 2. This phase of curriculum reform "assumed that contemporary approaches to teaching and learning were adequate" (p. 141). "Reform rarely focused on school restructuring or classroom teaching and learning" (p. 140).

Whereas the first phase of reform focused on increasing graduation requirements, it left the differentiated curriculum intact. The result was that the gap continued to widen based upon socio-economic background. In 1984, John Goodlad proposed "a common core of studies" (Lee & Ready, 2009, p. 142). During this time, research conducted

almost exclusively at public comprehensive high schools found that students learned more if they attended schools where they were required to take college-prep courses.

This belief led to the second phase of reform that insisted that all students take "a common core of studies" (Lee & Ready, 2009, p. 142). In 1989 the United States governors established six goals for improving American education in a report called *America 2000*. The primary objectives of the report were "improving high school graduation rates to 90 percent; ensuring that students in grades 4, 8, and 12 demonstrated competencies in English, mathematics, science, history, and geography; and making the U.S. number one in the world in math and science achievement" (Armstrong, 2006, p. 22).

"This process of 'raising the bar' began in earnest in the early 1990s, when national organizations released model content standards" (Conley, 2003a, p. 9). States soon followed with their own standards and assessments. President Clinton revised *America 2000* and called it *Goals 2000: Educate America Act,* and Congress passed the *Improving America's Schools Act* that "required the states to develop performance standards, create assessments that were aligned to those standards, and establish benchmarks for improvement (known as adequate yearly progress)" (Armstrong, 2006, pp. 22-23). The premise upon which all government-initiated programs have been founded is that with increased effort, formalized assessment, and accountability all students, no matter what their background, have the ability to learn. At the center of this phase of reform were the at-risk and underrepresented population of students; however, current research seems to indicate that these reform attempts may not have been beneficial for these students. According to Rose (2011), "you can prep kids for a

standardized test, get a bump in scores, yet not be providing a very good education. The end result is the replication of a troubling pattern in American schooling" (pp. 34-35).

The research conducted during the second phase of reform led reformers to insist that all students take college-prep courses. The third phase of reform has changed curriculum policy to include "a college-prep curriculum for all students, expanded AP offerings, support courses in ninth grade, and the suspension of remedial courses" (Lee & Ready, 2009, p. 145). Early research findings revealed that course offerings have changed, but methodology still has not been at the forefront of curriculum decisions. Under-represented students have been given the opportunity to take more advanced courses, but graduation rates have not increased. Even with mixed results and many questions, "few contemporary policy makers support a return to traditional tracking and the segregating and stratifying effects of the comprehensive high school curriculum" (p. 151).

Current High School Reform Models

The Bureau of Labor Statistics projected that "between 2004 and 2014, 80 percent of the fastest growing jobs will require some postsecondary education or advanced training" (Corbett & Huebner, 2007, p. 1). For this reason, curriculum reform models have continued to emphasize the need for all students to graduate from high school prepared to pursue post-secondary education, even if they do not enter high school with college as their goal. Many components of this report would fall under the AAD label because they advocate quantitative study and a rigorous college-prep curriculum for all. Corbett and Huebner (2007) proposed that teachers start with this goal in mind and work backwards to develop the curriculum. They also demonstrated an understanding of HDD

thought, since they advocated student choice; small, supportive learning communities that create a sense of belonging; and student mentors who help to advise and counsel them as a friend and a role model. They even recommended the creation of individualized academic plans to allow students to work at their own pace with the support of a personal advocate.

High school reform models that attempt to improve college readiness through increased academic rigor fall in the AAD camp. "*Standards in Practice*™ (SIP) is a professional development model that…helps teachers and school leaders inject rigor into assignments and align them with the highest educational standards" (The Education Trust, 2007, p. 9). ACT's research has shown that simply taking the desired courses does not ensure success. In 2006, ACT (2007) found that three out of four students who had completed the necessary coursework did not score college ready using the ACT benchmarks for college readiness. After analyzing the results at 400 schools that have shown great improvement in the areas of math and science, they determined that there is a high correlation between higher scores and students taking more rigorous courses.

DiMartino and Clarke (2008) based their work on the HDD framework. They stated that the nineteenth century invention of Carnegie units is an obsolete system. Their new vision for high school placed students at the center of their own learning. Graduation requirements would not become more standardized, but more generalized. They also advocated for the use of personalized learning plans (PLP) that helps students to clarify their direction and implement a plan to meet their goals. For schools that adopt PLPs, Project Based Learning (PBL) is the preferred instructional method because it is student-centered and allows for student choice and individuality (What is PBL).

According to Murphy (2006), "there is a nearly universally-accepted belief in play that the nation has gained almost no ground in its efforts to reform our high schools" (p. 285). He proposed that "the American high school is in the midst of a second major revolution…one that promises to overhaul secondary education in the US as dramatically as the first recreation between 1890 and 1920" (p. 286). "College prep for all" has not produced the desired results; therefore, high schools have begun to reform the structure of their organizations in an attempt to prepare their graduates for post-secondary study. Previous attempts to reform the high school curriculum have maintained the "fragmented, alienating system stalled by an adherence to an outmoded transmission-oriented model of teaching and learning" (Thompson & Ongaga, 2011, p. 43). Under the Comprehensive School Reform Demonstration program (CSRD) in 1998, the US Congress appropriated $145 million to "change virtually all aspects of school operations by requiring use of research-based strategies, comprehensive and aligned activities, and measurable goals and benchmarks" (Kuo, 2010, p. 391).

There has also been consensus among researchers about what constitutes an effective high school. It "combines rigorous and relevant curricula for all students in a personalized and responsive learning community with strong relations between teacher and student and between school and parents" (Fleishman & Heppen, 2009, Gordon, 2003, & Oxley, 2008, as cited in Armstead, Bessell, Sembiante, & Plaza, 2010, p. 365).

Fleishman and Heppen (2009) provided five reform outcomes that educators should use in determining the most effective reform model to follow. They included: 1) a personalized and orderly learning environment; 2) remediation for incoming high school students with poor academic skills; 3) improved instructional content and practice; 4)

preparation for life beyond high school; and 5) positive change in low-performing and stressed high schools (p. 110). They stated that although numerous reform models have emerged, research results documenting their effectiveness are "still quite limited both in quantity and quality" (p. 108). Of the 1,500 studies that they reviewed, only 42 met their "standards for quality and rigor" (pp. 108-109).

Educators have taken these research findings and have implemented them in numerous reform models that are currently in existence. They include various types of smaller learning communities, secondary-postsecondary learning options (SPLOs), charter schools and education management organizations, blended learning, year-round schooling, and University-Model Schools®.

Smaller Learning Communities.

Most of the models presented below could fall under the definition of a smaller learning community, as Kuo (2010) defined small as schools ranging from 600 to 900 students. Research has shown that smaller high schools exhibit "lower dropout rates, higher attendance, and higher graduation rates" (p. 392) because there is more personalization for the students. In addition, academic achievement increases, vandalism and behavioral issues decrease, and students state that they feel a sense of belonging (Page et al., 2002, as cited in Kuo, 2010). Students from lower socio-economic groups tend to benefit the most from the smaller school community. The overall effects of the Comprehensive School Reform Demonstration program (CSRD) are small and are produced over time (Borman, Hewes, Overman, & Brown, 2003, as cited in Kuo, 2010; Smerdon & Cohen, 2009). Three principles guide smaller learning communities: "small supportive structures; strong academic rigor; and effective, accountable instruction and

leadership" (Smerdon & Cohen, 2009, p. 239). In a study conducted by Armstead et al. (2010), smaller learning communities were effective for some students. The uneven implementation of the varying communities resulted in mixed results.

Specialty (or Theme-based) and Career Academies.

Another type of smaller high school that has been developed to individualize instruction is the specialty or theme-based school. The basic premise of this type of school is that if the teachers and students have chosen to become a part of this community of learners, they have done so because they can pursue their interests in a way that maximizes learning. Teachers and students automatically have something in common, so it tends to be easier for them to form close relationships. Raywid (2006) presented several examples of schools that revolve around a different theme. The Alternative School, a school within Wheatley High School in Temple, Texas, has formed a three-themed program that emphasizes "human relations, democracy and a rigorous program of electives among which students choose" (p. 655). The School of Environmental Studies in Apple Valley, MN, is located at a zoo. Here "students enroll in an array of interdisciplinary courses, as well as taking part in internships, apprenticeships, and community-service options" (p. 655). Central Park East Secondary School emphasizes habits of mind. Raywid stated that "a theme like the habits of mind sometimes works better than a substantive theme to provide continuity from one class to another" (p. 655). Sternberg (2000) believed that the reasons these small thematic schools work is that they are community-based. As students become active members of their learning communities, they give back to the community as in a real world setting. Schools that emphasize the whole student fall under the HDD model of learning.

Not all thematic schools strive for that warm and cozy feeling. STEM (Science, Technology, Engineering, and Math) high schools are geared more for the academically gifted students who desire to study a rigorous curriculum with similarly motivated and academically focused peers (Subotnik, Kolar, Olszewski-Kubilius, & Cross, 2010). The California Academy of Mathematics and Science (CAMS) is an award-winning magnet school just outside of Los Angeles that focuses on preparing students for the fields of math, science, technology, and engineering. CAMS students must take four years of math and science, plus two years of engineering and AP calculus (Ramirez, 2008, p. 43).

According to a 15-year study of Career Academies, students, especially Hispanic and African American, experienced "sustained employment and earning gains but did not experience any differences in educational attainment compared to non-Academy students" (Kuo, 2010, p. 393). Talent Development High Schools are a type of Career Academy that has been found to significantly increase high school graduation and promotion rates. First Things First is another Career Academy that relies on family advocates and instructional improvements in order to increase their graduation rates (Kemple, Herlihy, & Smith, 2005; Levin & Belfield, 2007; Quint, 2006; as cited in Kuo, 2010).

Small themed schools were originally intended to produce diverse and integrated student populations. The premise was that allowing students to choose a school based upon their personal interests should alleviate segregation by income, race, ethnicity, or ability level. According to Ancess and Allen (2006), themes have developed into an "unspoken code" that communicates "powerful messages about race, gender, class, income, expectations, college-going, future orientations, definitions of success, and

more" (p. 403). Eric Nadelstern, the Department of Education's (DOE) mastermind behind New York City's numerous theme-based schools, acknowledged the less than ideal conditions to build a new system, but contended that the alternative was to "continue the extensive tinkering with big high schools that has had a twenty-year history of failure and steroid-strength immunity to reform" (p. 412). The outcome data of the DOE's new reform model looks promising, with 93 percent as compared to just 68 percent of high school freshmen being promoted to tenth grade. A ten-year study of small schools by New York University's Institute for Education and Social Policy found that more than 100 NYC small schools (mostly theme-based) created between 1993 and 2003 have shown significantly higher graduation rates, significantly lower dropout rates, and equal cost as compared to the traditional larger high schools (p. 413).

Secondary-Postsecondary Learning Options (SPLOs).

According to Orr (2000), K-16 initiatives have emerged encouraging high schools to work together with community college to "coordinate their missions and educational activities more closely" (as cited in Jordan, Cavalluzzo, & Corallo, 2006, p. 729). SPLOs are following this recommendation by allowing students to participate in college-level courses while still in high school. Some students earn college credit for these courses and some do not. A number of SPLOs target disadvantaged youth or students who have dropped out of high school, with the goal of providing them with challenging work with academic support (Lerner & Brand, 2007). Benefits include a lower drop-out rate and an increase in students who continue to pursue postsecondary education (O'Connor & Justice, 2008).

Dual Enrollment.

Dual-enrollment opportunities fall under the broader category of secondary-postsecondary learning options (SPLOs). According to Mokher and McLendon (2009), one popular reform model is to allow students to enroll at both their local high school and a local college, receiving credit at both institutions simultaneously. The goals of dual enrollment are many. Students will become more college ready both academically and socially. They will have increased confidence in their ability to complete college-level work, and will consequently aspire to attending college after high school. The time and money required to graduate from college should also be shortened. Dual enrollment programs benefit from a greater variety and more rigorous courses that are relevant to the students' lives (Mokher & McLendon, 2009; Jordan, Cavalluzzo, & Corallo, 2006).

Many dual enrollment programs are simply an agreement between a high school and a college, allowing high school students to take classes concurrently at both locations. Other programs provide the courses at their local high schools. Still others follow the Early or Middle College High School Programs presented below, where the high school is located on the college campus. Traditionally, dual enrollment programs have been seen as opportunities for the more academically talented students. In recent years, they have expanded to include students at risk or students who traditionally would not consider college as an option. These students may benefit from dual enrollment the most, for the prospect of attending college becomes a reality for them because of the experience. Research has shown that schools who attempt dual enrollment programs must focus on their intended population, as programs that have tried to meet the needs of

students at both ends of the continuum have experienced a difficult time with program implementation (Jordan, et al., 2006).

Early and Middle College High Schools.

The Early College High School Initiative (ECHSI), founded by the Bill and Melinda Gates Foundation, is another example of a smaller learning community that would also be considered a secondary-postsecondary learning option (SPLO). Students enrolled in an ECHSI have the chance to earn an Associates degree or two years of college credit in addition to their high school diploma. Sometimes students must remain in school for a fifth year in order to receive both. Underrepresented students especially benefit from this initiative because they experience success at the college level, thus prompting them to continue on to higher education. Studies of ECHSI schools have shown higher levels of student engagement, improved attendance rates, and increased standardized test scores. The best results occurred when the school was affiliated with and located on the campus of a four-year college (Kuo, 2010). An additional benefit of the ECHSI model was the substantial economic savings that families experienced (Wright & Bogotch, 2006).

Middle college high schools differ from early college high schools in that students graduate from high school with some college credit but not a degree (Lerner & Brand, 2007; Jordan, et al., 2006).

Key to the success of early and middle college high schools are rigor and relevance (Ongaga, 2010). Rigor "implies a challenging academic program and experience that prepares all students for college, work, and citizenship" (Mitchell et al., 2005; Shear et al., 2008, as cited in Ongaga, 2010, p. 376). "Relevance denotes studies

students find engaging and meaningful to their current and future lives" (Shear et al., 2008, as cited in Ongaga, 2010, p. 377).

In a study conducted by Thompson and Ongaga (2011), results revealed two major findings. Caring relationships were important to students and were effective in increasing achievement when linked with high expectations. Looping and the use of student cohorts contributed to a feeling of family for students enrolled in an early college high school located in southeastern North Carolina. The second theme that emerged was associated with the teacher challenges when entering new territory with old school rules and high testing expectations. The authors likened this school's experience to flying a plane while building it (Ongaga, 2010). As a relatively new reform model, questions exist as to how early college high school attendance will affect bright students who desire to attend highly-competitive colleges and have already completed up to two years of courses elsewhere. Their lower college grades might also weaken their enrollment chances at Ivy League schools (Wright & Bogotch, 2006). These are questions still to be answered concerning this new reform model.

Charter Schools and Education Management Organizations.

Charter schools are another option for parents and high school students that have produced limited positive effects (Kuo, 2010). Some charter schools were opened as a result of a failing public school based on adequate yearly progress (AYP). These schools were basically a take-over, with staff being replaced and either the state or a private company taking over operation of the school. A study conducted by the New York City Charter Schools Evaluation Project, found that specific school characteristics led to higher achievement within charter schools. "The positive associations are with a long

school year (this is especially strong), the number of minutes spent on English per day, a small rewards/small punishments disciplinary strategy, teacher pay based on performance or duties, and a mission statement that emphasizes academic performance" (Hoxby, Murarka, & Kang, 2009, p. 70). The researchers could not say that the charter schools as a whole made the difference.

A study conducted by Booker, Sass, Gill, and Zimmer (2008) to look at the relationship between charter high school attendance and educational attainment showed a seven to 15 percentage point increase in the number of charter school students who completed high school and an eight to ten percentage point difference in college attendance. Traditional public schools were used as the control group for comparison purposes. Their study was limited to Chicago and Florida, and they stated their uncertainty concerning the reasons for their findings, which were consistent with similar studies of Catholic schools. For this reason they suggested that perhaps the expansion of "school choice at the high school level may be a part of an effective policy to reduce high school dropout rates and to promote college attendance" (p. 19). They did not find that the smaller size of the schools was a contributing factor.

Cyber Schools.

Cyber schools offer academic instruction in an online format. They typically are run as online charter schools associated with public institutions. One example is the cyber school offered to Pennsylvania residents. In 2000, students in kindergarten through grade 12 began to take classes using curricular materials, a free computer and printer, and a monthly reimbursement for their internet connection. Students had access to online discussion boards; however, no onsite teacher was available to help the students. In

2008, 44 states offered cyber school as an option. One benefit of this online environment has been that enrolled students come from all parts of the state, thus diversity has increased. Another benefit was that students could learn using an individualized program based upon their own needs. Cyber school administrators have experienced the freedom to use innovative approaches to instruction. Unfortunately, just because they were able to be innovative did not guarantee that cyber instruction would meet this criterion (Carr-Chellman & March, 2009).

Students with learning challenges are one group that may benefit from cyber schooling for a number of reasons. Students can individualize their instruction by choosing from real-time and self-paced classes, they can enroll in classes below grade level without fear of being stigmatized for doing so, and they can better focus on academics without worrying about social distractions (Hipsky & Adams, 2006). Success in educating students with exceptionalities, however, has not been consistent. According to Miron, Nelson, and Risley (2002), "some charter schools appear highly successful in serving students with special needs, while others appear unable (according to some critics, unwilling) to serve such students" (as cited in Hipsky & Adams, 2006, p. 2).

Blended Learning.

The Net Generation is a new population of students who are being raised with access to information 24/7. According to Beyers, "they need a redesigned education system and teachers who have been retrained and reoriented" (2009, p. 219). One such option is to mix face-to-face classes with online options. By using technology to connect students to information, teachers become facilitators who enable students to take ownership of their own learning. Piaget's learning theory of constructivism supports this

approach, as "it says that people construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences….We are active creators of our own knowledge" (Mechlova, Konicek, & Balnar, 2003, as cited in Beyers, 2009, p. 220).

The online component of blended instruction allows teachers to individualize instruction, to engage students with the type of interactive media they are used to, and to provide students from all socio-economic environments with the same instruction (Olthouse, 2011). Numerous studies have shown promising results. In one study the Advanced Placement (AP) scores of online students and traditional students were compared and found to be equal (Smith, Clark & Blomeyer, 2005, as cited in Olthouse, 2011). In another study, the achievement of online versus traditional students was compared. Online students' scores were equal to or better than the comparison group (Mills & Roblyer, 2005, as cited in Olthouse, 2011). In a third study of the Cisco networking academy, a blended option, the achievement of urban, rural, and suburban students was found to be similar (Cakir, Delialioglu, Dennis, & Duffy, 2009, as cited in Olthouse, 2011).

Year-round Schooling.

Year-round schooling is another model that has been implemented with "nearly 2.2 million students who are enrolled in more than 3,000 K-12 schools" (St. Gerard, 2007, p. 56). One of the primary reasons that educators have moved to a year-round school is because of summer learning loss. This term refers to the negative effect that a long summer break has on the retention of material and the academic ability of students. Summer learning loss is more prominent with economically disadvantaged students

(Huebner, 2010). Research results have been inconclusive on whether there is any advantage to year-round schooling.

Year-round schooling does not necessarily mean more school days; schools simply schedule the 180 days throughout the year by reducing the length of the summer vacation and implementing more frequent shorter vacations throughout the year. In 2009, President Obama advocated for extending the amount of time American children spend in school, citing the fact that American children "spend over a month less in school than children in South Korea. That is no way to prepare them for a twenty-first century economy" (Mendrala, 2010, p. 210). Obama is advocating for a school year of greater than 180 days. Some studies have seemed to indicate that increased classroom time "allows for a more in-depth study of core subjects as well as broader curriculum offerings" (p. 211). Researchers have concluded, however, that "a variety of factors beyond the mere extension of time may contribute to students' success" (p. 214). Without a significant change in the curriculum that is offered, simply extending the amount of time that a student spends in school is not sufficient in itself to increase student achievement.

University-Model Schools (UMS®).

According to MacArthur (as cited in Schultz, 2002), "God Himself has given the responsibility for raising children to parents—not to schoolteachers, peers, child-care workers, or other people outside the family" (p. 61). Scripture instructs parents that the two single most important things they are to do in life are to love God with their whole heart and to teach their children to do likewise (p. 29). There are many parents who choose to homeschool their children for the primary reason that they desire to instill in

their children this same biblical worldview. Oftentimes, these parents are successful; however, parents will admit that as the courses become increasingly more difficult, partnering with an expert in the field who shares the same biblical worldview is a wise option. In addition to the challenge of academic reform is the area of student behavior. When schools took God out of the curriculum, they not only denied the existence of absolute truth, but also of absolutes in morality. According to Reese, (as cited in Murphy, 2006), "Most educators in the 19th century assumed that character development, religiosity, and intellectual achievement were inseparable. Knowledge was always embedded in a moral framework" (pp. 290-291).

Started in 1992, the UMS® offers a unique choice to parents who desire to have an integral part in their child's schooling. It was founded on two educational theories tested by the GPA Project: the significance of parental involvement and the role of character development in educational success as they prepare for college (History, www.naums.net). This model offers more flexibility to parents, and allows them to spend more time with their children to impart their faith and values (Turner, 2001). In a UMS®, high school students attend classes either Monday-Wednesday-Friday, or Tuesday-Thursday, as they would in college. Students enroll in rigorous academic courses on a semester basis, taking as many or as few as they desire. They develop a strong work ethic that will serve them well when they get to college. Proponents of UMS® view it as a balanced approach; teachers and parents are true partners in the educational process.

Research studies have shown the importance that family involvement contributes to the success of the student. According to Conley (2008), "students vary in the degree to which high school and family life prepare them for college, and that preparation has a

dramatic impact on their transition to college and subsequent success" (p. 3). Unfortunately, the current approach to education has almost completely separated schools from their communities, let alone the families of the children who attend there. Parents have been marginalized as "co-producers of their children's learning" (Consortium of Productivity in Schools, 1995, as cited in Murphy, 2006).

Effective school/home partnerships are characterized by mutual trust and respect among all parties. Three primary factors determine the effectiveness of the relationship: "(1) the degree of match between teacher's and parent's culture and values; (2) societal forces at work on family and school; and (3) how teachers and parents view their roles" (Keyes, 2002, p. 179). The parent-cooperative movement advocates teachers and parents working "side by side empowering parents and giving the parents teaching roles" (Keyes, 2002, p. 182). Not all feel this way, but prefer to leave the running of schools up to the experts (Greenberg, 1989, Greenwood & Hickman, 1991, as cited in Keyes, 2002).

Research has shown a positive correlation between parental involvement on student grades, attendance, attitude, and motivation (Lloyd-Smith & Baron, 2010). In fact, "adolescence is the time when most teens are forming lifetime values, making continued parental involvement in both home life and school life especially critical" (Wheeler, 1992, as cited in Lloyd-Smith & Baron, 2010, p. 27). Even so, there are challenges at the high school level in the implementation of effective programs that involve parents. In a 1999 national poll conducted for the Public Education Network (Fege, 2000, as cited by Lloyd-Smith & Baron, 2010), parents gave three reasons for not actively participating at the high school level: 1) they did not feel they had a role in their child's education; 2) they admitted that time prohibited them from doing so; or 3) they

were not given an opportunity or didn't know how to become involved. Effective communication by school administrators is essential if parents are to feel welcomed to participate in their child's schooling. The key is to identify meaningful ways in which parents can become involved that are considered acceptable by the administrators.

The UMS® model directly opposes a longer school year with increased instructional time that was determined as having a positive effect on student achievement in New York City charter schools (Hoxby, Murarka, & Kang, 2009). It also seeks to break the mold begun in 1896 with the American Historical Association's (Committee of Seven's) decision that one academic year of study must include five "exercises" a week, which has been interpreted in most schools as five periods a week (Bohan, 2003). The concept of the Carnegie unit, where high school work is measured by amount of time spent (usually 40 to 50 minutes for 36 to 40 weeks per year) is being questioned (Boyer, 1983).

As the UMS® model reducing the amount of time spent in the central classroom and does not limit course study to "five periods a week," research is needed to determine if the increased time with parents as educators has the same "extremely robust" finding of the effects of a longer school year in the Hoxby study (p. 62).

History of American Christian Schools

Whereas all current reform models presented in this paper have been primarily utilized within American public schools, the UMS® model of education has only been implemented in Protestant Christian schools. For this reason, a brief history of the American Christian School movement is important for placing this model within the proper context.

For three centuries, beginning in the early 1600s, "it was assumed that public schooling was rooted in the Christian faith" (Pennings, Seel, Neven Van Pelt, Sikkink, & Wiens, 2011, p. 9). Even so, Christian schools have been in existence since 1606, when the first Catholic school was established in St. Augustine, FL. Private Protestant schools also began to spring up that espoused the Puritan faith, followed by Dutch immigrants establishing private Christian schools in the mid-1800s. "It was not until early in the 20th century that private Christian schooling began to flourish" (p. 9). During the mid-twentieth century, Catholic immigration increased. At first the Catholics tried to reform the public schools that continued with "fundamentalist Protestant overtones" (p. 9). When this did not work, Catholic parents started their own schools.

Protestant schools became more prevalent after World War II, when public schools began to espouse more secular philosophies. Prior to this time, the church and state upheld the same Christian values; therefore, the state had no problem with the church teaching academics while also instilling in children morals, values, and religion (Kranendonk, 1978). During the 1960s and 1970s, the Supreme Court took prayer out of schools and the government pushed for more scientific study. Although the theory of biological evolution had been widely accepted prior to this time, textbook publishers had presented the topic in "a cursory and non-controversial manner" (Skoog, 2005, p. 398) in science textbooks prior to 1960 for fear of "political backlash from conservative Christians" (Laats, 2010, p. 60). The Biological Sciences Curriculum Study (BSCS) influenced textbook publishers to give "unprecedented emphasis to evolution and, in doing so, provided impetus for other publishers to do likewise" (Skoog, 2005, p. 398).

By the end of the 1960s, "almost half of the nations' public school districts had adopted the evolution-heavy BSCS textbooks" (Laats, 2010, p. 60).

Turmoil over desegregation and cultural upheaval increased parental discontent with public schools. The addition of new math and sex-education classes also contributed to the rise in the number of Christian schools (Laats, 2010). According to a study by the National Center for Education Statistics (1993), 90% of Protestant Christian schools were founded in the mid-1960s (as cited in Pennings et al, 2011). The 1970s and 1980s were a time of rapid growth. Paul Parsons (as cited in Laats, 2010) stated that "three new evangelical schools opened every day in the United States" during this time (p. 57).

Three strong fundamentalist factions also grew during the 1970s and 1980s. Each espoused a different philosophy of education and created curricular materials to promote their philosophies. Donald Howard devised his Accelerated Christian Education (ACE), a model that emphasized individualized instruction and student responsibility. Beka and Arlin Horton promoted a "traditional Christian" philosophy, calling upon schools to use textbooks that had been in classrooms during the early years of the United States (Laats, 2001, p. 62). Walter Fremont, of Bob Jones University (BJU), espoused a "conventional approach" to Christian education (p. 62).

Even with their disagreements over pedagogy, today's Christian schools are more similar than they are different. They view themselves as an extension of both the church and the home, with their ultimate goal being the transformation of its students into the image of Christ. The Christian school is in contrast with the public school in that it teaches that truth is "absolute" and "supernatural" (Gangel & Benson, 1983, p. 357). The

public school teaches a truth that is "relative" and "natural" (p. 357). Christian schools, therefore, make biblical integration into all subject areas a priority.

Of utmost importance in the Christian school is the teacher, who is viewed as the living curriculum. The mature Christian school teacher is able to make those spiritual connections with academic material. Teachers also serve as role models of a mature Christian and seek opportunities to disciple the students in their spiritual walk. According to Horton (1992), the teacher "must be a person of spiritual, emotional, and social maturity. He must be steeped in Biblical wisdom…. His moral character and conduct must be above reproach, for he exemplifies to the student the nature and work of God" (p. 16).

Numerous books have been written by authors intrigued with the modern Christian school movement, but not necessarily proponents of it. Susan Rose (1988) studied two very different Christian schools in an attempt to better understand the philosophy upon which they were built. She concluded that "the movement is both innovative in its educational methods and reactionary in its attempt to restore traditional values and re-establish Protestant education in American society" (p. 3). She viewed the ACE model, that emphasizes "self-discipline and isolation" (p. 209), as a means of limiting the employment prospects of its students by instilling in them a mindset best geared toward lower-class, unskilled labor. On the other hand, she viewed the schools espoused by the charismatic churches as instilling in their students the ability to enter "roles that will enable them to act on the world" (p. 206). Their parents would want their children to be "competitive in the professional job market—'not in order to be successful

in worldly concerns, but to be able to influence society from a position of power and strength'" (Meyer, 1977, as cited in Rose, 1988, p. 206).

Reed and Provost (1993) proposed that some Christian schools were formed for other less spiritual reasons. For instance, the Supreme Court rulings that took prayer and Bible reading out of public schools allowed those "who opposed racial integration to claim for themselves a moral and spiritual 'high ground'; they justified their racist 'Christian' schools through a rhetoric of concern for the religious education of their children" (p. 371). Reed and Provost admitted that "some of these segregationist schools have ceased to exist" (p. 371).

Nevin and Bills (1976) took these claims one step further. They proposed that Christian schools drew students that were raised in secure nuclear families from a higher socio-economic background. The result was that "the haven they offer fleeing middle-class families certainly exacerbates the problems in public school. As the more stable element departs, the proportion remaining becomes more and more volatile, which provokes further flight" (p. 87). They implied that the exodus to Christian schools has harmed public schools by draining their resources.

During this same time, proponents of Christian education pointed out that Christian schools suffered attacks from the courts and from school officials in an attempt to make it difficult for Christian schools to operate. These attacks ranged from private schools being required to build "a six-foot high fence and 10 feet of shrubbery" around their buildings to accusing Christian teachers of "injuring children's mental health" by asking four and five-year-olds to memorize Scripture (Towns, 1974, p. 94).

Throughout these turbulent times, the modern Christian school movement has continued to grow. Perhaps one reason for its continued presence was the development of Christian school associations that have provided assistance to individual Christian schools my means of accreditation and professional development. There are five associations that continue today. The National Association of Christian Schools (NACS) began in 1947. Close behind, in 1948, the Mid-Atlantic Christian School Association (MACSA) was founded. The American Association of Christian Schools (AACS) was started in 1972. Christian Schools International formally began in 1978, as an extension of the 1892 Society for Christian Instruction on a Reformed Basis – Michigan Alliance – Chicago Alliance and the 1920 National Union of Christian Schools. Eight other associations merged in 1978 to form the Association of Christian Schools International (Kienel, 2005). NAUMS is a Christian school association that certifies schools following their unique model of instruction.

Predictors of College Success

Numerous models have been developed in an attempt to predict which students will be successful in college and which will not. This study is not attempting to make this determination, but rather to determine if school type has a relationship with college academic readiness. Nonetheless, inclusion of indicators that have been determined to support college readiness in the literature review are important for a greater understanding of the key elements that lead to college readiness.

High school GPA is the number one predictor of academic college readiness, with standardized achievement scores coming in second. DeBerard, Spielmans, and Julka (2004) found that high school GPA explained approximately 56% of the variance of

second-semester college grades, and that SAT scores have been found to account for 18% of college success. Stumpf and Stanley (2002) added that SAT scores and high school GPA hold significant predictive ability of college graduation. Other studies have affirmed these findings (Harackiewicz, Barron, Tauer, and Elliott, 2002; Kahan and Nauta, 2001; Strauss and Volkwein, 2002; Wade and Walker, 1994; and Kirby, White, and Aruguete, 2007). These same studies have also added additional predictive factors to high school GPA, such as class rank, socioeconomic status, parents' occupation, and need for financial aid. Braunstein, McGrath, and Pescatrice (2000) found that one of the reasons socioeconomic factors play into the equation is that students with fewer financial resources have to work more hours during school, thus they are more likely to discontinue enrollment. Other researchers found that class rank, high school GPA, and standardized test scores taken together predict college GPA (De Berard, et al., 2004; Harackiewicz, et al., 2002; and Kahn and Nauta, 2001).

Zwick and Sklar (2005) came up with slightly different statistics. They found that high school GPA and SAT together predicted 22% of the variance in first-year college GPA. They added student language/ethnicity to their model and found it to increase the predictive value only slightly, to 22.5%; however, the effect on "the Black/English group was statistically significant, and the effect of membership in the Hispanic/English group, although not statistically significant, was also large" (p. 460). Bryson, Smith, and Vineyard's 2002 study found that high school GPA was predictive of college success for African-American students, while high school rank and ACT scores were better predictors for Caucasian students. Noble and Sawyer (2004) found the ACT to be an effective predictor of first-year college success, especially when combined with high

school GPA. Komarraju, Ramsey, and Rinella (2013) affirmed this finding, as their study found ACT scores to predict 13% of the variance in college GPA. High school GPA predicted an additional 11%, and academic discipline added 2% more. They defined academic discipline as psychosocial factors like conscientiousness, effort, study skills, self-management, intrinsic motivation, self-efficacy, and work drive. In their study, they used the Student Readiness Inventory (SRI) that was constructed by Robbins, Lauver, Le, Davis, Langley, and Carlstrom in 2004. The SRI is a measurement of psychosocial and academic factors that can be used to predict college readiness. They based their instrument on 109 studies of college success models and determined three specific areas, in addition to high school GPA, ACT and SAT scores, and socioeconomic status, that are valid in predicting academic performance criterion: "academic self-efficacy, achievement motivation, [and] academic goals" (Le, Casillas, and Robbins, 2005, p. 483). Their ideas were based on two motivation theories: achievement-as-drive and achievement-as-goal.

Furthermore, specific personality traits have been determined to be predictive of college success: "emotional stability (or neuroticism), extroversion, conscientiousness, agreeableness, and openness" (Digman, 1990, as cited in Le, Casillas, Robbins, & Langley, 2005, p. 485). Academic-related skills have also been shown to be predictive of college success. They include study skills, problem solving skills, communication skills, and emotional control skills (Robbins, Lauver, Le, Davis, Langley, & Carlstrom, 2004). They based their studies on educational persistence models and motivational theories.

Kitsantas, Winsler, and Huie (2008) added self-regulation as a key predictor of college success. Self-regulation includes independence, self-initiation, use of various

learning strategies, setting goals, self-efficacy, intrinsic interest, and self-monitoring skills (p. 45). Learner autonomy has also been found to predict course success in community college online students (Yen & Liu, 2009). Wigfield and Eccles (2000) affirm these findings, pointing out that college students learn these critical skills and attitudes while they are adolescents. They base their beliefs on Expectancy-Value Theory, which states that what students have learned to expect of themselves and what they value as important play key roles in academic achievement.

Personality traits and learned behaviors, such as procrastination, have also been shown to be predictors of college success (Jackson, et al., 2003). Kahn and Nauta (2001) added factors related to persistence taken from Social Cognitive Career Theory (SCCT) to the list. SCCT suggests that academic ability and prior academic achievement are important to consider; however, it also states that student confidence, the ability to anticipate consequences, and a determination to press on to graduation are just as important to college success (p. 635).

Although these studies pertain more to college success and retention than to college readiness, Adelman's 1999 and 2006 studies pointed out the important fact that "the best predictor of whether a student will complete a bachelor's degree is the intensity and quality of that student's secondary school curriculum" (as cited in Watt, Huerta, & Alkan, 2011, p. 122). Adelman supports a rigorous curriculum that prepares students for college-level work. Even so, he acknowledges that college success depends on time management, study skills, planning, and a personal support system.

College Readiness Research

This study seeks to use academic college readiness indicators as a means of determining the relationship of a new high school reform model. Therefore, an understanding of college readiness research is important to the background of the study.

There are many proponents of educational accountability who have been involved in researching college readiness. According to Armstrong (2006), the key components of the framework that upholds the Academic Achievement Discourse were the importance of content and skills acquisition, measurement of achievement through grading and standardized testing, a rigorous and uniform curriculum that prepares students for future success, and change built upon scientifically based research. (pp. 10-14). The National Center for Educational Achievement (NCEA), the Bill and Melinda Gates Foundation, The Educational Policy Improvement Center (EPIC), the National Center for Educational Accountability (Just for the Kids), and Achieve, Inc. (American Diploma Project Network) have all determined that the alignment of high school standards with college expectations is extremely necessary if teenagers are going to be successful as young adults in the 21st century.

In 2005, Achieve, Inc. sponsored the National Education Summit where its leaders agreed to "raise academic standards and graduation requirements, build stronger data and assessment systems, better prepare teachers, redesign high schools, and hold K-12 and postsecondary schools accountable for improved performance" (*Closing the Expectation Gap*, 2008, p. 2). Achieve, Inc. also launched the American Diploma Project (ADP) Network in an effort to align standards and close the gap between high school and college. Strategies to meet these objectives have emerged. "To create a more

performance-based system, some states are designing processes that stress the demonstration of skills and knowledge more than the accumulation of Carnegie units" (p. 10). One example is in Rhode Island, where students can use a variety of ways to "demonstrate proficiency in applied learning skills – critical thinking, problem solving, research, communication, decision-making, interpreting information, analytic reasoning, and personal or social responsibility – in all six core content areas" (p. 10). Here some aspects of HDD have been incorporated into a predominantly assessment oriented, standardized curriculum: differentiated assessments and student choice for capstone project.

"While states have raised academic standards, they have rarely considered how their standards contribute to improved student success in college" (Conley, 2003b, p. 5). Unfortunately, standards-based education was instituted without input from college and university professionals. Conley (2003a) found that:

> No state created educational standards and assessments for the express purpose of increasing college enrollments or success….The unspoken assumption often is that college preparation doesn't need fixing or that, by raising standards, all students benefit. Both of these assumptions continue to be largely unsubstantiated. (p. 9)

"The primary goal of high schools should be graduating students who are ready (and eager) to learn more, capable of thinking critically, and comfortable with the ambiguities of the problem-solving process" (National Commission on the High School Senior Year, 2001, p. 9, 11). The question is: how do schools go about doing this? One project that has produced specific standards for students desiring to take entry-level

college courses was sponsored by the Association of American Universities and The Pew Charitable Trusts. Standards for Success (S4S) identified specific content knowledge in the four core subjects, world languages, and the arts, as well as general cognitive skills that were not defined by course boundaries.

S4S stated that in English, students must be able to identify a theme, take notes while reading, and summarize and critique material. They must think critically about and paraphrase what they have read and be able to defend a position in a discussion. Students should come with a familiarity of literary forms and genres and major U.S. and British authors. They must have good grammatical skills, be able to write coherent works, and have good editing and proof reading skills. Solid research skills, that include gathering and processing of the information, are also important (Conley, 2003c, pp. 17-21).

Students must also arrive with basic math concepts in computation, algebra, geometry, and trigonometry. They must approach math from an analytical point of view, with the ability to effectively solve problems. They need to reason logically, be fluent in the language of math, and understand the importance of the mathematical process (Conley, 2003c, pp. 29-30).

In the natural sciences, students must be "capable of integrating scientific methods and contextual understanding, critical thinking and hands-on skills" (Conley, 2003c p. 39). They need to use their math competencies to "estimate, question and solve problems" (p. 39). They must arrive with scientific common sense, experimental thinking, and an understanding of how scientific concepts are interrelated. They must be able to link their knowledge of current events to scientific inquiry, be able to design and test a scientific question, and have a good working knowledge of scientific vocabulary.

Science students have a healthy skepticism, a curiosity about their world, are willing to take risks, and persevere to see their experiments through to the end (pp. 39-41).

In the social sciences, students must be well versed in history, economics, geography, political science, and sociology. They must have the curiosity and desire to explore social and moral issues. They need a solid understanding of chronological sequencing and cause and effect. They must be able to relate past events to present ones and to predict how they will affect the future. Successful social science students are aware of diversity, have a sense of place, and approach geography from how it affects culture, economics, and politics. The same research skills that are important in English also apply to the social sciences. Good social science students are adept at making connections between ideas and facts, and readily accept challenges (Conley, 2003c, pp. 55 -58).

In the field of world languages, students must "communicate effectively with speakers of another language in authentic cultural contexts" (Conley, 2003c, p. 67). Communication includes four aspects: listening, speaking, reading, and writing. Students must understand culture and its inter-relation with language, and also the basics of grammar and vocabulary (pp. 67-68).

The last component of the S4S content standards concerned the arts. Students of the arts are self aware, they think independently, and can work with a focused state of mind that is capable of blocking out distractions. They must possess effective time management, be able to break a project down into steps, and possess an intellectual curiosity and a willingness to experiment with different types of media. Students must be

able to accept criticism of their work and be collaborative in their endeavors (Conley, 2003c, pp. 73-74).

Although the content standards have been found to be important to college readiness, the university faculty members that were surveyed presented habits of mind that even more closely related to university success. They devised a long list of attitudes and behaviors that students must bring with them from high school to college:

> Critical thinking, analytic thinking and problem solving; an inquisitive nature and interest in taking advantage of what a research university has to offer; the willingness to accept critical feedback and to adjust based on such feedback; openness to possible failures from time to time; and the ability and desire to cope with frustrating and ambiguous learning tasks;…the ability to express one's self in writing and orally in a clear and convincing fashion; to discern the relative importance and credibility of various sources of information; to draw inferences and reach conclusions independently; and to use technology as a tool to assist the learning process rather than as a crutch. (Conley, 2003c, p. 8)

The American Diploma Project is another organization that has done extensive work to develop benchmarks in English and math that "define the knowledge and skills high school graduates need to be successful" (ADP Benchmarks, www.achieve.org). For English, the benchmarks are divided into eight strands: language, communication, writing, research, logic, informational text, media, and literature. For math, the benchmarks include number sense and numerical operations, algebra, geometry, data interpretation, statistics, and probability. Workplace tasks and college assignments are included to give schools examples of what students must be able to do to prove college

readiness. The goal of the American Diploma Project was for schools to compare their curriculum to the benchmarks, for high school teachers to use the examples to help develop their curriculum and lesson plans, and for employers to begin to see the value of achievement data as an indicator of workplace preparation. Finally, the project hoped that policymakers at the secondary and postsecondary levels would refer to the tasks and assignments to compare them with real-world expectations (How to Use the Benchmarks and Samples, www.achieve.org).

Assessing College Readiness

Even if schools have a desire to make changes to help students become prepared for college, they are only as good as their assessments. The primary way that schools have determined readiness is by using proficiency standards on state exams. The first study to determine the degree of correlation between state exams and state standards was conducted by S4S, 17 sponsoring universities, and 11 endorsing universities. The study found that there was an inconsistent relationship between the exam questions and the knowledge and skills that had been determined to produce university success. The language arts and mathematics sections of the tests were examined from 20 states, with a total of 66 exams being analyzed. S4S determined that "state tests matched up with the college success standards most frequently in Reading/Comprehension and Computation. States fared less well in Writing and Critical Thinking in English, and Algebra, Mathematical Reasoning, and Geometry in Mathematics" (Conley, 2003b, p. 5). What the results imply is that state testing is not a good indicator of college readiness (p. 13).

Another way that schools have used to measure readiness is through the accumulation of credits on a transcript. Dougherty, Mellor, and Jian (2006) set out to

determine why students with high level courses on their transcripts were not performing as expected in college. They have coined the phrase "course credit inflation" to refer to the effect that has occurred over time when the rigorous standards of the course have fallen over time so students are receiving credit for material that they have not mastered (p. 4). They likened course credit inflation to social promotion, since students have simply been allowed to pass on to the next level of instruction, even when they have not met the standards of the initial course (p. 6). They made similar recommendations to those previously mentioned. They promoted the careful alignment of curriculum from elementary all the way through high school. Students in need of remediation must be identified early so that they do not enter high school unprepared. Schools should provide summer schools to help students make up prerequisite skills, and they should develop final exams that truly measure student learning in the course. Above all, schools must create a "culture of achievement" that acknowledges student efforts in the more rigorous courses and promotes higher expectations for all (pp. 6-7).

In order to assess college preparedness, Conley (2007) has divided the major elements of readiness into four components and has devised a means of assessing each in a different, yet complimentary fashion. He has used the following headings: "Key cognitive strategies, key content knowledge, academic behaviors, and contextual skills and awareness" (p. 12). The author provided several ways that each of these four components can be measured.

Conley (2007) defined the key cognitive strategies as "patterns of intellectual behavior that lead to the development of mental processes and capabilities necessary for college-level work" (p. 13). He listed "intellectual openness; inquisitiveness; analysis;

reasoning, argumentation, and proof; interpretation; precision and accuracy; and problem solving" (pp. 13-14). He stated that these strategies could best be measured through the collection of classroom evidence. These collections would be similar to portfolios, but they are more structured in that they are scored by more rigorous methods of assessment. One example is the Proficiency-based Admission Standards System (PASS) that has been used by Oregon's university system as an alternative means of seeking acceptance. In Washington State, a collection of evidence method has been used for students who did not pass the state high school exit exam. The Educational Policy Improvement Center (EPIC) is in the process of producing a formative assessment for grades 6 through 12 that includes the following five key dimensions: "reasoning, argumentation, and proof; interpretation; precision and accuracy; problem solving; and research" (Conley, McGaughy, O'Shaughnessy, & Rivinus, as cited in Conley, 2007, p. 20).

Conley (2007) adhered to the key content knowledge as outlined in the S4S documents that listed essential content for the four core areas, world languages, and the arts. "The two academic skill areas that have repeatedly been identified as being centrally important to college [are] writing and research" (p. 14). College admissions tests have been the default means of assessing content knowledge. Conley suggested that the end of year exam for each course is another means of making this determination. The exams should be developed in conjunction with college expectations for mastery in each course. A similar exam is the AP exam that students take after completing an AP level course. "A college readiness assessment system that consisted of a series of end-of-course exams would yield much more detailed, fine-grained information regarding student knowledge and skills relative to college readiness standards" (p. 21).

Conley (2007) proposed that academic behaviors are not linked specifically to one content area, as are the cognitive strategies. They would fall primarily under two headings: self-monitoring skills and study skills (p. 16-17).To gauge student competence in these areas, student surveys or self-inventories would be useful. Advisors who get to know their advisees well could also assess progress in these areas (p. 21).

Finally, Conley (2007) stated that contextual skills and awareness refer to specifically understanding how college is different from high school and the coping mechanisms that must be in place in order for a college student to navigate through the system. It includes human relations skills, collaborative abilities, and college knowledge. By this, Conley meant understanding the following processes: "college admissions,…college options and choices,…tuition costs and the financial aid system; placement requirements, testing, and standards; the culture of college; and the challenge level of college courses, including increasing expectations of higher education (Lundell et al., as cited in Conley, 2007, p. 17). Questionnaires are also useful to assess college knowledge of individuals; however, perhaps assessment of the effectiveness of the school's program would be more useful information to collect. (p. 21).

Conley (2007) proposed the use of one comprehensive assessment that "would be an integrated system that provides all this information to students in a progressive, developmentally appropriate fashion so that they have a continuous sense of how well they are being prepared—and are preparing themselves—for college" (p. 22). He recommended that the tracking of progress begin in sixth grade and continue until the student graduates from high school.

Closing the Expectation Gap as a Means of Reform

Not all educators believe that current high school reform models will have the desired effect of preparing graduates for post-secondary success. Conley (2003a) proposed that if high schools want to prepare students for success after high school, then they must work together with employers and college officials to determine what qualities a graduate must have to be successful. Schools must also ensure a smooth transition between secondary and post-secondary options. He stated that following state standards is not, in and of itself, a bad thing to do; however, "standards that link to nothing create another potential dead-end" (p. 10). High schools remain stuck in an obsolete system, and colleges and universities have refused to "revamp the general education component of their curriculum to align better with high schools" (p. 10).

The Standards for Success Commission (S4S) made four recommendations to help improve the alignment of state standards and college readiness. The first was that states should analyze more carefully the relationship between their state standards and college readiness standards. Secondly, states should conduct a study to determine the relationship between students who score well on their exams and how well they do upon entrance to college. Thirdly, as states make modifications to their exams, they should seek to include questions that assess the broader cognitive skills that have been determined to correlate to university success. Lastly, they encouraged educational leaders at both the secondary and post-secondary levels to join together to better align state standards and university admissions policies. By making this concerted effort at working together, S4S believed that high school graduates would have a better understanding of their readiness for college-level work (Conley, 2003b, p. 13).

In 2006, ACT conducted a national curriculum survey that found that "secondary and postsecondary educators differ greatly in how well they believe their state's standards prepare students for college level work in the content area in which they teach" (ACT, 2009, pp. 16-17). High school teachers believed that they were preparing their students for college success. College professors did not view high school class content as rigorous enough to ensure success. In order to bridge the gap, those in higher education must become serious about working with secondary school professionals as partners in standards-driven educational reform. Colleges must enter into the standards dialogue if the debate is ever to come to an end (Conley, 2003a).

In a 2006 ACT survey, they found that high school teachers reported spending between one-fourth and one-third of their teaching time "re-teaching skills that should have been learned prior to high school. It is important that…students who lack foundational skills for high school work can be identified earlier and their weaknesses remediated" (ACT, 2007, p. 20). The National Commission on the High School Senior Year (2001) recognized the disconnect that must be repaired in order for students to enter high school ready for rigorous course work. They recommended that a cohesive curriculum from preschool through college be established, with clear benchmarks so that students know exactly what is expected of them at every level (p. 5).

One recommendation of the Achieve-sponsored summit was the development of a P-20 longitudinal system of data collection to determine how well prepared high school graduates were for college and how well they adjusted to life after school. In 2008 only nine states had a system in place for data collection. Today, fourteen states, including one new state added in 2010, Delaware, have such a system in place. The data assesses

graduation rate, the number of students who had taken college preparatory courses and had scored college-ready on a high school assessment, and percentage of students who were ready to take credit-bearing, not remedial, college courses (*Closing the Expectations Gap,* 2011, p. 13)

All of this data collection is for the sole purpose of "working to close the expectations gap that has left too many young people unprepared for life after high school" (*Closing the Expectations Gap,* 2008, p. 19). The coordination of educators from preschool through graduate school should provide students with an education void of holes and gaps in learning and enable more high school graduates to be successful in college and work.

The good news is that in the last six years progress has been made to align high school competencies with higher education standards. According to the sixth annual report on the alignment of high school policies with college and career requirements, 47 states, plus the District of Columbia, have college preparedness standards as compared to just three states six years ago. Twenty states, plus Washington, DC, now require all students to complete a college prep curriculum in order to graduate. Fourteen states, as compared to just three, now use assessments that align with college entrance standards. Twenty-two states have begun to coordinate data collection between secondary and post-secondary schools, including six new states that just began the process this past year. Achieve asks states to consider four areas that assess college preparedness: "the percentage of high school graduates who earn a college- and career-ready diploma, obtain readiness scores on a high school assessment, earn college credit while still in high school, and require remediation upon entering college" (p. 4). Today, only Texas uses all

four of these indicators, while half of the states use at least one of these criteria in its system of accountability (*Closing the Expectations Gap*, 2011, pp. 2-4).

Schools have been making the attempt to improve the quality and rigor of their courses, with numerous reform models being followed to take schools from good to great. There are several elements that must be included in these programs in order to better equip high school graduates with the necessary skills and knowledge base to be a success in college. First of all, states should reassess their standards and exams to make sure they correlate with what colleges require. They have a good base upon which to build, but they must work together with university faculty members to determine what standards are essential, and which ones are secondary. Many states have too many standards of unequal importance. Educators need guidance in the implementation of the state standards.

Secondly, K-12 schools must follow the newly-framed standards and work toward proficiency for all. If states do not modify their standards, then schools should base their curriculum on college readiness proficiencies in order to accomplish their school's mission. The narrow focus of NCLB must be expanded so that schools do not limit their curriculum to simply teach to the test. Students are individuals with unique interests and abilities. Great schools do not forget that the focus of education should be on the child as learner. Schools that ensure that students are connected with adults in meaningful ways have a better chance of producing well-balanced young adults ready to enter the world of work or higher education.

Thirdly, a cohesive data collection system must be implemented that can readily assess individual student preparedness for college. This is the one area where the least

amount of research has been done. Since high school graduate preparedness is a topic that is pertinent to both K-12 teachers and college-level educators, focusing on this issue will be well worth the expense and time invested to implement an effective program.

Summary

Conley (2007) proposed a broader definition of college readiness that included being capable of understanding college material, coping with the content included in the course, and interacting within the class in a way that the student is able to meet the objectives of the course. He went beyond this to include being prepared for the whole college experience by understanding the culture and structure of college, as well as intellectual and social norms prevalent therein: "A more robust, inclusive definition of college readiness can help shape student behaviors and high school practices in ways that result in more students entering college with the academic and social tools to succeed" (p. 6).

Research seems to indicate that in order for schools to graduate students ready to enter post-secondary institutions; they must incorporate elements from both the AAD and HDD camps. Schools must provide rigorous course instruction that teaches the necessary skills and knowledge for students to be successful in college. They must also ensure that students are connected to the learning community and that they take a personal interest in each one as an individual with unique needs and desires. The two schools of thought are complementary to, not competitive with, each other.

Research studies to determine the effectiveness of the current high school reform models are appearing everyday. Christian schools are also reinventing themselves in order to meet the demands of the twenty-first century learner. The University-Model

School® is a reform model with limited information and only one recently completed dissertation to research its claims. Schools following the UMS® model have been operating for 18 years and have been accredited since 2003. Data collected from other types of schools promote parent involvement to increase achievement and improve behavior. This study proposes to quantify UMS® beliefs that students who are taught by teachers and parents with the same worldview and moral beliefs can produce high school graduates who are prepared for college and career. Can less time in school actually increase student achievement? Can teacher and parent effectively partner together to instill in students the habits of mind needed for a smooth transition from high school to college? Perhaps following a college-model schedule makes the transition to post-secondary education easier, as proponents of the UMS® model say.

According to Turner (2001), "Schools reflect homes. Research has validated that when homes are strengthened, schools improve. UMS® schools are successfully accessing the most powerful known single influence for reforming education in America: meaningfully involved parents!" (p. 13). Current reform models focus on rigor and relevance. UMS® schools include the additional component of parent involvement that is lacking in the other reform attempts.

At present, UMS® schools are being used solely in the Christian community, although this is a model that could be made available to parents of other faiths who desire to pass along their values to their children while investing in their education. This study will be limited to a comparison of UMS® Christian high schools and traditional, comprehensive Christian high schools; however, should the research find that UMS® is a viable reform model that improves college readiness of high school students; it may be

added to the list of overall options utilized by the greater educational community. The key is to determine if UMS® schools do, in fact, contribute to college readiness, thus closing the expectation gap between high school and higher education.

CHAPTER THREE: METHODOLOGY

High school reform models exist with the goal of better preparing high school graduates for success in post-secondary institutions. Research that examines the effectiveness of the different reform models has produced mixed results. The first University-Model School® (UMS®) test school opened in December, 1992, with the organization of the National Association of University-Model Schools (NAUMS) being formed in 2002. At present, there is one recently completed dissertation concerning parental involvement in UMS® schools, but there is no published research to back the National Association of University-Model Schools' claims that the University-Model School® (UMS®) high school produces students who are academically prepared for college.

This chapter begins by identifying the research design, the participants, and the setting. It follows with the instrumentation and procedures that were used in this study. It concludes with the analysis of the data.

Design

A correlational design was used to determine if there is a statistically significant relationship between the type of high school a senior attends (UMS® or traditional, comprehensive Christian) and academic college readiness, controlling for prior academic achievement, gender, and ethnicity. A correlational research design was chosen for the following reasons:

1) The study sought to test hypotheses concerning the relationship between the school type and academic college readiness.

2) Parents decide the placement of their students into a UMS® school or a traditional school; therefore, it was impossible to manipulate the two groups using an experimental design. This practice ensured that the two groups that formed the predictor variable were naturally occurring, requiring no manipulation on the part of the researcher.

3) The National Association of University-Model Schools (NAUMS) is in great need of preliminary research results to affirm its current educational practices. The non-experimental designs are helpful for an initial correlational study even though the results may not be as convincing as would those of a true experimental or quasi-experimental design.

4) The study could have been conducted using a causal-comparative design; however, an advantage of using a correlational design is that relationships between many variables may be evaluated simultaneously. In addition, the correlational design provides information about the degree of the relationship between the variables (Gall, Gall, & Borg, 2007).

The correlational design sought to determine if there is a possible relationship between the type of high school the senior attends (UMS® or traditional, comprehensive Christian) and academic college readiness. The predictor variable in this study is high school type, whether traditional, comprehensive or University-Model School® (UMS®). The criterion variable is academic college readiness, as measured by SAT and ACT scores. The primary control variable is prior academic achievement, as measured by the Stanford Achievement Test-10. An additional control variable is gender.

Threats to Validity

Thought was given as to how to control for threats to validity. To allow for external validity, this study used Association of Christian Schools International (ACSI) and National Association of University-Model Schools (NAUMS) schools that were also Southern Association of Colleges and Schools (SACS)-accredited located in the state of Texas. The results may only be generalized to the schools within the sample. Because of the large sample size (N=246), results may possibly be generalized to similar Christian schools within the state of Texas. Since this was a preliminary study, the best way to improve external validity would be to conduct this same research experiment in several different locations within the United States at Association of Christian Schools International (ACSI) and the National Association of University-Model Schools (NAUMS) schools.

To control for internal validity, students who transferred into the schools during their junior or senior years were excluded from the sample in order to preclude prior education as a major difference within the two groups. Scores on the Stanford Achievement Test-10 taken prior to enrollment or the student's sophomore year were used to control for prior academic achievement. The researcher ran an independent sample *t*-test on the mean scores for the largest sample of the groups of students from each type of school to determine if there was a significant difference between the groups.

Research Questions and Hypotheses

The following questions and hypotheses guided the researcher in this project:

Research Question 1: Is there a statistically significant relationship between SAT Composite (Reading and Math) scores and the type of high school seniors attend

(UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 1a, Ho: There is no statistically significant relationship between SAT Composite scores and gender.

Null Hypothesis 1b, Ho: There is no statistically significant relationship between SAT Composite scores and prior academic achievement, controlling for gender.

Null Hypothesis 1c, Ho: There is no statistically significant relationship between SAT Composite scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Research Question 2: Is there a statistically significant relationship between SAT Writing scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 2a, Ho: There is no statistically significant relationship between SAT Writing scores and gender.

Null Hypothesis 2b, Ho: There is no statistically significant relationship between SAT Writing scores and prior academic achievement, controlling for gender.

Null Hypothesis 2c, Ho: There is no statistically significant relationship between SAT Writing scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender

Research Question 3: Is there a statistically significant relationship between ACT Composite scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Null Hypothesis 3a, Ho: There is no statistically significant relationship between ACT Composite scores and gender.

Null Hypothesis 3b, Ho: There is no statistically significant relationship between ACT Composite scores and prior academic achievement, controlling for gender.

Null Hypothesis 3c, Ho: There is no statistically significant relationship between ACT Composite scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Setting

The setting of the study consisted of three schools of each type that agreed to participate in the study. There are seven UMS® schools and 14 ACSI schools located in Texas that were invited to participate.

The seven UMS® schools met the criteria of both NAUMS certification and SACS accreditation. At the time of the study the NAUMS website listed 13 schools that met both NAUMS and SACS requirements. Barbara Freeman, Director of NAUMS, informed the researcher that there was another school that had just met NAUMS certification that was not listed on the website, so this school was also invited to participate. Many UMS® schools follow a classical Christian model. This study was limited to Christian high schools that follow a traditional model of education. There were nine schools that met this criterion, seven of which were located in Texas.

NAUMS is the certifying body that entitles schools to use the UMS® trademark and NAUMS materials. The UMS® certification ensures the quality of the academic program of schools that bear its name (http://naums.net/). The three educational programs that are assessed for UMS® certification are academic, character development,

and student activities. There are 18 standards for the academic program, seven standards for character development, and five for student activities that must be met in order to become certified. Because this study was limited to academic college readiness, the academic standards were emphasized. They include the school's vision, a college-simulated schedule, single-subject course offerings, course pre-requisites, semester registration, flexibility in scheduling by level, a well-developed curriculum guide, effective parent-teacher communication, organized course work for the satellite classroom, educationally sound and parent-friendly course materials, continued instructional improvement and professional development, and qualified and certified staff members (University-Model School® Certification Process).

Schools can also be accredited through the Southern Association of Colleges and Schools (SACS) that uses AdvancED to complete the process. Schools that have met the requirements for NAUMS certification and SACS accreditation have gone through a stringent process to "evaluate their vision, strategies, priorities, leadership, and programs and resources. The process of earning and maintaining accreditation provides institutions and educational systems with clear and compelling direction for implementing changes to move toward excellence" (www.advanc-ed.org/). There are five standards that must be met in order to receive SACS accreditation. Schools must have a clear purpose and direction that is both demonstrated and communicated to the school community. They must operate using effective governance and leadership. The curriculum, instruction, and assessment must ensure effective student learning. The schools must have adequate resources to meet their given mission. They must also assess student learning so that

continual improvement can be made to allow for increased student achievement ((http://www.advanc-ed.org/).

UMS® schools that are both NAUMS-certified and SACS-accredited would be well-aligned with ACSI/SACS-accredited schools that follow the traditional, comprehensive model of schooling because of the similarities in their accreditation requirements.

ACSI is the governing body that certifies teachers and provides accreditation to schools who meet their stringent requirements. Schools must demonstrate competency in ten areas: philosophy and foundations; governance and leadership; home-school relations; personnel; the instructional program; library, media, and technology; crisis planning, safety, health, and nutrition; facilities, environment, and transportation; character and spiritual development; and continuous school improvement (*REACH 1.2, 2008).* At the time of the study, according to the ACSI website there were 48 schools in Texas who had met these requirements. For this study, to further qualify these schools, additional accreditation with a regional body such as SACS provided a list of 14 schools in Texas. The 14 schools that were ACSI- and SACS-accredited share common characteristics. They are schools built on a solid foundation, hold a good reputation, and are leaders in the Christian community. The 14 schools that follow a traditional, comprehensive model of education were eligible for participation in the study.

To conduct this study, the researcher began by contacting the NAUMS and the ACSI headquarters to gain their support for the study and to determine the aggregate data characteristics that were available for qualifying schools and students. Data of interest for schools included size and location of the school, racial makeup, socio-economic

makeup, and ratio of general education to special education students. Using a letter of introduction, the NAUMS and ACSI headquarters made the initial contact to the individual schools that met the requirements for the study. Twenty-one schools, seven UMS® schools and 14 ACSI schools, were invited to participate. All graduates from the classes of 2009, 2010, and 2011 who had attended at least three years at the schools and that had the necessary test scores formed the sample population. Eight schools, four of each type, agreed to participate. In the end, data were received from seven schools; however, one school did not have graduates who had attended for at least three years, therefore no students qualified to be included in the sample.

The schools were not able to provide information on socio-economics or special needs percentages; however, data were obtained for location, size, and ethnic diversity. The six schools were all located within a 175-mile radius of Dallas. One of each type was considered urban, and two of each type were considered rural. The demographics of the three ACSI traditional schools are found in Table 1. The demographics of the three UMS® schools are found in Table 2.

Table 1

Demographics of ACSI Traditional Schools

Demographics	Trad. School 1	Trad. School 2	Trad. School 3
Total Enrollment (PK-12)	685	326	483
High School Enrollment	162	75	138
Caucasian	93.0%	89.0%	94.5%
African-American	2.0%	1.0%	0.5%
Asian/Pacific Islander	2.0%	5.0%	0.0%
Hispanic	2.0%	1.0%	1.5%
American Indian	0.0%	1.0%	0.0%

Table 2

Demographics of UMS® Schools

Demographics	UMS® 1	UMS® 2	UMS® 3
Total Enrollment (1-12)	216	448	238
High School Enrollment	92	204	65
Caucasian	94.0%	93.0%	93.0%
African-American	1.0%	3.0%	1.0%
Asian/Pacific Islander	0.0%	0.0%	<1.0%
Hispanic	6.0%	5.0%	5.0%
American Indian	0.0%	0.0%	<1.0%

Participants

This study used a criterion sample of graduating seniors from National Association of University-Model Schools (NAUMS)/Southern Association of Colleges and Schools (SACS)-accredited University-Model School® (UMS®) high schools and graduating seniors from Association of Christian Schools International (ACSI)/Southern Association of Colleges and Schools (SACS)-accredited traditional, comprehensive Christian high schools that were located in Texas. In order to increase population validity, all UMS® graduates from the classes of 2009, 2010, and 2011 who had attended their respective schools for a minimum of three years were eligible to be in the study. The sample was drawn from schools that desired to participate; therefore convenience sampling was used to procure the desired sample. Data for individual students included gender, ethnicity, graduation year, and academic ability (as measured by Stanford Achievement Test-10 scores). Two hundred forty-six students formed the sample (N=246), with 156 from traditional schools and 90 from UMS® schools.

According to Gall, Gall, and Borg (2007), a correlational study requires a minimum of 30 participants. When it was decided to use a sequential multiple regression to analyze the data, the minimum sample size was calculated at 50+8K, with K equaling the number of criterion variables (Tabachnick & Fidell, 2007). For this study, the ideal number when considering a medium effect size was 154. The actual total sample size for this study was 246.

Instrumentation

There were three instruments that were used to collect data in this study. The Stanford Achievement Test-10 (SAT-10) was used to control for prior academic achievement. The SAT and the ACT were used to measure college readiness.

Whereas high school grade-point average (GPA) is "generally the most reliable predictor of first-year academic performance in college" (NACAC, 2009, p. 17), grades were not used in this study because schools utilize different grading scales and have differing levels of difficulty in their courses. The second most important factor that has been consistently rated to predict college success is achievement test scores.

Tests for Prior Academic Achievement

The SAT-10 was used in order to control for prior academic achievement. It is a multiple choice test that helps "educators find out what students know and are able to do" (Stanford Achievement Test Series, Tenth Edition, 2012). It is a norm-referenced test that provides national comparisons. It is also a criterion-referenced test that meets federal requirements for accountability to *No Child Left Behind (NCLB).* Since it incorporates elements of both norm-referenced and criterion-referenced assessments, SAT-10 is considered a standards-based test, for it is "normed to a reference group and aligned to a

set of performance standards" (Kraft, 2008, p. 2). The SAT-10 has been nationally recognized as a standard for assessing student progress for 80 years and uses a 2002 standardization sample, with 2007 updated norms (p. 4). "The Reading section of the SAT-10 received an alpha reliability rating of .87, the Math section .80 - .87, and the language section .78 - .84" (www.statisticscolutions.com).

The SAT-10 tests reading, mathematics, language, spelling, science, social science, listening, and thinking skills. Subscores for reading include word study skills, reading vocabulary, and reading comprehension. Subscores for mathematics include problem solving and procedures. Subscores for language include mechanics and expression. The SAT-10 includes a score for the basic battery and one for the complete battery. Also included are scores for specific skills within each category. Scores for each skill are listed showing the number possible, the number correct, and a scaled score. The student's score is labeled as below average, average, or above average. The total possible correct for each section varies from 24 for language expression and mechanics to 100 for thinking skills. The number correct, along with a scaled score, is listed in the results. A national percentage, national normal curve equivalent (NCE), grade level equivalent, and achievement/ability comparisons (AAC) range are provided, comparing each student with other students in the same grade across the nation (Stanford Achievement Test Series, Tenth Edition, 2012). Because students took the Stanford-10 during either their seventh, eighth, or ninth-grade year, the scaled scores were used. Also, depending upon the grade-level when the test was taken, certain subtests were not always included on the test. Because only 85 of the 246 students (35%) had scores for SAT-10 Math Problem Solving, Math Procedures, and Listening, these scores were deleted prior to data analysis.

It is acceptable to delete variables when there are a lot of missing values as long as that variable is not critical to analysis (Tabachnick & Fidell, 2007). Since two of the three were subscores of the Math Scaled Score, and because there is no comparable section on the SAT and ACT to the Listening section, their individual scores were not necessary to the study.

The following scores were used in the data analysis: Reading scaled score, Reading Vocabulary scaled score, Reading Comprehension scaled score, Math scaled score, Language scaled score, Language mechanics scaled score, Language Expression scaled score, Spelling scaled score, Science scaled score, Social Science scaled score, and Thinking skills scaled score.

Tests for College Readiness

This study used the two most widely utilized standardized tests for college admission, the SAT and the ACT. Both exams are reliable in that they measure what they intend to measure: college readiness (NACAC, 2008). Both measure a student's basic knowledge of high school courses, as this knowledge is considered important for college acceptance and for students to be successful in their college studies (ACT Inc., Using Your ACT Results, 2008/2009, as cited in Briggs, 2009). The SAT also assesses how students "think, solve problems, and communicate" (The College Board, The SAT Program Handbook, 2008, as cited in Briggs, 2009, p. 8).

The SAT (formerly called the Scholastic Aptitude Test) was first utilized in 1926, at which time approximately 8,000 white males took the test. Today more than 2.7 million SAT test-takers include men and women and also represent Asian, Hispanic/Latino, and African American students. In its original version, nine subtests

were used and time constraints were rigid. In 1930 the test was divided into two sections: verbal aptitude and mathematical aptitude. Over the years the test has included antonyms, double definitions, and paragraph reading. Analogies were not used between 1930 and 1935, but were added again in 1936. Initially the verbal section tested both reasoning and verbal abilities. Changes have been made to shift the balance away from reasoning, toward pure verbal abilities. By 2001, the SAT verbal section included analogies, sentence completions, reading comprehension, and Critical Reading. Today the verbal portion of the test measures the ability to construct meaning of the English language in an academic setting. Critical Reading skills are used as students read passages concerning science, social science, and the humanities (Lawrence, I., Rigol, G. W., Van Essen, T., & Jackson, C. A., 2002).

Oddly enough, the mathematics portion of the SAT in 1928, 1929, and between 1936 and 1941 did not contain any math questions. Between 1930 and 1935 it only contained free-response questions. Students were asked to solve problems and to fill in their responses. In 1959 data sufficiency questions were introduced and then replaced in 1974 with quantitative comparisons. The comparison questions require the same skills; however, they are less dependent on the verbal skills of the test-taker. 1994 brought about significant change to the math portion of the test. Students were allowed to use a calculator and open-ended questions were once again introduced. By 2001 the test included multiple choice, quantitative comparison, and student-produced response questions. The changes were made in order to better align the test with current math curricula and to reduce the impact that speed had on the results. Today the mathematics portion of the test focuses on the ability to solve problems using mathematical concepts

and skills. It expects an understanding of arithmetic operations, algebra, geometry, statistics, and probability (Lawrence, I., Rigol, G. W., Van Essen, T., & Jackson, C. A., 2002; What does the SAT test?, 2012).

The writing section was first introduced in 2006 and includes both multiple choice questions and an essay. The 49 multiple choice questions primarily test the student's knowledge of sentence structure, grammar, and language usage, while the essay looks for a coherent argument that supports a point of view. The essay accounts for 30 percent of the total writing score. The writing section is the most predictive of college success among its test-takers (The SAT® writing section, 2008).

Today's version of the SAT "focuses on assessing fundamental math and reading skills that are crucial to success in college and adult life" (Lawrence, I., Rigol, G. W., Van Essen, T., & Jackson, C. A., 2002, p. 12). It does not measure content mastery. According to Briggs (2009) each section is worth between 200 and 800 points, with increments of 10 points. The standard error of measurement for the Mathematics and Critical Reading section is about 30 points; the standard error of measurement associated with the Writing section is about 40 points (p. 9). The total possible score is 2400; however, most students score between 1500 and 1600. The raw score is converted to a scaled score between 200 and 800 using a statistical procedure called equating. This is done so that a score received using one edition of the SAT will equate to the same score on a different edition. Scores are not affected by how well other students do on the edition that the student takes (How the SAT is scored, 2012).

According to the 2008 NACAC report, "admission test scores may be over-predictive of first year GPA for some minority students, and may be under-predictive of

first year GPA for some female students" (p. 11). Even with the newly-revised SAT that includes a writing portion, the predictive validity of the test varies based on gender, ethnicity, and language (Mattern, Patterson, Shaw, Kobrin, & Barbuti, 2008). One difference is that the new writing section "is the most highly predictive of the three individual SAT sections" (Kobrin, Patterson, Shaw, Mattern, & Barbuti, 2008, p. 1). Its correlation with the first year GPA is the highest ($r = 0.33$, *Adj.* $r = 0.51$) (p. 5). Because of this fact, this study will control for gender. The researcher desired to also control for ethnicity; however there was not adequate ethnic diversity in the sample.

The ACT is the second test to be used to measure academic college readiness. Prior to 1959 the SAT was the only college entrance test available to students. Originally called The American College Testing Program, Inc., the name was changed to ACT in 1996 (History of ACT, 2012). The ACT differs from the SAT in that it measures achievement in four areas: English, mathematics, reading, and science. In 2010, approximately 47 percent of all high school students in the United States took the ACT. The ACT places college readiness benchmarks in English composition, social science courses, college algebra, and biology, as these are usually the first credit-bearing courses taken by first-year college students. Students who receive a minimum ACT score have "a 50 percent chance of earning a B or better and approximately a 75 percent chance of earning a C or better" in the corresponding course (ACT, 2011, p. 3).

Each subscore has a range of one to 18. The English section tests usage/mechanics and rhetorical skills. The three mathematics sections are pre-algebra/algebra, algebra/geometry, and plane geometry/trigonometry. The reading section provides scores for social studies/sciences and arts/literature. The science section

provides just one score. There is a combined English/writing section and then a writing score for the essay that ranges from 2 to 12. Students also receive a ranking, which is equivalent to the percentage of students who received scores the same as or lower than the student. The ACT composite score is also indicated (Understand your score, 2012).

The ACT composite score has a significant impact on first year GPA, with a 0.072 increase in GPA for every one point increase in ACT composite score. The findings also suggest that these results are applicable to schools of different academic standards (Bettinger, Evans, & Pope, 2011). According to Briggs (2009):

> The ACT score scale ranges from one to 36 with increments of one. The standard error of measurement associated with test scores range between 1.5 and two points on the individual sections, with a standard error of measurement of about one point associated with the composite score. (p. 9)

The most recent study of the predictive value the ACT shows "a strong correlation between higher ACT composite scores and positive college outcomes. However,…Mathematics and English scores are much more tightly correlated with college success than are Reading and Science scores" (p. 2). When taken separately, the Reading and Science sections alone are not good indicators of college success.

Procedures

The study was conducted using archival data; therefore, consent and assent from individuals were not warranted; however, agreement to participate by individual schools was secured. When the director of NAUMS learned of the study, she requested that she be allowed to contact possible schools for the study prior to the initial letter of introduction. In order to be consistent, the researcher contacted the regional director of

ACSI to see if he would like to act in a similar capacity. He agreed. Both received a letter of introduction and a list of the schools that would qualify for the study. Initially four UMS® and three traditional Christian schools agreed to receive a letter of introduction. A fourth traditional school later asked to participate. In the end, data were received from seven schools, with six of the schools sending data from graduates that met the criteria of the study.

After receiving written IRB approval (see Appendix), the researcher requested the needed archival data from each school. The data consisted of descriptive information for each student: gender, ethnicity, graduation year, year they first attended, and number of children in the family, if known. Achievement test scores for the SAT-10, the SAT, and the ACT were also procured. Of utmost importance was that confidentiality of each student be maintained. Student names and identification numbers were removed by the sending schools. They were then given a new identification number that correlated directly to the study. Once the archival data were received and organized, they were ready for analysis.

Data Analysis

To determine if the two groups of students were equivalent or whether it was necessary to control for pre-existing factors, the researcher compared the mean of each of the SAT-10 using an independent *t*-test. The difference in means ranged from -25.521 on the SAT-10 Reading Vocabulary scaled score (higher for UMS®) to 1.187 on the SAT-10 Social Science scaled score (higher for traditional). Full details and results will be presented in chapter 4. Based upon this statistic, it was determined that a means of analysis was needed that would control for confounding. It was decided that a sequential

model (or hierarchical model) of multiple regression would be able to account for the differences in the initial groups so that the results could be attributed to school type and not the initial differences in the two groups of students. This decision was made for a number of reasons. The researcher had a clear understanding of the desired outcome: to determine if there is a possible relationship between the type of school one attends and academic college readiness. As previously stated, the researcher also knew from prior studies that standardized tests may be over-predictive or under-predictive for certain students, especially minority and female students (Mattern, Patterson, Shaw, Kobrin, & Barbuti, 2008; Kobrin, Patterson, Shaw, Mattern & Barbuti, 2008).

By using the sequential model, the researcher was able to add the control variables in steps, placing gender in the first step, since gender has previously been determined to have a relationship with academic college readiness. A benefit of doing so is that the relationship between the predictor variables and the criterion variable is re-computed at each step (Tabachnick & Fidell, 2007). Other benefits of using sequential multiple regression are that it is an appropriate choice even if the predictor variables are correlated. The criterion variables may also be continuous (as are SAT and ACT scores). Another consideration in choosing multiple regression is the difference in sample size between the SAT Composite (N=223) and the ACT Composite (N=144). By running three separate multiple regressions, all of the available data was able to be included in the study. In addition, numerous recent educational studies have utilized multiple regression, so using a similar model would be helpful for practitioners in understanding the results (Kahn & Nauta, 2001; Noteborn, Carbonell, Dailey-Hebert, & Gijselaers, 2012; Artino &

Jones, 2012; Xu & Meyer, 2007). For these reasons, sequential multiple regression was chosen (Tabachnick & Fidell, 2007).

The rule of thumb for calculating sample size when using multiple regression is 50+8K, with K equaling the number of predictor variables (Tabachnick & Fidell, 2007). For this study, the ideal number when considering a medium effect size was 154. The actual total sample size for this study was 246.

Next, the researcher considered the available SAT and ACT scores. The SAT and ACT are divided into sections. Most students take the main section of the SAT that consists of Reading and Math. Students have the option of completing the Writing section that consists of a multiple choice subscore and the SAT Essay or just completing the Essay portion. For this study, 223 students took both sections (SAT Composite (Reading and Math) and the SAT Writing section. The SAT sample consisted of 223 students, 141 from the traditional schools and 82 from the UMS® schools.

Most students also take the ACT without completing the Writing portion. Their scores on the English, math, reading, and science sections are used to comprise an ACT Composite score. The researcher formed a second group for the ACT Composite that consisted of 144 students who took the four main sections of the exam. This group consisted 103 from the traditional schools and 41 from the UMS® schools.

The next step was to recode the predictor variables. There were two types of schools (0 = UMS®, 1 = traditional) and two categories for gender (0 = male, 1 = female). The study originally included ethnicity as a predictor variable; however, the sample did not produce an adequate number of cases based upon ethnicity. The research question and null hypotheses were modified to exclude ethnicity as a control variable (Tabachnick

& Fidell, 2007). Table 3 shows the different variables that were used in the study and how they were measured.

Table 3

Variables and Measurement Methods

Theor. Fram/Research	Variable	ACSI & NAUMS Websites	Unit of Analysis
Turner, 2001 www.acsi.org www.naums.net	School Type	ACSI & NAUMS Websites	0 = UMS® 1 =Traditional
NACAC, 2008 Mattern, Patterson, Shaw, Kobrin & Barbuti, 2008	Gender	School Provided	Male/Female 0 = Male 1 = Female
SAT Series, Tenth Ed, 2012; Kraft, 2008	Prior Academic Achievement	SAT-10 Scaled Scores/School Provided	Scaled Scores
NACAC, 2009 Kobrin, Patterson, Shaw, Mattern & Barbuti, 2008	Academic College Readiness SAT	School Provided; Highest Score/Multiple Tries	Transformed Raw Score; SAT Composite – Scaled Score 400-1600; SAT Writing – 49 Multiple Choice; SAT Essay Total 2-12; 30% of Writing Score; Rubric
ACT, 2011; Briggs, 2009; Bettinger, Evans & Poper, 2011	Academic College Readiness ACT	School Provided; Highest Score/Multiple Tries	ACT Composite – Math, English, Reading, Science; Range 1-36

Assumptions.

In addition to determining an appropriate sample size, the researcher ran numerous data analyses to verify that the important assumptions were met. The five assumptions are (1) a linear relationship between the variables; (2) homoscedasticity of the predictor variables; (3) normality of the data distribution (4) little or no multicollinearity, and (5) no extreme outliers. (Tabachnick & Fidell, 2007). The researcher used histograms and probability-probability (P-P) plots to check for normality, scatterplots to verify the linearity and homoscedasticity of the data, and Mahalanobis' Distance and Cook's Distance to identify multivariate outliers. A correlation matrix, the variance-inflation factor (VIF), and a collinearity diagnostic table were utilized to determine if multicollinearity and singularity existed. Results are presented in chapter 4.

Summary

High schools continue to reform their programs in order to maximize the academic success of their students. Using standardized achievement test scores, this quantitative study compared the academic college readiness factors of students from UMS® high schools with students of the traditional, comprehensive Christian high schools to determine if there is a possible relationship between attending either type of high school and college academic readiness. Archival data from three high schools of each type located near Dallas, Texas were collected from ACSI and NAUMS member schools that are also SACS-accredited and who agreed to participate in the study. The Stanford Achievement Test-10 controlled for prior academic achievement. The other control variable was gender. Results of the study are presented in the next chapter.

CHAPTER FOUR: FINDINGS

Chapter 4 is organized into four sections: (a) a restatement of the purpose of the study, (b) demographic and descriptive data of the study, (c) data analysis and results of the sequential multiple regression for each research question, and (d) a summary of the results.

Restatement of the Purpose

The purpose of this correlational study was to determine if there is a statistically significant relationship between the type of school a high school senior attends (University Model School® or traditional, comprehensive Christian) and academic college readiness, when controlling for prior academic achievement and gender. The data was collected from schools located within a 175-mile radius of Dallas, Texas for the graduating classes of 2009, 2010, and 2011. The predictor variable was type of high school: UMS® or traditional, comprehensive Christian. The criterion variable was academic college readiness as measured by SAT and ACT exam scores. The control variables were prior academic achievement and gender.

This study also sought to expand upon previously conducted research concerning the relationship of high school reform models to the preparation of students for success in entry-level college courses.

Academic college readiness was measured using SAT and ACT scores, with SAT scores being used to answer the first two research questions and ACT scores being used to answer the third research question. The research questions were as follows:

Research Question 1: Is there a statistically significant relationship between SAT Composite (Reading and Math) scores and the type of high school seniors attend

(UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Research Question 2: Is there a statistically significant relationship between SAT Writing scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Research Question 3: Is there a statistically significant relationship between ACT Composite scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Demographic and Descriptive Data

Data were obtained from 156 high school graduates from three traditional, comprehensive Christian schools and 90 high school graduates from three UMS® schools located near Dallas, Texas. All of these graduates met the following criteria to be included in the study: (a) attendance at the school for a minimum of three years, (b) scores on the Stanford-10 taken in grade 7, 8, or 9, (c) graduation year of 2009, 2010, or 2011, and (d) scores on the SAT, the ACT, or both. If a student took the SAT or the ACT more than once, then the highest score (or subscore) was used in this study, as this is a common practice at many colleges. Tables 4 and 5 present the demographic information of the participants.

Table 4

Ethnicity of Students by School Type

	Traditional School		UMS® School		Total	
Ethnicity	*n*	%	*n*	%	*n*	%
African American	3	1.94	2	2.22	5	2.04
Asian/Pacific Islander	3	1.94	0	0.00	3	1.22
Bi-Racial	0	0.00	1	1.11	1	0.41
Caucasian	150	96.77	80	88.89	230	93.88
Hispanic	0	0.00	4	4.04	4	1.63
Unknown	0	0.00	3	3.33	3	1.22
Total	156	100.00	90	100.00	246	100.00

Table 5

Gender of Students by School Type

	Traditional School		UMS® School		Total	
Gender	*n*	%	*n*	%	*n*	%
Male	78	50.00	51	56.67	129	52.44
Female	78	50.00	39	43.33	117	47.56
Total	156	10.00	90	100.00	246	200.00

Research Questions and Hypotheses

This study sought to determine if there is a relationship between the type of high school (UMS® or traditional, comprehensive Christian) a student attends and academic college readiness (measured by SAT and ACT exams scores) for high school graduates in six Christian schools located near Dallas, Texas. There were three questions and nine null hypotheses that guided this research.

Research Question 1: Is there a statistically significant relationship between SAT Composite (Reading and Math) scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 1a, Ho: There is no statistically significant relationship between SAT Composite scores and gender.

Null Hypothesis 1b, Ho: There is no statistically significant relationship between SAT Composite scores and prior academic achievement, controlling for gender.

Null Hypothesis 1c, Ho: There is no statistically significant relationship between SAT Composite scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Research Question 2: Is there a statistically significant relationship between SAT Writing scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Null Hypothesis 2a, Ho: There is no statistically significant relationship between SAT Writing scores and gender.

Null Hypothesis 2b, Ho: There is no statistically significant relationship between SAT Writing scores and prior academic achievement, controlling for gender.

Null Hypothesis 2c, Ho: There is no statistically significant relationship between SAT Writing scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Research Question 3: Is there a statistically significant relationship between ACT Composite scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 3a, Ho: There is no statistically significant relationship between ACT Composite scores and gender.

Null Hypothesis 3b, Ho: There is no statistically significant relationship between ACT Composite scores and prior academic achievement, controlling for gender.

Null Hypothesis 3c, Ho: There is no statistically significant relationship between ACT Composite scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Data Analysis and Results

Controlling for Prior Academic Achievement

The difference in means ranged from -25.521 on the SAT-10 Reading Vocabulary scaled score (higher for UMS®) to 1.187 on the SAT-10 Social Science scaled score (higher for traditional). The first step to determine if this difference is significant was to consider Levene's Test of Equality of Variances, for which only the Social Science scaled scores had a significance level of $< .05$ (.001). This means that the variance in the scores of the two school types was significantly different. For this reason, on ten of the

scores, the "equal variances assumed" *t*-test and significance levels are reported. For Social Science, the "equal variances not assumed" scores are reported. A significance level of < .05 for the *t*-test is interpreted that the difference in means is statistically significant. Results showed that the mean on five of the scores was statistically significant; therefore, a multiple regression was determined to be appropriate to control for confounding (see Table 6).

Table 6

SAT-10 Mean, Mean Difference, and t-Test Results by School Type

SAT-10 Test	Traditional	UMS®	Mean Difference	*t*-test	*Sig.*
Total Reading	712.72	723.62	-10.898	-2.939	.004
Reading Vocabulary	729.30	754.82	-25.521	-4.174	.000
Reading Comprehension	701.04	713.21	-12.166	-1.774	.077
Math	724.22	731.69	-7.465	-1.775	.077
Total Language	712.88	716.57	-3.688	-0.741	.459
Language Mechanics	710.33	718.63	-8.306	-1.705	.090
Language Expression	715.81	715.94	-0.137	-0.026	.979
Spelling	700.24	715.48	-15.234	-2.569	.011
Science	688.15	698.71	-10.557	-1.999	.047
Social Science	702.11	700.92	1.187	0.380*	.704*
Thinking	704.43	710.83	-6.404	-2.194	.029

Note. SAT-10 scores are scaled scores
* Equal variances not assumed; all others – equal variances assumed
$p < .05$; $\alpha = .05$

Missing Values

There were 246 seniors in the sample; however, not all students had scores for all sections of the SAT and ACT. Tables 7 and 8 show the demographic data for students

included in the sample for the SAT Composite and Writing sample ($N = 223$). Tables 9 and 10 show the demographic data for students included in the sample for the ACT Composite sample ($N = 144$).

Table 7

Ethnicity of Students by School Type in SAT Sample

	Traditional School		UMS® School		Total	
Ethnicity	*n*	%	*n*	%	*n*	%
African American	2	1.42	2	2.44	4	1.79
Asian/Pacific Islander	3	2.13	0	0.00	3	1.35
Bi-Racial	0	0.00	0	0.00	1	0.00
Caucasian	136	96.45	74	90.24	210	94.17
Hispanic	0	0.00	3	3.66	3	1.35
Unknown	0	0.00	3	3.66	3	1.35
Total	141	100.00	82	100.00	223	100.00

Table 8

Gender of Students by School Type in SAT Sample

	Traditional School		UMS® School		Total	
Gender	*n*	%	*n*	%	*n*	%
Male	70	49.64	45	54.88	115	51.57
Female	71	50.36	37	45.12	108	48.43
Total	141	100.00	82	100.00	223	100.00

Table 9

Ethnicity of Students by School Type in ACT Sample

	Traditional School		UMS® School		Total	
Ethnicity	*n*	%	*n*	%	*n*	%
African American	1	0.97	0	0.00	1	0.69
Asian/Pacific Islander	1	0.97	0	0.00	1	0.69
Bi-Racial	0	0.00	1	2.44	1	0.69
Caucasian	101	98.06	38	92.68	139	96.53
Hispanic	0	0.00	0	0.00	0	0.00
Unknown	0	0.00	2	4.88	2	1.39
Total	103	100.00	41	100.00	144	100.00

Table 10

Gender of Students by School Type in ACT Sample

	Traditional School		UMS® School		Total	
Gender	*n*	%	*n*	%	*n*	%
Male	51	49.50	24	58.54	75	52.08
Female	52	50.50	17	41.46	69	47.92
Total	103	100.00	41	100.00	144	100.00

Data Analysis by Null Hypothesis

Research Question 1: Is there a statistically significant relationship between SAT Composite (Reading and Math) scores and the type of high school seniors attend

(UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 1a, Ho: There is no statistically significant relationship between SAT Composite scores and gender.

Null Hypothesis 1b, Ho: There is no statistically significant relationship between SAT Composite scores and prior academic achievement, controlling for gender.

Null Hypothesis 1c, Ho: There is no statistically significant relationship between SAT Composite scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Sequential (hierarchical) multiple regression was used to determine the significance of the relationship between school type and academic college readiness (SAT Composite score) while controlling for prior academic achievement and gender.

Prior to analysis, SPSS was used to analyze the accuracy of the data and to evaluate the tenability of the assumptions of multivariate analysis. There were no missing values.

A histogram and a probability-probability plot (p-p plot) were used to ensure the normal distribution of the residuals. The histogram supported the assumption of normality. There were both positive and negative scores nearing four standard deviations. This alerted the researcher to the possibility of extreme outliers. Scores on the p-p plot hugged the line, also verifying the assumption of normality.

Next a scatterplot showing the relationship between standardized residuals and standardized predicted value was used to check for homoscedasticity and linearity of the data. The observations showed scores that were approximately linear and symmetrically

distributed around the line; however, the researcher noticed two scores greater than 3 standard deviations from the mean, using the three-sigma rule as a guide (Detecting outliers, n.d.). They were cases 146 and 195. The researcher verified that the students' scores were accurately recorded. The SAT Composite scores were 830 and 140, both within the range of other student scores. More testing was needed. Mahalanobis' Distance (D^2) and Cook's Distance were calculated to determine if the outliers had any undue influence on the model. The maximum score for D^2 was 216.676. Using a critical value's chart for the Chi-Square test with 14 degrees of freedom and significance set at 0.001, an acceptable score was 36.123, so 216.676 signified the presence of an outlier or outliers. SPSS listed case 146 as having an SAT Composite score (830) 351.31 points lower than its predicted value (1181.31). It listed case 195 as having an SAT Composite score (1400) 393.37 higher than its predicted value (1006.63). Cook's Distance also showed a high value of 5.210 for maximum. A score of greater than 1 is considered an influential outlier (Cook & Weisberg, 1982). The researcher transformed the scores to within one unit of the next closest outlier. This did not radically change the diagnostic scores, and case 195 was still listed as an outlier. According to Tabachnick and Fidell (2007), when working with multivariate outliers even after transformation they may continue to be too extreme for the model. It is difficult to transform multivariate outliers because the problem rests with the combination of several scores. If allowed to remain in the sample, there is the potential that they could distort the results in either direction (p. 77). For this reason, case 146 was maintained as a transformed number, while case 195 was deleted, leaving a sample size of 222.

According to Tabachnick & Fidell (2007), regression is strongest when the predictor variables are strongly correlated with the criterion variable but uncorrelated with each other (p. 122). For this reason, the researcher tested for the assumption of little or no multicollinearity. A correlation matrix showed that no scores were equal to 1 or -1; however, there were some scores that were close to 1. (See Table 11)

Table 11

Correlation Matrix for Predictor and Criterion Variables for SAT Composite

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
A	1.000	-.201	-.049	.392	.281	.678	.430	.461	.319	.439	.562	.596	.752	.501
B	-.201	1.000	.057	-.218	-.110	-.104	-.120	.008	-.152	-.111	.035	-.180	-.132	-.050
C	-.049	.057	1.000	-.088	-.015	-.105	.205	.266	-.006	-.146	-.159	.023	-.058	.258
D	.392	-.218	-.088	1.000	.195	.247	.197	.219	.296	.188	.312	.513	.380	.241
E	.281	-.110	-.015	.195	1.000	.278	.281	.226	.220	.202	.300	.469	.422	.302
F	.678	-.104	-.105	.247	.278	1.000	.457	.431	.257	.350	.523	.473	.833	.500
G	.430	-.120	.205	.197	.281	.457	1.000	.532	.359	.204	.296	.443	.493	.871
H	.461	.008	.266	.219	.226	.431	.532	1.000	.348	.246	.476	.586	.616	.847
I	.319	-.152	.006	.296	.220	.257	.359	.348	1.000	.187	.232	.505	.385	.385
J	.439	-.111	-.146	.188	.202	.350	.204	.246	.187	1.000	.344	.360	.444	.251
K	.562	.035	-.159	.312	.300	.523	.296	.476	.232	.344	1.000	.607	.791	.445
L	.596	-.180	.023	.513	.469	.473	.443	.586	.505	.360	.607	1.000	.781	.576
M	.752	-.123	.058	.380	.422	.833	.493	.616	.385	.444	.791	.781	1.000	.623
N	.501	-.050	.256	.241	.302	.500	.871	.847	.385	.251	.445	.576	.623	1.000

Note. A=SAT Composite; B=School Type; C=Gender; D=SAT-10 Reading Vocabulary; E=Sat-10 Reading Comprehension; F=SAT-10 Math; G=SAT-10 Language Mechanics; H=SAT-10 Language Expression; I=SAT-10 Spelling; J=SAT-10 Science; K=SAT-10 Social Science; L=SAT-10 Total Reading; M=SAT-10 Thinking; N=SAT-10 Total Language

Language Mechanics and Language Expression correlated with Total Language with scores of .871 and .847. This was not unexpected, as the two are subscores of the Total. The Thinking score also correlated with Math at .833, with Social Science at .791,

and with Total Reading at .781. The Thinking score is calculated by taking the scores of specific questions in the other sections of the SAT-10 that involve higher level thinking skills; therefore, it was not surprising for there to be some correlation with other scores, and especially with the Math score.

To verify these correlation values, a variance-inflation factor (VIF) and tolerance level were calculated to see if the VIF was greater than 10 or the tolerance level was less than 0.10 for any of the variables. Total Language (VIF 28.488; Tol. .035), Language Mechanics (VIF 11.590; Tol. .086) Language Expression (VIF 10.397; Tol. .096), and Thinking (VIF 19.680; Tol. .051) affirmed the findings of the Correlation Matrix.

A Collinearity Diagnostic Table was utilized to see if any variance proportions (VP) fell above 0.50 while the corresponding Condition Indices (CI) were 30 or larger. Once again, Total Language (CI 487.806; VP .96), Language Mechanics (CI 487.806; VP .88), Language Expression (CI 487.806; VP .78), and Thinking (CI 591.907; VP .99) were included on the list. This diagnostic, however, added Reading Vocabulary (CI 46.542; VP .79), Reading Comprehension (CI 54.351; VP .81), Spelling (CI 63.181; VP .54), and Math (CI 591.907; VP .74) to the list.

It is wise to make decisions on deleting variables for logical rather than statistical reasons (Tabachnick & Fiddell, 2007), so the researcher decided to remove the Thinking scaled score and the Total Language scaled score while keeping the two Language subscores. This decision was based on the fact that indicators of collinearity for Total Language were consistently higher than for the two subscores, and the Thinking score consisted of test questions from other sections of the test. Collinearity diagnostics were run again. Pearson's Correlation for Language Mechanics and Language Expression fell

to .532. The VIF and tolerance levels for all remaining variables did not violate the assumption. The variance proportion (VP) of six scores continued to fall above .50 while the CI was above 30. They were SAT-10 Reading Vocabulary (CI 43.309; VP .79), Reading Comprehension (CI 50.762; VP .80), Total Reading (CI 172.173; VP .81), Math (CI 111.048; VP .83), Language Mechanics (CI 91.618; VP .63), Spelling (CI 58.692; VP .63), and Science (CI 69.100; VP .61). Since Total Reading is a composite score of Reading Vocabulary and Reading Comprehension, the researcher tried deleting Total Reading first. The first two diagnostics remained good, while CI and VP continued to remain high. The same held true for deleting Reading Vocabulary and Reading Comprehension and keeping Total Reading. Another option when dealing with collinearity is to combine scores rather than delete them. The researcher combined the three Reading scores; however, the results remained the same. Since the Correlations Matrix and the VIF and tolerance levels were good with all SAT-10 scores minus Thinking and Total Language, the researcher decided not to delete or combine any further predictor variables.

In order to control for prior academic achievement and gender, the variables were grouped into three blocks so that their significance to the prediction of SAT Composite scores was evident. The control variables were placed in blocks one and two. Block one consisted of gender, since this variable had already been found to have a relationship to standardized exam scores (NACAC, 2008; Mattern, Patterson, Shaw, Kobrin, & Barbuti, 2008). The R^2 value of .002 shows that model accounts for 0.2% of the variance in the SAT Composite score. The model was not found to be significant, F (1, 220) = 0.521, p

= .471. The contribution of gender to the model was also not significant (Sig. *F* change = .471). Null hypothesis 1a was not rejected at the .05 confidence level (α = .05).

Block two contributed SAT-10 scaled scores to the equation. These standardized test scores were added next because the SAT-10 tests similar course content, with the SAT Composite's focus on reading and math (Lawrence, I., Rigol, G. W., Van Essen, T., & Jackson, C. A., 2002). The addition of these variables that control for prior academic achievement were found to make the model as a whole statistically significant, R^2 change = .600, F (10, 211) = 31.973, $p < .001$. An R^2 value of .602 indicates that 60.2% of the variability in SAT Composite scores is predicted by gender and prior academic achievement. The contribution of SAT-10 scores to the model was found to be significant (Sig. *F* Change < .001). In fact, addition of these scores to the equation resulted in a significant increase in R^2. In particular, several of the SAT-10 scaled scores made a significant contribution to the equation, while others did not. The SAT-10 Total Reading scaled score (β = .177, p = .023), the SAT-10 Reading Vocabulary scaled score (β = .118, p = .022), SAT-10 Math scaled score (β = .418, $p < .001$), the SAT-10 Science scaled score (β = .155, p = .002), and SAT-10 Social Science scaled score (β = .134, p = .030 were found to be statistically significant variables within block two. Null hypothesis 1b was rejected at the .05 confidence level (α = .05).

Block three added the variable of school type (UMS® or traditional, comprehensive Christian) and accounted for 0.8 % of the model, R^2 change = .008, F (11, 210) = 29.932, $p < .001$, bringing the total variance of the three blocks to 61.1%. The contribution of school type to the model was found to be statistically significant (Sig. *F*

change = .037); and the overall model including all three blocks was found to be statistically significant ($p < .001$).

The pattern of these results suggests that 0.2% of the variability in SAT Composite scores is related to (predicted by) gender, an additional 60% of the variability is related to prior academic achievement (SAT-10 scores), while school type adds 0.8% to the model. The final model accounted for 61.1% of the variance ($R^2 = .611$). The model was determined to be statistically significant in predicting SAT Composite scores. Null hypothesis 1c was rejected at the .05 confidence level ($\alpha = .05$).

Table 12 displays R^2 change, the F ratio for R^2 change, the unstandardized regression coefficient (B), the standard error of B, the standardized regression coefficient beta (β), the t value, the significance level for each variable, and the 95% confidence interval for B for each variable after all three blocks of variables had been entered. Results show that block two (consisting of gender and prior academic achievement variables) had the greatest significance in the change (F Ratio of R^2 Change = 35.386), followed by Block three which adds type of school (4.389). Both were significant at the .05 confidence level ($\alpha = .05$). Additionally, six predictor variables produced statistically significant t scores: SAT-10 Total Reading ($t = 2.014$, $p = .045$), SAT-10 Reading Vocabulary ($t = 2.023$, $p = .044$), SAT-10 Math ($t = 7.264$, $p < .001$), SAT-10 Science ($t = 3.091$, $p = .002$), SAT-10 Social Science ($t = 2.566$, $p = .011$), and School Type ($t = -2.095$, $p = .037$). SAT-10 Math had the greatest influence.

The regression coefficient (B) is the actual point difference on the SAT Composite score between UMS® and traditional, comprehensive Christian school students after controlling for initial differences in the two groups. A B score of -32.081

for school type indicates that the UMS® students scored on average 32.081 points higher than the traditional, comprehensive Christian school students on the SAT Composite, with a standard error of 15.65. The 95% confidence intervals (-63.665 to -1.937) show that repeated studies would produce similar scores, with UMS® students scoring higher on the SAT Composite than the traditional, comprehensive Christian school students.

Some researchers argue that it is more appropriate to use the β value (standardized coefficient) when reporting results (Lee & Mohajeri, 2012). By computing all scores to a standardized value, the practical significance of the study can be reported. In this study, the standardized regression coefficients represent the change in terms of standard deviations on the SAT Composite score that result from a change of one standard deviation in the predictor variable. So for every one standard deviation a student scored higher on the SAT-10 test, the student scored the β value higher in standard deviations on the SAT Composite. The β values of the six predictor variables that were found to be statistically significant are as follows, with the variable with the greatest contribution being listed first: SAT-10 Math (.410), SAT-10 Social Science (.159), SAT-10 Total Reading (.156), SAT-10 Science (.149), SAT-10 Reading Vocabulary (.104), and School Type (-.096). One may conclude that a change in the SAT-10 Math score (.410) would make a more significant contribution to a higher SAT Composite score than SAT-10 Spelling (.005), which has the lowest β value, and thus the least practical significance in producing higher SAT Composite scores. The closer the β value gets to the absolute value of 1, the stronger the relationship that predictor variable has to the criterion variable, in this case SAT Composite scores.

Because the school type β value was -.096, this would mean that there was no practical significance between the type of school that a student attended and his or her SAT Composite score. The same would hold true for gender, where females scored on average 11.074 points higher than males; however with a β value of .034, the difference would not have practical significance in looking at the relationship between gender and SAT Composite scores.

Other researchers argue that standardized coefficients are in general harder to interpret, that they don't add any further information to the relationship between the predictor and criterion variables, and that they may even add "seriously misleading information" (King, 1986). In this study, trying to use a common unit for SAT-10 scores, school type, and gender in relationship to SAT Composite scores is basically impossible; whereas looking at the unstandardized coefficient (the actual number of points that would change on the SAT Composite exam if a student went to a UMS® school versus a traditional, comprehensive Christian school) is meaningful.

Table 12

Sequential Multiple Regression Model for SAT Composite

	R^2 Change	*F* Ratio/ R^2 Change	*B*	*SE B*	β	*t*	Sig.	95% CI *B* *LL*	95% CI *B* *UL*
Block 1	.002	0.521							
Block 2	.600	35.386*							
Block 3	.008	4.389*							
Gender			11.074	16.223	.034	0.683	.496	-20.907	43.054
SAT-10 Total Reading			0.910	0.452	.156	2.014	.045*	0.019	1.800
SAT-10 Reading Vocabulary			0.259	0.128	.104	2.023	.044*	0.007	0.512
SAT-10 Reading Comprehension			-0.111	0.152	-.036	-0.732	.465	-0.410	0.188
SAT-10 Math			2.123	0.292	.410	7.264	.000*	1.547	2.700
SAT-10 Language Mechanics			0.226	0.256	.050	0.885	.377	-0.278	0.730
SAT-10 Language Expression			0.130	0.270	.030	0.480	.631	-0.403	0.662
SAT-10 Spelling			0.018	0.182	.005	0.099	.921	-0.341	0.377
SAT-10 Science			0.599	0.194	.149	3.091	.002*	0.217	0.982
SAT-10 Social Science			1.048	0.408	.159	2.566	.011*	0.243	1.852
School Type			-32.801	15.656	-.096	-2.095	.037*	-63.665	-1.937

Note. SAT-10 scores are scaled scores
CI = confidence interval; *LL* = lower limit; *UL* = upper limit
*$p < .05$; $\alpha = .05$

Research Question 2: Is there a statistically significant relationship between SAT Writing scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 2a, Ho: There is no statistically significant relationship between SAT Writing scores and gender.

Null Hypothesis 2b, Ho: There is no statistically significant relationship between SAT Writing scores and prior academic achievement, controlling for gender.

Null Hypothesis 2c, Ho: There is no statistically significant relationship between SAT Writing scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Sequential (hierarchical) multiple regression was used to determine the significance of the relationship between school type and academic college readiness (SAT Writing score) while controlling for prior academic achievement and gender.

Prior to analysis, SPSS was used to analyze the accuracy of the data and to evaluate the tenability of the assumptions of multivariate analysis. There were no missing values.

A histogram and a probability-probability plot (p-p plot) were used to ensure the normal distribution of the residuals. The histogram supported the assumption of normality, although it was slightly skewed to the positive with a score nearing four standard deviations. This alerted the researcher to the possibility of extreme outliers. Scores on the p-p plot hugged the line, also verifying the assumption of normality.

Next a scatterplot showing the relationship between standardized residuals and standardized predicted value was used to check for homoscedasticity and linearity of the data. The observations showed scores that were approximately linear and symmetrically distributed around the line; however, the researcher noticed three scores greater than 3 standard deviations from the mean, using the three-sigma rule as a guide (Detecting outliers, n.d.). These were cases 131, 193, and 195. The researcher verified that these scores were accurately recorded. The SAT Writing scores were 610, 430, and 710. All

were reasonable scores; therefore, additional testing was needed. Mahalanobis' Distance (D^2) and Cook's Distance were calculated to determine if the outliers had any undue influence on the model. The maximum score for Mahalanobis' Distance was 215.676. Using a critical value's chart for the Chi-Square test with 14 degrees of freedom and significance level set at .001, an acceptable score was 36.123, so 215.676 signified the presence of an outlier or outliers. SPSS listed three cases as possible outliers: 131 had an SAT Writing score of 610, 261.12 points higher than its predicted value (348.88); 193 had an SAT Writing score of 430, 216.16 points lower than its predicted value (646.16); and 195 had an SAT Writing score of 710, 212.60 points higher than its predicted value (497.40). Cook's Distance, however, showed an acceptable level of 0.268. A score of greater than 1 is considered an influential outlier (Cook & Weisberg, 1982). Upon re-examination of the scatterplot, score 131 was plotted as the most extreme of the outliers as it was the only one nearing 4 standard deviations from the mean. There were no other scores near it, so it was removed and scores were recalculated. D^2 was still extreme (215.720) and Cook's Distance was still below 1 (0.835). When cases 193 and 195 were removed Cook's Distance became unacceptable with a score of 2.000 with all outliers removed. The researcher decided to transform them using one unit difference from the next closest cases on the scatterplot. Case 195 became 700 and case 193 became 440. D^2 was still extreme (215.720) and Cook's Distance was still below 1 (0.846). This decision left a sample size of 222.

According to Tabachnick & Fiddell (2007), regression is strongest when the predictor variables are strongly correlated with the criterion variable but uncorrelated with the each other (p. 122). For this reason, the researcher tested for the assumption of

little or no multicollinearity. A correlation matrix showed that no scores were equal to 1 or -1; however, there were some scores that were close to 1. (See Table 13)

Table 13

Correlation Matrix for Predictor and Criterion Variables for SAT Writing

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
A	1.000	-.110	.236	.352	.263	.431	.419	.524	.355	.282	.485	.609	.594	.529
B	-.110	1.000	.054	-.211	-.104	-.102	-.105	.024	-.140	-.112	.050	-.171	-.112	-.034
C	.236	.054	1.000	-.099	-.024	-.105	.191	.251	-.020	-.145	-.177	.004	-.070	.251
D	.352	-.211	-.099	1.000	.180	.265	.187	.204	.281	.191	.294	.498	.380	.228
E	.263	-.104	-.024	.180	1.000	.294	.270	.211	.204	.205	.283	.455	.413	.290
F	.431	-.102	-.105	.265	.294	1.000	.475	.454	.279	.349	.553	.523	.854	.521
G	.419	-.105	.191	.187	.270	.475	1.000	.532	.353	.204	.289	.434	.490	.871
H	.524	.024	.251	.204	.211	.454	.532	1.000	.338	.248	.466	.575	.612	.847
I	.355	-.140	-.020	.281	.204	.279	.352	.338	1.000	.190	.212	.487	.376	.377
J	.282	-.112	-.145	.191	.205	.349	.204	.248	.190	1.000	.351	.378	.447	.251
K	.485	.050	-.177	.294	.283	.553	.289	.466	.212	.351	1.000	.590	.789	.437
L	.609	-.171	.004	.498	.455	.523	.434	.575	.487	.378	.590	1.000	.785	.568
M	.594	-.112	-.070	.370	.413	.854	.490	.619	.376	.447	.789	.785	1.000	.619
N	.529	-.034	.241	.228	.290	.521	.871	.847	.377	.251	.437	.568	.619	1.000

Note. A=SAT Writing; B=School Type; C=Gender; D=SAT-10 Reading Vocabulary; E=Sat-10 Reading Comprehension; F=SAT-10 Math; G=SAT-10 Language Mechanics; H=SAT-10 Language Expression; I=SAT-10 Spelling; J=SAT-10 Science; K=SAT-10 Social Science; L=SAT-10 Total Reading; M=SAT-10 Thinking; N=SAT-10 Total Language

Language Mechanics and Language Expression correlated with Total Language with scores of .871 and .847. This was not unexpected, as the two are subscores of the Total. The Thinking score also correlated with Math at .854, with Social Science at .789, and with Total Reading at .785. The Thinking score is calculated by taking the scores of specific questions in the other sections of the SAT-10 that involve higher level thinking skills; therefore, it was not surprising for there to be some correlation with other scores, and especially with the Math score.

To verify these correlation values, a variance-inflation factor (VIF) and tolerance level were calculated to see if the VIF was greater than 10 or the tolerance level was less than .10 for any of the variables. Total Language (VIF 28.433; Tol. .035, Language Mechanics (VIF 11.601; Tol. .086); Language Expression (VIF 10.247; Tol. .098), and Thinking (VIF 19.504; Tol. .051) affirmed the findings of the Correlation Matrix.

A Collinearity Diagnostic Table was utilized to see if any variance proportions (VP) fell above .50 while the corresponding Condition Indices (CI) were 30 or larger. Once again, Total Language (CI 487.831; VP .97), Language Mechanics (CI 487.831; VP .89), Language Expression (CI 487.831; VP .78), and Thinking (CI 592.010; VP .99) were included on the list. This diagnostic, however, added Reading Total (CI 186.572; VP .52), Reading Vocabulary (CI 46.808; VP .79), Reading Comprehension (CI 54.503; VP .79), Math (CI 592.010; VP .73), and Spelling (CI 63.665; VP .51) to the list.

It is wise to make decisions on deleting variables for logical rather than statistical reasons (Tabachnick & Fidell, 2007), so the researcher decided to remove the Thinking scaled score and the Total Language scaled score while keeping the two Language subscores. This decision was based on the fact that indicators of collinearity for Total Language were consistently higher than for the two subscores, and the Thinking score consisted of test questions from other sections of the test. Collinearity diagnostics were run again. Pearson's Correlation for Language Mechanics and Language Expression was .532. The VIF and tolerance levels for all remaining variables did not violate the assumption. The variance proportion (VP) of six scores continued to fall above .50 while the CI was above 30. They were SAT-10 Reading Vocabulary (CI 43.539; VP .79),

Reading Comprehension (CI 51.015; VP .79), Total Reading (CI 172.560; VP .84), Math (CI 112.628; VP .81), Spelling (CI 59.151; VP .61), and Science (CI 68.845; VP .57).

The researcher tried removing SAT-10 Total Reading; however, SAT-10 Reading Vocabulary and Comprehension remained collinear based upon their VP (.90 and .87) and CI scores (41.549 and 48.685). Another option when dealing with collinearity is to combine scores rather than delete them. The researcher combined SAT-10 Reading Vocabulary and Comprehension and put SAT-10 Total Reading back in. The VP scores were still .87 and .65, while the CI scores were 165.664 and 61.044. The third option was to remove SAT-10 Reading Vocabulary and Comprehension, the two subscores of Total Reading. The VP for SAT-10 Total Reading fell to just above .50 (.54).

The variables were only showing collinearity using the Collinearity Diagnostics Table. The VIF and tolerance levels were well within the guidelines to meet the assumption. Tabachnick and Fidell (2007) recommend removing variables with a bivariate correlation of greater than .70 from the analysis (p. 90). All of the variables met this guideline, so the researcher left the original predictor variables in the equation with the exception of Total Language and Thinking.

In order to control for prior academic achievement and gender, the variables were grouped into three blocks so that their significance to the prediction of SAT Writing scores was evident. The control variables were placed in blocks one and two. Block one consisted of gender, since this variable had already been found to have a relationship to standardized exam scores (NACAC, 2008; Mattern, Patterson, Shaw, Kobrin, & Barbuti, 2008). The R^2 value of .056 shows that model accounts for 5.6% of the variance in the SAT Writing score. The model was found to be significant, F (1, 220) = 13.016, $p <$

.001. The contribution of gender to the model was also significant (Sig. *F* change < .001). Null hypothesis 2a was rejected at the .05 confidence level (α = .05).

Block two contributed SAT-10 scaled scores to the equation. These standardized test scores were added next because the SAT-10 tests similar course content, as well one's ability to think and communicate (The College Board, The SAT Program Handbook, 2008, as cited in Briggs, 2009). The multiple choice questions on the SAT writing section test the student's knowledge of language mechanics and usage. The essay also looks for one's ability to present a coherent point of view (The SAT® writing section, 2008).

The addition of these variables that control for prior academic achievement were found to make the model as a whole statistically significant, R^2 change = .450, F (10, 211) = 21.586, $p < .001$. An R^2 value of .506 indicates that 50.6% of the variability in SAT Writing scores is predicted by gender and prior academic achievement. The contribution of SAT-10 scores to the model was found to be significant (Sig. *F* Change < .001). In fact, addition of these scores to the equation resulted in a significant increase in R^2 (.506). In particular, several of the SAT-10 scaled scores made a significant contribution to the equation, while others did not. The SAT-10 Total Reading scaled score (β = .271, p < .001) and the SAT-10 Social Science scaled score (β = .221, p = .001) were found to be statistically significant variables within block two. Null hypothesis 2b was rejected at the .05 confidence level (α = .05).

Block three added the variable of school type (UMS® or traditional, comprehensive Christian) and accounted for 0.2% of the model, R^2 change = .002, F (11, 210) = 19.681, $p < .001$, bringing the total variance of the three blocks to 50.8% (R^2 =

.508). The contribution of school type to the model was not found to be statistically significant (Sig. *F* change = .368); however, the overall model including all three blocks was found to be statistically significant ($p < .001$). Null hypothesis 2c was rejected at the .05 confidence level ($\alpha = .05$).

The pattern of these results suggests that 5.6% of the variability in SAT Writing scores is related to (predicted by) gender, an additional 45% of the variability is related to prior academic achievement (SAT-10 scores), while school type adds 0.2% to the model. The final model accounted for 50.8% of the variance ($R^2 = .508$). The model was determined to be statistically significant in predicting SAT Writing scores.

Table 14 displays R^2 change, the *F* ratio for R^2 change, the unstandardized regression coefficient (*B*), the standard error of *B*, the standardized regression coeeficient beta (β), the *t* value, the significance level for each variable, and the 95% confidence interval for *B* for each variable after all three blocks of variables had been entered. Results show that block two (consisting of gender and prior academic achievement variables) had the greatest significance in the change (F Ratio of R^2 Change = 26.699), followed by Block one which included gender (13.016). Both were significant at the .05 confidence level ($\alpha = .05$). Additionally, three predictor variables produced statistically significant *t* scores: gender ($t = 4.938$, $p < .001$), (SAT-10 Total Reading ($t = 2.977$, $p = .003$), and SAT-10 Social Science ($t = 3.370$, $p = .001$).

A regression coefficient (*B)* score of -8.822 for school type indicates the actual point difference on the SAT Writing score between UMS® and traditional, comprehensive Christian school students after controlling for initial differences in the two groups. In this study the UMS® students scored 8.822 points higher than the

traditional, comprehensive Christian school students on SAT Writing. The 95% confidence level shows that repeated studies would produce scores ranging from 28.110 for UMS® students to 10.465 higher for traditional, comprehensive Christian school student. This range of scores means that repeated studies may not reproduce the same findings.

A comparison of the standardized regression coefficients (β) shows that a change in the SAT-10 Total Reading score (.253) would make a more significant contribution to a higher SAT Writing score than SAT-10 Reading Comprehension (-.013), which has the least practical significance to the model. A β value closest to the absolute value of 1 would indicate a stronger relationship to the criterion variable, the SAT Writing score. Gender produced the largest β value (.273), which means that of all the predictor variables, gender had the greatest practical difference in SAT Writing scores, even though its relative strength was not that high. Because the school type β value was -.046, this would mean that there was no practical significance between the type of school that a student attended and his or her SAT Writing score.

Table 14

Sequential Multiple Regression Model for SAT Writing

	R^2 Change	F Ratio/ R^2 Change	*B*	*SE B*	β	*t*	Sig.	95% CI *B* *LL*	95% CI *B* UL
Block 1	.056	13.016							
Block 2	.441	26.699*							
Block 3	.003	1.292							
Gender			49.932	10.113	.273	4.938	.000*	29.997	69.868
SAT-10 Total Reading			0.859	0.289	.253	2.977	.003*	0.290	1.428
SAT-10 Reading Vocabulary			0.140	0.080	.100	1.745	.083	-0.018	0.299
SAT-10 Reading Comprehension			-0.022	0.095	-.013	-0.236	.813	-0.210	0.165
SAT-10 Math			0.189	0.191	.065	0.991	.323	-0.187	0.565
SAT-10 Language Mechanics			0.135	0.160	.053	0.843	.400	-0.181	0.451
SAT-10 Language Expression			0.211	0.169	.088	1.249	.213	-0.122	0.543
SAT-10 Spelling			0.157	0.114	.079	1.379	.170	-0.068	0.382
SAT-10 Science			0.118	0.122	.052	0.968	.334	-0.122	0.358
SAT-10 Social Science			0.871	0.258	.233	3.370	.001*	0.361	1.380
School Type			-8.822	9.784	-.046	-0.902	.368	-28.110	10.465

Note. SAT-10 scores are scaled scores
CI = confidence interval; *LL* = lower limit; *UL* = upper limit
*$p < .05$; $\alpha = .05$

Research Question 3: Is there a statistically significant relationship between ACT exam scores and the type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender?

Null Hypothesis 3a, Ho: There is no statistically significant relationship between ACT Composite scores and gender.

Null Hypothesis 3b, Ho: There is no statistically significant relationship between ACT Composite scores and prior academic achievement, controlling for gender.

Null Hypothesis 3c, Ho: There is no statistically significant relationship between ACT Composite scores and type of high school seniors attend (UMS® or traditional, comprehensive Christian), controlling for prior academic achievement and gender.

Sequential (hierarchical) multiple regression was used to determine the significance of the relationship between school type and academic college readiness (ACT Composite score) while controlling for prior academic achievement and gender.

Prior to analysis, SPSS was used to analyze the accuracy of the data and to evaluate the tenability of the assumptions of multivariate analysis. There were no missing values.

A histogram and a probability-probability plot (p-p plot) were used to ensure the normal distribution of the residuals. The histogram supported the assumption of normality, although it was slightly skewed to the positive with a score nearing four standard deviations. This alerted the researcher to the possibility of extreme outliers. Scores on the p-p plot hugged the line, also verifying the assumption of normality.

Next a scatterplot showing the relationship between standardized residuals and standardized predicted value was used to check for homoscedasticity and linearity of the data. The observations showed scores that were approximately linear and symmetrically distributed around the line; however, the researcher noticed one score greater than three standard deviations from the mean, using the three-sigma rule as a guide (Detecting outliers, n.d.). This was case number 124. The researcher verified that this student's scores were accurately recorded. The ACT Composite score was 32, but other students

had also received that score, so more testing was needed. Mahalanobis' Distance (D^2) and Cook's Distance were calculated to determine if the outlier had any undue influence on the model. The maximum score for Mahalanobis' Distance was 140.667. Using a critical value's chart for the Chi-Square test with 14 degrees of freedom and significance set at .001, an acceptable score was 36.123, so 140.667 signified the presence of an outlier or outliers. SPSS listed case 124 as having an ACT Composite score (32) 10.37 points higher than its predicted value (21.63). Cook's Distance also showed an extremely high value of 21.312. A score of greater than 1 is considered an influential outlier (Cook & Weisberg, 1982). These multiple test results and the fact that there was only one significant extreme outlier led to the removal of case 124, leaving a sample size of 143.

According to Tabachnick & Fiddell (2007), regression is strongest when the predictor variables are strongly correlated with the criterion variable but uncorrelated with the each other (p. 122). For this reason, the researcher tested for the assumption of little or no multicollinearity. A correlation matrix showed that no scores were equal to 1 or -1; however, there were some scores that were close to 1. (See Table 15)

Table 15

Correlation Matrix for Predictor and Criterion Variables for ACT Composite

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
A	1.000	-.104	-.055	.432	.295	.574	.287	.515	.251	.433	.633	.640	.732	.442
B	-.104	1.000	.094	-.195	-.111	-.118	-.007	.043	-.111	-.083	-.005	-.183	-.167	.036
C	-.055	.094	1.000	-.086	-.015	-.146	.215	.199	-.074	-.147	-.197	.047	-.104	.220
D	.432	-.195	-.086	1.000	.173	.338	.177	.268	.320	.238	.416	.614	.492	.261
E	.295	-.111	-.015	.173	1.000	.268	.246	.166	.121	.171	.249	.364	.365	.246
F	.574	-.118	-.146	.338	.268	1.000	.441	.510	.185	.333	.574	.521	.858	.522
G	.287	-.007	.215	.177	.246	.441	1.000	.600	.258	.149	.309	.427	.467	.889
H	.515	.043	.199	.268	.166	.510	.600	1.000	.269	.273	.532	.614	.645	.869
I	.251	-.111	-.074	.320	.121	.185	.258	.269	1.000	.166	.185	.389	.299	.273
J	.433	-.083	-.147	.238	.171	.333	.149	.273	.166	1.000	.308	.363	.417	.227
K	.633	-.005	-.197	.416	.249	.574	.309	.532	.185	.308	1.000	.615	.796	.460
L	.640	-.183	.047	.614	.364	.521	.427	.614	.389	.363	.615	1.000	.798	.565
M	.732	-.167	-.104	.492	.365	.858	.467	.645	.299	.417	.796	.798	1.000	.604
N	.442	.036	.220	.261	.246	.522	.889	.869	.273	.227	.460	.565	.604	1.000

Note. A=SAT Writing; B=School Type; C=Gender; D=SAT-10 Reading Vocabulary; E=Sat-10 Reading Comprehension; F=SAT-10 Math; G=SAT-10 Language Mechanics; H=SAT-10 Language Expression; I=SAT-10 Spelling; J=SAT-10 Science; K=SAT-10 Social Science; L=SAT-10 Total Reading; M=SAT-10 Thinking; N=SAT-10 Total Language

Language Mechanics and Language Expression correlated with Total Language with scores of .889 and .869. They also correlated with each other at a score of .600. This was not unexpected, as the two are subscores of the Total. The Thinking score also correlated with Math at .858, with Social Science at .796, and with Total Reading at .798. The Thinking score is calculated by taking the scores of specific questions in the other sections of the SAT-10 that involve higher level thinking skills; therefore, it was not surprising to find some correlation with other scores, and especially with the Math score.

To verify these correlation values, a variance-inflation factor (VIF) and tolerance level were calculated to see if the VIF was greater than 10 or the tolerance level was less than .10 for any of the variables. Total Language (VIF 31.581; Tol. .032), Language Mechanics (VIF 12.290; Tol. .081) Language Expression (VIF 11.757; Tol. .085), and Thinking (VIF 21. 879; Tol. .046) affirmed the findings of the Correlation Matrix.

A Collinearity Diagnostic Table was utilized to see if any variance proportions (VP) fell above .50 while the corresponding Condition Indices (CI) were 30 or larger. Once again, Total Language (CI 495.252; VP .97), Language Mechanics (CI 495.242; VP .89), Language Expression (CI 495.252; VP .80), and Thinking (CI 623.255; VP .99) were included on the list. This diagnostic, however, added Reading Total (CI 192.689; VP .51) and Math (CI 623.255; VP .76) to the list.

It is wise to make decisions on deleting variables for logical rather than statistical reasons (Tabachnick & Fiddell, 2007), so the researcher decided to remove the Thinking scaled score and the Total Language scaled score while keeping the two Language subscores. This decision was based on the fact that indicators of collinearity for Total Language were consistently higher than for the two subscores, and the Thinking score consisted of test questions from other sections of the test. Collinearity diagnostics were run again. Pearson's Correlation for Language Mechanics and Language Expression fell to .600. The VIF and tolerance levels for all remaining variables did not violate the assumption. The variance proportion (VP) of three scores continued to fall above .50 while the CI was above 30. They were SAT-10 Reading Vocabulary (CI 56.879; VP .57), Language Mechanics (CI 98,306; VP .73), and Total Reading (CI 179.658; VP .95). Another option when dealing with collinearity is to combine scores rather than delete

them. Since the Collinearity Diagnostic Table had already indicated Total Reading as being collinear, the researcher decided to combine SAT-10 Reading Vocabulary and Total Reading into one score. The diagnostics were run a third time. The Correlation Matrix produced consistently lower scores for all variables. For the newly-combined score the VIF fell to 1.763, with a tolerance score of .567, and the VP did not exceed .50. The Language Mechanics score barely exceeded the .50 guideline, with a CI of 102.739 and a VP of .54. Its VIF score was 1.776 and its tolerance level .563, both well within the guidelines of meeting the assumption of collinearity. The researcher kept the combined score of SAT-10 Reading Vocabulary and Total Reading score and deleted Total Language and Thinking.

In order to control for prior academic achievement and gender, the variables were grouped into three blocks so that their significance to the prediction of ACT Composite scores was evident. The control variables were placed in blocks one and two. Block one consisted of gender, since this variable had already been found to have a relationship to standardized exam scores (NACAC, 2008; Mattern, Patterson, Shaw, Kobrin, & Barbuti, 2008). Gender explained 0.3% of the change in ACT Composite scores ($R^2 = .003$), with F (1, 141) = 0.424, $p = .516$, and the model was not found to be significant. The contribution of gender to the model was also not significant (Sig. F change = .424). Null hypothesis 3a was not rejected at the .05 confidence level ($\alpha = .05$).

Block two contributed SAT-10 scaled scores to the equation. These standardized test scores were added next because the SAT-10 tests similar course content to the ACT. Both test a student's ability in English, math, science, and reading (ACT, 2011). The addition of these variables that control for prior academic achievement were found to

make the model as a whole statistically significant, R^2 change = .563, F (9, 133) = 19.282, $p < .001$. An R^2 value of .566 indicates that 56.6% of the variability in ACT Composite scores is predicted by gender and prior academic achievement. The contribution of SAT-10 scores to the model was found to be significant (Sig. F Change < .001). In fact, addition of these scores to the equation resulted in a significant increase in R^2. In particular, several of the SAT-10 scaled scores made a significant contribution to the equation, while others did not. The SAT-10 Total Reading and Vocabulary combined score ($\beta = .177$, $p = .018$), the SAT-10 Math scaled score ($\beta = .219$, $p = .006$), the SAT-10 Science scaled score ($\beta = .178$, $p = .005$), and the SAT-10 Social Science scaled score ($\beta = .298$, $p < .001$) were found to be statistically significant variables within block two. Null hypothesis 3b was rejected at the .05 confidence level ($\alpha = .05$).

Block three added the variable of school type (UMS® or traditional, comprehensive Christian) and accounted for 0.1% of the model, R^2 change = .001, F (10, 132) = 17.268, $p < .001$, bringing the total variance of the three blocks to 56.7%. The contribution of school type to the model was not found to be statistically significant (Sig. F change = .662); however, the overall model including all three blocks was found to be statistically significant ($p < .001$). Null hypothesis 3c was rejected at the .05 confidence level ($\alpha = .05$).

The pattern of these results suggests that 56.7% of the variability in ACT Composite scores is related to (predicted by) prior academic achievement (SAT-10 scores), while school type adds 0.1% to the model. The model was determined to be statistically significant in predicting ACT Composite scores.

Table 16 displays R^2 change, the F ratio for R^2 change, the unstandardized regression coefficient (B), the standard error of B, the standardized regression coefficient beta (β), the t value, the significance level for each variable, and the 95% confidence interval for B for each variable after all three blocks of variables had been entered. Block two (consisting of gender and prior academic achievement variables) had the greatest significance in the change (F Ratio of R^2 Change = 21.577), followed by Block one with gender (F Ratio of R^2 Change = 0.424), and finally by Block three which adds type of school (F Ratio of R^2 Change = 0.192). Only Block two was significant at the .05 confidence level (α = .05). Additionally, four predictor variables produced statistically significant t scores: SAT-10 Total Reading/Vocabulary combined score (t = 2.236, p = .027), SAT-10 Math (t = 2.724, p = .007), SAT-10 Science (t = 2.820, p = .006), and SAT-10 Social Science (t = 3.634, $p < .001$). A B score of -0.243 for school type indicates that the UMS® students scored on average 0.243 points higher than the traditional, comprehensive Christian school students on the ACT Composite, with $SE\ B$ = 0.555. The 95% confidence intervals (-1.342 to .855) show that repeated studies may not produce similar scores.

A regression coefficient (B) score of -0.243 for school type indicates the actual point difference on the ACT Composite score between UMS® and traditional, comprehensive Christian school students after controlling for initial differences in the two groups. In this study the UMS® students scored 0.243 points higher than the traditional, comprehensive Christian school students on the ACT Composite. The 95% confidence levels show that repeated studies would produce scores ranging from 1.342 points higher for UMS® students to 0.855 points higher for traditional, comprehensive

Christian school students. This range of scores means that repeated studies may not reproduce the same findings.

When looking at the standardized regression coefficient (β) of the predictor variables, SAT-10 Social Science (β = .302) made the most significant contribution to ACT Composite scores. The least significant contribution was made by SAT-10 Spelling (β = .042). Gender produced a β value of .071, which means that it did not make a significant practical difference in ACT Composite scores. Because the school type β value was -.026, this would mean that there was no practical significance between the type of school that a student attended and the ACT Composite score. Because the β value of the predictor variables was not close to the absolute value of 1, none of them yielded a strong practical significance in predicting ACT Composite scores.

Table 16

Sequential Multiple Regression Model for ACT Composite

	R^2 Change	*F* Ratio/ R^2 Change	*B*	*SE B*	β	*t*	Sig.	95% CI *B* *LL*	95% CI *B* UL
Block 1	.003	.424							
Block 2	.563	21.577*							
Block 3	.001	.192							
Gender			0.588	0.547	.071	1.074	.285	-0.494	1.670
SAT-10 Total Reading/Vocabulary			0.010	0.004	.170	2.236	.027*	0.001	0.018
SAT-10 Reading Comprehension			0.005	0.004	.083	1.346	.180	-0.003	0.013
SAT-10 Math			0.028	0.010	.215	2.724	.007*	0.008	0.049
SAT-10 Language Mechanics			-0.014	0.009	-.117	-1.536	.127	-0.031	0.004
SAT-10 Language Expression			0.016	0.009	.156	1.791	.076	-0.002	0.034
SAT-10 Spelling			0.004	0.005	.042	0.663	.509	-0.007	0.014
SAT-10 Science			0.015	0.005	.178	2.820	.006*	0.005	0.026
SAT-10 Social Science			0.049	0.014	.302	3.634	.000*	0.022	0.076
School Type			-0.243	0.555	-.026	-0.438	.662	-1.342	0.855

Note. SAT-10 scores are scaled scores
CI = confidence interval; *LL* = lower limit; *UL* = upper limit
*$p < .05$; $\alpha = .05$

Summary

Three sequential multiple regressions were used to determine if there is a possible relationship between attending either a traditional, comprehensive Christian school or a UMS® school and academic college readiness. An independent *t*-test showed statistically significant differences in the mean on the SAT-10 used to measure prior academic achievement. In order to control for confounding, prior academic achievement and gender were included as predictor variables in the study. Sample size (*N*=246) exceeded

the minimum size needed for multiple regression (50+8K = 154) (Tabachnick & Fidell, 2007). Assumptions testing showed normality, linearity, and homostedasticity of the data. Extreme outliers were either removed from the study or transformed so they would not influence the study. Correlated SAT-10 scores were also removed or combined based upon results of a correlation matrix, the variance-inflation factor (VIF), and the tolerance level.

The study was divided into three research questions, using SAT Composite scores, SAT Writing scores, and ACT Composite scores as measures of academic college readiness. Each question tested three null hypotheses, one for each block of the sequence. Block one included gender in the equation. Block two included SAT-10 scores to control for prior academic achievement. Block three added school type, controlling for gender and prior academic achievement.

For research question one, block one accounted for 0.2% (R^2 = .002) of the variance in SAT Composite scores. Neither the block one model (p = .471) nor gender (Sig. F change = .471) were significant. Null hypothesis 1a was not rejected at the .05 confidence level (α = .05). The model including gender and SAT-10 scores was significant (p < .001), accounting for 60% (R^2 change = .600) of the variability in SAT Composite score, controlling for gender. The contribution of SAT-10 scores to the model was significant (Sig. F change = .001). Null hypothesis 1b was rejected .05 confidence level (α = .05). The model including gender, SAT-10 scores, and school type was found to be significant (p < *.001*) and contribution of school type to the model was also significant (Sig. F change = .037). An additional 0.8% of the variance was attributed to school type, while controlling for gender and prior academic achievement (R^2 change =

.008). The model accounted for 61.1% (R^2 change = .611) of the change in SAT Composite scores. Null hypothesis 1c was rejected at the .05 confidence level (α = .05).

For research question two, block one accounted for 5.6% (R^2 = .056) of the variance in SAT Writing scores. Both the model ($p < .001$) and the contribution of gender to the model (Sig. F change < .001) were significant. Null hypothesis 2a was rejected at the .05 confidence level (α = .05). The addition of SAT-10 scores to the model accounted for 45% (R^2 change = .450) of the variance when controlling for gender, with 50.6% (R^2 value = .506) of the variance accounted for by gender and SAT-10 scores. The model was significant ($p < .001$), and the contribution of SAT-10 scores to the model was significant (Sig. F change <.001). Null hypothesis 2b was rejected at the .05 confidence level (α = .05). The addition of school type to the model, controlling for gender and prior academic achievement, accounted for 0.2% (R^2 change = .002) of the variance in SAT Writing scores. The model was found to be significant ($p < .001$); however, the contribution of school type to the model was not significant (Sig. F change = .368). The model accounted for 50.8% (R^2 change = .508) of the variance in SAT Writing scores. Null hypothesis 1c was rejected at the .05 confidence level (α = .05).

For research question three, neither the block one model (p = .516) nor gender (Sig. F change = .424) were significant. The model accounted for 0.3% (R^2 = .003) of the variance in ACT Composite scores. Null hypothesis 3a was not rejected at the .05 confidence level (α = .05). The model including gender and SAT-10 scores accounted for an additional 56.3% (R^2 change = .563), for a total of 56.6% (R^2 value = .566). Both the model ($p < .001$) and the contribution of SAT-10 scores to the model were significant (Sig. F change < .001). Null hypothesis 3b was rejected at the .05 confidence level (α =

.05). When controlling for gender and prior academic ability, school type accounted for an additional 0.1% (R^2 change = .001) of the variance in ACT Composite scores, for a total of 56.7% (R^2 value = .567). The model was found to be significant ($p < .001$); however, contribution of school type to the model was not significant (Sig. F change = .662). Null hypothesis 3c was rejected at the .05 confidence level ($\alpha = .05$).

Chapter five discusses the findings, implications and limitations of the study, and suggestions for further research.

CHAPTER FIVE: CONCLUSIONS, DISCUSSION, AND SUGGESTIONS FOR FURTHER RESEARCH

High school administrators continue to implement reform models in order to increase academic student achievement and to better prepare students academically for college. One current reform model proposes extending the amount of time in the classroom in order to compensate for summer learning loss (Huebner, 2010; Mendrala, 2010). A unique model of education that was started in the Christian school community is the University Model School®. Students who attend UMS® schools follow a university-style schedule where they are in the classroom either two or three days a week, and then continue their school work at home (in the satellite classroom) under the supervision of their parents. It would appear counter-intuitive to expect these students to be as well-prepared for college as their counterparts who are in the classroom for many more hours and days than they are.

This correlational study produced varying results depending upon the standardized test utilized to measure academic college readiness. The study compared the academic college readiness of UMS® high school graduates with the academic college readiness of traditional, comprehensive Christian school graduates using the SAT and ACT exams as a means of measurement. In order to control for differences in schools, accredited Christian schools in the state of Texas that follow one of the two models were invited to participate. Six schools (three of each model) located within a 175-mile radius of Dallas provided archival data for their students.

In addition to controlling for school differences, personal information about each student was also requested. In order to be included in the study, the students must have

been enrolled at the school for at least three full years prior to graduation; they must have taken the SAT-10 during their seventh, eighth, or ninth grade years; and they must have taken either the SAT, the ACT, or both. The SAT-10 was used to control for prior academic achievement. The study also controlled for gender. Students for the graduating classes of 2009, 2010, and 2011 were included in the study. 246 students (90 UMS®; 156 traditional) met all the requirements to be included in the sample.

The basic research question to be answered was whether there is a relationship between the type of high school a student attended and their academic college readiness, as measured by SAT and ACT scores. Three sequential multiple regressions were used to control for confounding and to determine the relationship between school type and academic college readiness.

Research Question One

The first research question investigated whether there was a relationship between type of school the student attended and SAT Composite scores. It included three null hypotheses, one for each step of the regression. The first stated that there is no statistically significant relationship between SAT Composite scores and gender. The null hypothesis was not rejected, as gender was not found to be a contributing factor to the prediction of SAT Composite scores (F (1, 220) = 0.521, p = .471; Sig. F change = .471).

The second null hypothesis stating that there is no statistically significant relationship between SAT Composite scores and prior academic achievement, controlling for gender, was rejected. SAT-10 scores were found to contribute 60% of the variability in SAT Composite scores, when controlling for gender (F (10, 211) = 31.973, p < .001;

Sig. *F* change = .001). This implies that prior academic achievement does have a significant relationship with predicting SAT Composite scores.

The third null hypothesis stated that there is no statistically significant relationship between school type and SAT Composite scores, when controlling for gender and prior academic achievement. School type was found to have a statistically significant relationship with SAT Composite scores, although the contribution was 0.8% of the variance (F (11, 210) = 29.932, $p < .001$; Sig. F change = .037). This new model to predict academic college readiness was also found to be statistically significant.

The correlation coefficient (B = -32.081) shows that UMS® students scored 32.081 points higher (95% confidence intervals from -63.665 to -1.937) than traditional, comprehensive Christian high school students on the SAT Composite, when controlling for gender and prior academic achievement. The uncontrolled difference in means was 68.6 points (UMS® - M = 1132.22, SD = 165.129; traditional - M = 1063.62, SD = 159.527; total - M = 1088.65, SD = 164.584).

In addition, six predictor variables produced a statistically significant contribution to the prediction value of the model. They are as follows: SAT-10 Math (t = 7.264, $p < .001$); SAT-10 Science (t = 3.091, p = .002); SAT-10 Social Science (t = 2.566, p =. 011); School Type (t = -2.095, p = .037); SAT-10 Reading Vocabulary (t = 2.023, p = .044); SAT-10 Total Reading (t = 2.014, p = .045). These particular SAT-10 scores showed the greatest relationship with SAT Composite scores. School type (UMS® or traditional) was also found to be statistically significant.

The regression coefficient (*B)* is the actual point difference on the SAT Composite score between UMS® and traditional, comprehensive Christian school

students after controlling for initial differences in the two groups. A *B* score of -32.081 for school type indicates that the UMS® students scored on average 32.081 points higher than the traditional, comprehensive Christian school students on the SAT Composite, with a standard error of 15.65. The 95% confidence intervals (-63.665 to -1.937) show that repeated studies would produce similar scores, with UMS® students scoring higher on the SAT Composite than the traditional, comprehensive Christian school students.

The standardized regression coefficient (β) of the SAT-10 Math score (.410) shows that a change in the Math score would make a more significant contribution to a higher SAT Composite score than a change in the SAT-10 Spelling score (.005), which has the lowest β value, and thus the least practical significance in producing higher SAT Composite scores.

The β value of school type was -.096, thus implying no practical significance between the type of school that a student attended and his or her SAT Composite score. The same would hold true for gender, with a β value of .034.

Research Question Two

The second research question investigated whether there was a relationship between type of school the student attended and SAT Writing scores. The first null hypothesis stated that there is no statistically significant relationship between SAT Writing scores and gender. The null hypothesis was rejected, as gender was found to be a contributing factor to the prediction of SAT Writing scores (F (1, 220) = 13.016, $p <$ .001); Sig. F change < .001), contributing 5.6% (R^2 = .056) of the variance. This finding differs from null hypothesis 1a, where gender was not found to have a significant relationship with SAT Composite scores.

. The second null hypothesis stating that there is no statistically significant relationship between SAT Writing scores and prior academic achievement, controlling for gender, was rejected. SAT-10 scores were found to contribute 45% (R^2 change = .450) of the variability in SAT Writing scores, when controlling for gender (F (10, 211) = 21.586, $p < .001$; Sig. *F* change = .001). This finding is consistent with the relationship of prior academic achievement to the prediction of SAT Composite scores.

The third null hypothesis stated that there is no statistically significant relationship between school type and SAT Writing scores, when controlling for gender and prior academic achievement. Although the model was found to be statistically significant (*F* (11, 210) = 19.681; $p < .001$), accounting for an additional 0.2% (R^2 change = .002), school type was not found to have a statistically significant relationship with SAT Writing scores (Sig. *F* change = .368). The null hypothesis was rejected because this new model to predict academic college readiness was found to be statistically significant. These results do not support the premise that school type has a relationship with SAT Writing scores and the findings of research question one. Although the UMS® students scored 8.822 points higher on the SAT Writing section, (*B* = -8.822), the 95% confidence intervals of -28.110 to 10.465 cannot affirm that if this study were reproduced the same results would be found.

Three specific predictors were found to have a statistically significant relationship with SAT Writing scores: gender ($t = 4.938$, $p < .001$); SAT-10 Social Science ($t = 3.370$, p=.001); and (SAT-10 Total Reading ($t = 2.977$, $p = .003$). Whereas gender was not found to have this same relationship with SAT Composite scores, it was found to have a relationship with predicting the scores on the Writing component of the test. The

correlation coefficient (*B* = 49.932) shows that the SAT Writing score went up on average 49.932 points for females, plus or minus the *SE* of 10.113, holding constant the other explanatory variables. A simple difference in means on SAT Writing showed that the mean score for females was 43.3 points higher than for males (male - *M* = 506.14, *SD* = 90.177; female - *M* = 549.44, *SD* = 88.548; total - *M* = 527.21, *SD* = 91.786).

When comparing standardized regression coefficients (β) the SAT-10 Total Reading score (.253) would make a more significant contribution to a higher SAT Writing score than SAT-10 Reading Comprehension (-.013), which has the least practical significance to the model. Gender produced the largest β value (.273), which means that of all the predictor variables, gender had the greatest practical difference in SAT Writing scores. Because the school type β value was -.046, this would mean that there was no practical significance between the type of school that a student attended and his or her SAT Writing score.

Research Question Three

The third research question investigated whether there was a relationship between type of school the student attended and ACT Composite scores. The first null hypothesis stated that there is no statistically significant relationship between ACT Composite scores and gender. The null hypothesis was not rejected, as gender was not found to be a contributing factor to the prediction of ACT Composite scores (F (1, 141) = 0.424, p = .516); Sig. F change = .424), contributing 0.3% (R^2 = .003) of the variance. This finding is consistent with research question one, where gender was also not found to have a significant relationship with predicting SAT Composite scores.

. The second null hypothesis stating that there is no statistically significant relationship between ACT Composite scores and prior academic achievement, controlling for gender, was rejected. SAT-10 scores were found to contribute 56.3% (R^2 change = .563) of the variability in ACT Composite scores, when controlling for gender (F (9,133) = 19,282, $p < .001$; Sig. F change < .001). This finding is consistent with the relationship of prior academic achievement to both SAT Composite and Writing scores.

The third null hypothesis stated that there is no statistically significant relationship between school type and ACT Composite scores, when controlling for gender and prior academic achievement. The null hypothesis was rejected, as this new model for predicting ACT Composite scores was found to be statistically significant (F (10, 132) = 17.268; $p < .001$). The model was found to consistently have a relationship with predicting standardized achievement test scores.

The contribution of school type to the model, when controlling for gender and prior academic achievement, was not found to be statistically signification (Sig. F change = .424). These results do not support the premise that school type has a relationship with ACT Composite scores. Although the UMS® students scored 0.243 points higher on the ACT Composite exam, (B = -0.243), the 95% confidence intervals of -1.342 to 0.855 cannot affirm that if this study were reproduced the same results would be found.

Four specific predictors were found to have a statistically significant relationship with ACT Composite scores: SAT-10 Social Science (t = 3.634, $p < .001$); SAT-10 Science (t = 2.820, p = .007); SAT-10 Math (t = 2.724, p = .003); and (SAT-10 Total Reading/Vocabulary combined (t = 2.236, p = .027).

When looking at the β value of the predictor variables, SAT-10 Social Science (β = .302) made the most significant contribution to ACT Composite scores. The least contribution was made by SAT-10 Spelling (β = .042). Gender produced a β value of .071, which means that it did not make a significant practical difference in ACT Composite scores. Because the school type β value was -.026, this would mean that there was no practical significance between the type of school that a student attended and the ACT Composite score.

Summary

Gender (and subsequently block one) was found to have a statistically significant relationship with academic college readiness as measured by the SAT Writing exam, but not SAT Composite or ACT Composite. Block two and SAT-10 scores have a statistically significant relationship with academic college readiness as measured by SAT Composite, SAT Writing, and ACT Composite exams. School type has a statistically significant relationship with academic college readiness as measured by the SAT Composite exam, but not for SAT Writing and ACT Composite. Block three was found to have a statistically significant relationship with academic college readiness as measured by SAT Composite, SAT Writing, and ACT Composite exams. This implies that a prediction model that determines to test the relationship between school type and academic college readiness when controlling for gender and prior academic achievement is a viable model.

Discussion of the Findings

This study indicated that there is a statistically significant relationship between academic college readiness when measured by the SAT Composite exam and school

type. The regression coefficient for school type for the SAT Composite exams was B = -32.081 ($SE\ B$ = 15.656), which shows that UMS® students scored higher than traditional, comprehensive Christian school students, with -63.665 to -1.937 at the 95% confidence level. This appears to support the premise that UMS® are preparing their students to be ready for the academic challenges of college.

The sample size for the ACT exam was smaller than for SAT (N = 144), and the addition of ACT scores to the prediction model was not found to be statistically significant (*Sig. F* change = .662); however, the ACT results affirm the SAT Composite score results as they were also higher for UMS® students (B = -.243; $SE\ B$ = .555). Several explanations may be possible for why the ACT scores were not as statistically significant as the SAT scores. First of all, the SAT and the ACT exams measure different skills. They both measure achievement in specific content areas (NACAC, 2008); however, the SAT also looks at a student's ability to "think, solve problems, and communicate" (The College Board, The SAT Program Handbook, 2008, as cited in Briggs, 2009, p. 8). UMS® seniors demonstrated their mastery of content material in addition to being more adept at higher order thinking skills. The format of UMS® schools may have a relationship with why these students performed better on the SAT Composite exam; however, this was not included in the parameters of this study. As was determined by Robbins, Lauver, Le, Davis, Langley, and Carlstrom (2004), communication skills have been found to be predictive of college success, so a study to determine if this difference in the significance of the relationship between SAT and ACT exams between school type and academic college readiness would be beneficial.

The same holds true for the SAT Writing scores, where UMS® students scored higher (B = -.8.822; $SE\ B$ = 9.784), with -28.110 to 10.465 at the 95% confidence level. Once again, these scores were not statistically significant (*Sig. F* change = .368). The SAT Writing section is considered the most highly predictive of college success (The SAT® writing section, 2008). This finding is important, as both traditional, Christian schools and UMS® must consider the importance of preparing their students to write well. The model to predict academic college readiness that included school type as a predictor for the SAT Writing produced statistically significant results (F = (11,210) – 19.681, p < .001), with a total change of 50.8%.

Gender was found to be a statistically significant predictor of academic college readiness when measured by the SAT Writing score. The average score for females was 49.932 points higher than males on this one exam, plus or minus 10.113 points, when controlling for other factors. Gender was not found to be a statistically significant predictor of academic college readiness for the SAT Composite and the ACT Composite. This finding is consistent with other studies showing that "gender is not a consistent predictor of overall academic achievement" (Bridgeman & Wendler, 1991, as cited in DeBerard, Spielmans, & Julka, 2004, p. 67).

The model of predicting academic college readiness using prior academic achievement as a predictor variable (while controlling for gender) was statistically significant for all three tests. The SAT-10 was taken during grades 7, 8, and 9, so these scores could possibly guide administrators and guidance counselors as they provide counsel to students entering high school. Encouragement to take rigorous, relevant courses is a must, as they will better prepare these students for college.

It was interesting that the SAT-10 scores that stood out as more highly predictive were not the ones that most people would first consider. For the SAT Composite, SAT-10 Math ($t = 7.264$, $p < .001$), SAT-10 Science ($t = 3.091$, $p = .002$), SAT-10 Social Science ($t = 2.566$, $p = .011$), SAT-10 Reading Vocabulary ($t = 2.023$, $p = .044$), and SAT-10 Total Reading ($t = 2.014$, $p = .045$). For the SAT Writing, SAT-10 Social Science ($t = 3.370$, $p = .001$) and (SAT-10 Total Reading ($t = 2.977$, $p = .003$) were the most significant variables. For ACT Composite, SAT-10 Social Science ($t = 3.634$, $p < .001$), SAT-10 Science ($t = 2.820$, $p = .007$), SAT-10 Math ($t = 2.724$, $p = .003$), and SAT-10 Total Read/Vocabulary ($t = 2.236$, $p = .027$) were the most significant predictors. None of the language scores were statistically significant for any of the tests. One would not think of Science and Social Science as having as much importance, especially in today's educational climate where emphasis on proficiency in reading and math are emphasized. Perhaps this study shows the importance of using math and reading within the context of other disciplines, as the students who do well in those content areas, also do well on the SAT and ACT exams.

The model of predicting academic college readiness by examining school type while controlling for prior academic achievement and gender was also found to be statistically significant, and thus a viable prediction model. This finding seems to affirm that there is a relationship with the type of school a student attends and his or her readiness for college academics. As educators look to transform schools into effective institutions that prepare their students for college, they must consider the three primary elements deemed necessary for an effective high school. Students must follow rigorous and relevant curricula in a personalized, responsive setting where there is a strong

relationship between students, teachers and parents (Fleishman & Heppen, 2009; Gordon, 2003; Oxley, 2008).

One must be cautious, however, in drawing conclusions based upon one study, for the varying statistics produced by a study can be interpreted in different ways. For example, when using the more controversial standardized regression coefficients, school type did not yield a β value demonstrating practical significance for any of the tests of academic college readiness. This value implies that there was no relationship between the scores on the SAT Composite, the SAT Writing, and the ACT Composite and the type of school the student attended. When considering that students in the UMS® schools are not in attendance at the traditional brick and mortar school for as many days as the traditional, comprehensive Christian school students, having comparable scores (or when considering the unstandardized coefficients, higher scores), seems to indicate that the amount of time one spends in school is not as important as the type of education that one receives. This study seems to indicate that the UMS® students located at the three schools in Texas did not suffer an academic penalty because of attending a non-traditional type of school.

In the 2011 Cardus Study, when compared with Catholic schools, Protestant Christian schools were found to emphasize character building and spiritual formation, while offering a less rigorous academic program. On the other hand, Protestant Christian school students felt the most prepared for college, as compared with Catholic, non-religious, and home-schooled religious students. The type of school students attend also impacts the type of college they will attend, as Protestant Christian school graduates are four times more likely to attend a Protestant Christian university. Another important

finding of the Cardus Study is that when comparing mean SAT scores, they found a strong positive effect for students attending non-religious private schools, but little effect for graduates of Protestant Christian schools (Pennings, Seel, Van Pelt, Sikkink, & Wiens, 2011). This current study found that there is a statistically significant relationship with the type of school within the Protestant Christian community that one attends and SAT Composite scores. An important conclusion of the 2011 Cardus Survey was that it is possible for Christian schools to produce "college-worthy, character-witnesses of Christ" (NAUMS home page). This is exactly the goal of traditional, comprehensive Christian schools and UMS® schools. "Academic rigor need not be sacrificed on account of either faith development or commitment to cultural engagement" (Pennings, Seel, Van Pelt, Sikkink, & Wiens, 2011).

Limitations of the Study

There are several limitations of this study. First, a correlational design was used, with a sequential multiple regression employed to control for extraneous variables. Not all variables, however, were considered. Data were not available for the socio-economic level of each student. Although students must have been enrolled in the school for a minimum of three years, enrollment by school type at the elementary and middle school levels was not within the realm of the study. Family size was not available for all students; therefore, it was not analyzed. In addition, parental educational achievement, socio-economic status, and learning disability indicators were not considered. The researcher attempted to control for ethnicity; however, the sample was 93.75% Caucasian, so ethnicity was not included as a control variable. All of these factors have

been shown to be important to the prediction of college success (Braunstein, McGrath, & Pescatrice, 2000; Zwick & Sklar, 2005; Bryson, Smith & Vineyard, 2002)

In an effort to control for differences in the school setting, students were chosen from schools that had met specific guidelines in order to achieve both regional accreditation and, if a UMS® school, NAUMS certification. Even so, each school offered students a unique educational experience that was beyond the control of the researcher. The number of years a school had been in existence, the financial well-being of the school, and the physical location of the school were not considered. The difference in academic program between schools, including teaching pedagogy, is also a limitation of the study.

Another limitation is that the results cannot be generalized to other populations. The study was limited to six Christian schools located near Dallas, Texas that follow either a traditional, comprehensive or a UMS® program; therefore, the results are limited to these six schools. The results may not be applicable to schools in other states, nor to schools of different types. 93.75% of the students in the study were Caucasian; therefore, the results may not apply to schools with greater diversity.

Implications of the Study

The research findings of this study could have implications for educational leaders facing the need for high school reform and the decision of what type of school produces college-ready students. As a model for predicting academic college readiness, the inclusion of school type was found to be a valid inclusive predictor variable. This affirms the importance of looking at school characteristics as playing a role in preparing students for academics at the college level. In addition, the UMS® was found to have a

statistically significant relationship with academic college readiness as measured by the SAT Composite exam. Key characteristics of the UMS® must be considered when looking at high school reform.

One key element of the UMS® type of school is the inclusion of more time at home with parents and not in the central classroom. The current model of education that includes the accumulation of Carnegie units based on amount of time the students sit in the central classroom is being questioned in numerous venues, including by proponents of University Model Schools® (Childers & Ireland, 2005; Danielson, C., 2002). Perhaps educational leaders should look more closely at how time is spent in the classroom and at home instead of focusing on the amount of time the students spend in the central classroom. This study demonstrated that students can be academically ready to attend college even if they don't spend the traditional amount of time in a school setting. As the SAT tests both content knowledge and higher order thinking skills, perhaps it is just as important for educators to assess the skills and habits UMS® students learn by being held more responsible for their own work because of the structure of the UMS® program.

This study does not reinforce Hoxby, Murarka, and Kang's 2009 findings that there is a positive association between a long school year and academic achievement. It also does not back President Obama's 2009 endorsement for extending the amount of time American children spend in school. On the other hand, it agrees with the researchers that have indicated that it is not the amount of time that students spend in the classroom that is important; but rather the change in the curriculum that is offered that contributes to greater student success (Mendrala, 2010).

Instead of proposing extended time in the classroom, the UMS® model emphasizes rigorous academics and character development (Turner, 2001). It is in line with current efforts at high school reform that are built upon educational research that affirms that an effective high school is a combination of a "rigorous and relevant curricula for all students in a personalized and responsive learning community with strong relations between teacher and student and between school and parents" (Fleishman & Heppen, 2009; Gordon, 2003; Oxley, 2008, as cited in Armstead, Bessell, Sembiante, & Plaza, 2010, p. 365). In fact, the UMS® founders have created a school where parents share the teacher role, where students are taught in a supportive learning environment, and where students have access to a rigorous curriculum that prepares them academically for college.

Rigor is the first element of a successful reform model. One of the reasons for the success of early and middle college high schools (Ongaga, 2010; Mokher & McLendon, 2009; Jordan, Cavalluzzo, & Corallo, 2006) is the student's ability to take college classes. The UMS® model schedule allows its students to take advantage of dual enrollment opportunities, where they can benefit from rigorous courses and increased options.

The UMS® model has similarities with cyber schooling, where students benefit from a more individualized program based upon their own needs. It also has similarities with blended learning. In traditional blended learning, students mix face-to-face classes with online options. Students enrolled in either blended learning or a UMS® school must take ownership of their own learning. Both models would acknowledge the benefit of time in the home where the students can construct their own learning through active experience and reflection (Beyers, 2009). The UMS® program also lends itself to the use

of technology. Course assignments are posted online, and some teachers utilize the "flipped classroom" method, where students at home watch lectures combined with short videos and then spend their time within the central classroom involved in activities and discussion with their teachers and classmates. While at home, students can replay the lectures as many times as needed, allowing for reinforcement that is not possible within the traditional classroom (Tucker, 2012).

The second aspect of an effective high school is a supportive learning environment where teachers and parents work together. The UMS® school is the epitome of a caring learning environment with extensive parental involvement. The smaller learning community is one reform effort that emphasizes this element of an effective education. Smerdon and Cohen (2009) noted that one of the benefits of a smaller learning community is that with smaller class sizes, students can be held to higher academic standards within a supportive environment. Kuo (2010) defined a smaller learning community as one with 600 to 800 students. In this study, the enrollment of all the schools fell either within this range or well below this number (216 to 685). In fact, NAUMS states that UMS® schools should use the following student/teacher ratio limits: 16:1 for elementary grades, 18:1 for junior high, and 20:1 for senior high (Turner, 2001).

Another defining characteristic of the UMS® school is parental involvement. Conley (2008) noted that parental involvement has a direct correlation with preparing ones children for transition to college. Research studies by Lloyd-Smith and Baron (2010) and Thompson and Ongaga (2011) affirmed the positive correlation between parental involvement and student achievement. In their studies, caring relationships were important to students and were effective in increasing achievement when linked with high

expectations. Research studies have shown the importance that family involvement contributes to the success of the student. It would appear that the results of this study affirm the UMS® "foundational premise that meaningful and positive parental mentoring makes the biggest difference in a child's education" (Turner, 2001, p. 52).

This study also confirmed prior research that indicated that both theoretical frameworks upon which high school reform efforts are built must be considered in order to increase academic college readiness. Schools must provide rigorous course instruction that prepares students for college within a connected, caring learning environment that takes a personal interest in each student (Armstrong, 2006). UMS® emphasizes the importance of integrating these two schools of thought.

Most importantly, this study provides statistical findings to back the claims of UMS® educators that they can and do prepare their students for college. It gives legitimacy to a high school reform model that lacked sufficient data to ensure its continuation. At minimum, it affirms that UMS® seniors are not penalized academically for attending this unique type of school. In addition, the findings in no way diminishes the accomplishments of the traditional, comprehensive Christian school students who have excelled in their studies. Results of this study showed that the traditional, Christian school students did well on all three exams, and more specifically on the SAT Writing and ACT Composite exams that support the premise that course content is being mastered. Perhaps those outside of Christian school circles will take notice of the results of this study and look carefully at what Christian schools are doing well. Christian schools have a place in the educational world, and in the world of academic research. They have strengths and weaknesses, just as public and other private schools do, but they

must be viewed as valid school models that produce students who are ready for college academics.

Recommendations for Future Research

This study was a preliminary one using school type, and more specifically UMS® and traditional, comprehensive Christian schools, in order to determine their relationship to academic college readiness. A study using data from students who have attended schools throughout the United States would add to the body of knowledge contributed by this one study. A larger sample size would allow for greater generalization of the results, especially with the inclusion of more scores on the ACT exam.

Also of interest would be the result of attendance at a specific high school type for students based upon ethnicity. Since 93.7% of the students in the study were Caucasian, subgroup analysis was not possible for under-represented students attending college. Socio-economic and cultural indicators, education level of parents, and statistics on special needs students were also not available for inclusion in this study. It is possible that the UMS® model of education works well for the communities where the six schools were located in Texas, but not in more ethnically-diverse populations located in different states. A similar study is needed to examine the relationship of these indicators with academic college readiness. Prior studies have shown that there may be different predictors that are more accurate for students of different ethnicities. Bryson, Smith, and Vineyard's 2002 study found that high school GPA was predictive of college success for African-American students, while high school rank and ACT scores were better predictors for Caucasian students. Kirby, White, and Aruguete (2007) found that academic factors such as high school GPA, standardized test scores, and socioeconomic

status, including parents' occupation and need for financial aid, were good predictors of college success.

In addition, since the two key components of the UMS® program are college readiness and character development, a future study including a qualitative component to determine if enrollment in a UMS® school contributes to the character development of its graduates would be highly beneficial. Since the parental role is so critical to the success of this model, research to determine if family size, the educational make-up of the parents, and the overall parental influence on the student could be topics for future studies.

This study was limited to academic college readiness indicators; therefore predictions concerning whether those in the sample will ultimately experience college success is beyond the realm of this study. Whereas SAT and ACT scores have been found to be predictive of college success (DeBerard, Spielmans, & Julka, 2004; Noble & Sawyer, 2004), so have high school GPA and class rank (Harackiewicz, Barron, Tauer, and Elliott, 2002; Kahan and Nauta, 2001; Strauss and Volkwein, 2002; Wade and Walker, 1994; and Kirby, White, and Aruguete, 2007).

Personality traits and learned behaviors, such as academic self-efficacy, study skills, self-management, intrinsic motivation, self-regulation, and work drive have also been found to be related to college success (Robbins, Lauver, Le, Davis, Langley, & Carlstrom, 2004; Le, Casillas, and Robbins, 2005; Kitsantas, Winsler, and Huie, 2008). Perhaps a future study could use the Student Readiness Inventory (SRI) to determine if these psychosocial and academic factors are a bi-product of the unique scheduling aspect of a UMS® education.

Conclusions

This study shows that the inclusion of school type in a model to predict academic college readiness, when controlling for gender and prior academic college readiness, is a statistically significant model. On the other hand, when using the β value, no practical significance was found between the type of school one attended and the scores on the SAT Composite, SAT Writing, and ACT Composite exams.

When comparing the actual difference in test scores controlling for gender and prior academic achievement, the unstandardized regression coefficients imply that the UMS® program of education prepares students for college, as supported by the SAT Composite exam scores. The SAT is a standardized test that assesses both content knowledge and skills application, whereas the ACT Composite exam measures specific content in English, math, science, and reading.

This study was limited to the prediction of academic college readiness. Conley (2007) proposed a broader definition of college readiness that includes being prepared for the entire college experience, not just being academically prepared for it. Of course students must be capable of doing college work; however, they must also understand the culture and structure of college, including its intellectual and societal norms. College professors have affirmed the importance of knowing academic content. They have also added "habits of mind" to the list of predictive criteria to college success and college retention. These habits include behaviors and attitudes such as higher order thinking, an inquisitive nature, the ability to adjust to critical feedback, coping mechanisms, effective written expression, discernment, inferential thought processes, and the appropriate use of technology in education (Conley, 2003c, p. 8).

UMS® students experience a type of education similar to that experienced by college students. They follow a schedule that resembles a college schedule and are held responsible for work that is completed outside the immediate supervision of the classroom teacher. They are enrolled in rigorous classes that have high academic expectations. Students must demonstrate self-regulatory and self-management skills that lead to learner autonomy and academic discipline, behaviors that are predictive of college success (Zimmerman, 1989, as cited in Kitsantas, Winsler, and Huie, 2008; Komarraju, Ransey, & Rinella, 2013). This study only begins to understand how this new model of education called University-Model Schools® prepares students for college. Further study concerning additional components of UMS® schools is not only recommended, but encouraged.

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APPENDIX: IRB Approval

LIBERTY
UNIVERSITY

The Graduate School at Liberty University

October 31, 2012

Sharon Brobst
IRB Exemption 1414.103112: Academic College Readiness Indicators of Seniors Enrolled in University-Model Schools® and Traditional, Comprehensive Christian Schools

Dear Sharon,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and that no further IRB oversight is required.

Your study falls under exemption category 46.101 (b)(4), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:

> (4) Research involving the **collection or study of existing data**, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the **information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects**.

Please note that this exemption only applies to your current research application, and that any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption, or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,

Fernando Garzon, Psy.D.
Professor, IRB Chair
Counseling

(434) 592-4054

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