

**The Effectiveness of Advanced Placement Courses in Improving ACT[®] Scores for
High School Students**

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Abstract

A large percentage of high school graduates are not on track to attend college or ready to complete college level work. High schools need to be able to effectively monitor student progress toward college readiness, and provide the educational experiences needed to close the readiness gap. The purpose of this quantitative quasi-experimental study was to examine the difference in college readiness, as determined by ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ Advanced Placement (AP) courses. It focuses on struggling students, those predicted not to be college ready, and the impact of taking AP courses. Statistical analyses were conducted to determine if there was a difference between AP participation and ACT[®] composite scores. Data was evaluated for students who were predicted to be on track to be college ready and students who were not predicted to be college ready. The study evaluated the performance of students from three different graduating classes from the North Kansas City School District in Kansas City, MO. The performance of 4,029 students was examined, and these students graduated during school years spanning 2012 – 2013, 2013 – 2014, and 2014 – 2015. The results indicated statistically significant differences in student college readiness, as assessed by ACT[®] composite scores, among all students enrolled in 1 or 2, or 3+ AP courses. The results also indicated statistically significant differences in student college readiness, as assessed by ACT[®] composite scores among struggling students enrolled in 1 or 2, or 3+ AP courses. The findings indicate the greater number of AP courses completed, the higher the composite ACT[®] score, regardless of a student's prior level of predicted college readiness.

Dedication

The completion of this degree would not have been possible without the help of so many different experiences and people who have supported me throughout my educational journey. I dedicate this work to my family:

My wife, Cassie, who encouraged me start this program while she was simultaneously going to school to earn a Nurse Practitioners degree. We spent many late evenings doing homework together, writing papers, completing discussion board posts, preparing for exams, and studying in general. I am so proud of her accomplishments, and the completion of her program. I am so excited to see where your education takes you professionally. I love you so much!

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Chapter One

Introduction

Since the reauthorization of the Elementary and Secondary Education Act (ESEA) in 2002, the United States (U.S.) government has formally challenged states to better prepare high school students for college-level coursework. Individual states and advocacy organizations such as the American Association of States Colleges and Universities, the U.S. Department of Education (USDE), and individual schools have aggressively pursued avenues to improve college and career readiness of all students. The result has been a heavy investment to increase graduation requirements for high school students to improve college readiness for all students (Yoon, Duncan, Lee, Scarloos, & Shapley, 2007).

Despite these efforts, the state of college readiness for students in the U.S. still needs improvement. As reported by Amos (2014), the Alliance for Excellent Education reported only 26% of 2014 high school graduates were deemed college ready as assessed by results of ACT[®] college readiness tests. Throughout the late 20th and early 21st centuries, the way college readiness was determined had been course titles (honors, regular, or remedial), grade point average (GPA), and performance on college entrance exams such as the ACT[®] and the SAT (Conley, 2007a). College readiness exams such as the ACT[®] and the SAT allow colleges and universities to compare students from across the United States. The ACT[®] exam “is not a direct measure of necessary content knowledge and thinking skills, but a gauge of probability” (Conley 2007a, p. 7). However, Conley (2007a) determined that student ACT[®] performance was a better indicator of college readiness than any state-developed assessment.

Background

According to the USDE (2010), the ESEA reauthorization included several subcomponents that outlined expectations for students. College readiness was emphasized from the opening statement of the report. “The goal for America’s educational system is clear: every student should graduate from high school ready for college or a career” (USDE, 2010, p. 1). The approach, as prescribed by the USDE, included rigorous course standards, improved accountability and assessment, measuring growth, and building capacity among educators (USDE, 2010, p. 4). Defined by these suggestions, the specific indicators the USDE recommended using to determine college readiness included the following:

1. Increasing the number of students taking Advanced Placement (AP) or International Baccalaureate (IB) courses.
2. Increasing the percentage of high school graduates who successfully attend college or a post-secondary training program.
3. Increasing usage of ACT[®] and SAT scores as the primary means of measuring course standards and improving overall college readiness and school accountability.

AP Courses were developed and offered by the College Board, and are “a rigorous academic program built on the commitment, passion, and hard work of students and educators from both secondary schools and higher education” (College Board, 2014a, para. 5). These AP courses include an established rigorous curriculum that culminated with an exam administered for each course at the end of each school year. In addition to a rigorous curriculum within the chosen discipline, AP courses help increase other

aspects of college readiness beyond content knowledge. According to the International Baccalaureate Organization (IBO), the IB Programme is an internationally developed program, which began in Switzerland, to compel students and teachers to use a standardized rigorous curriculum that encourages a multicultural and multidimensional approach to learning (IBO, 2014).

At the beginning of his first term in office, President Obama established high educational goals to improve college readiness for students in the U.S. to reach by the year 2020 (USDE, 2010). Goff (2014) declared one significant aspect of the goals was to increase the percentage of students who attend an institution of higher learning full-time from 59% to 65%. As more students were able to access higher education, a large percentage of students still had not demonstrated college readiness and were required to take non-credit bearing remediation courses (Goff, 2014).

Accessing challenging courses is another issue facing many high school students. When high school students are not able to access challenging courses, there is an increased likelihood that they will not be ready for credit bearing classes in college (USDE, 2014). The USDE (2014) reported during the 2012 – 2013 school year, “nationwide, only 50% of high schools offer calculus, and only 63% offer physics” (p. 1). This issue is also illustrated in the number of students who are required to pay for non-credit bearing classes. “Four out of every 10 new college students, including half of those at two-year institutions, take remedial courses” (USDE, 2010, p. 1). This high percentage of students requiring remediation indicates high school students must graduate better prepared for college to improve access and prevent wasting money on non-credit bearing courses. Many high school students are simply unable to access challenging

courses, and then are required to take more remedial courses in college. The more remedial courses a student took, the less probability for college degree attainment (Goff, 2014).

Conley (2007b) determined four key areas that define college readiness: content knowledge, core academic skills, non-cognitive skills, and college knowledge. The most significant effect on college readiness by secondary schools in the U.S. was content knowledge. One way to increase students' content knowledge to improve college readiness was encouraging them to take challenging coursework and to provide the necessary support needed to succeed. Conley (2007b) claimed AP and IB courses offer those academic challenges to students when taught with fidelity to the prescribed curriculum. More students are accessing AP courses, as AP enrollment has doubled between 2000 and 2010 (Stoker, 2010; Wood, 2010). Increasing access to rigorous courses has other benefits, as well. Research indicated students who have open access to AP courses demonstrate higher performance on state mandated tests than students in environments with strict prerequisite requirements (Stoker, 2010; Wood, 2010). This impact of AP courses has only started being examined since 2005, with a focus on the impact of AP courses on minority students and overall equal access to AP (ACT[®], 2005a; ACT[®], 2007a; ACT[®], 2007b). The ACT[®] was historically used exclusively as a college admissions test (ACT[®], 2009a). Beginning in the 1990's, however, the exam began being used to determine students' college readiness (ACT[®], 2009a).

Throughout the history of the organization, ACT[®] has developed different pre-
ACT[®] assessments to determine if students were on track to meet college readiness benchmarks and determine if students were predicted to succeed in college-level courses.

One ACT[®] developed pre-test, the PLAN[®], was “designed to improve students’ preparation for education, training, and work after high school” (ACT[®], 2015a, para. 1). This test was typically given during the first semester of a student’s sophomore year, and has sections assessing English, mathematics, reading, and science reasoning similar to the ACT[®] (ACT, 2014b). When entering college, students are required to demonstrate proficiency in English, reading, or mathematics by college readiness exams, or they are required to take remedial courses before they can take credit-bearing classes that would count toward a degree. For the national high school graduating class of 2014, only 28% of students met all college readiness benchmarks as assessed by the ACT[®] (ACT[®], 2015c).

The Missouri Coordinating Board of Higher Education (MCBHE) provides an annual report examining college enrollment trends, remediation rates, and the success of students graduating from Missouri high schools after their first year of college. Between the 2002 – 2003 and 2011 – 2012 school years, the percentage of students attending college in Missouri increased by 13.23% (MCBHE, 2013a). Over this same ten-year period, the percentage of students prepared for collegiate-level work decreased, and one out of every three first-year students attending Missouri colleges and universities took at least one remedial course in English, reading, or mathematics (MCBHE, 2013a). As illustrated in Table 1, between 2011 and 2014, the number of students attending college in Missouri remained steady, but with a significant increase since 2005 (MCBHE, 2015). Hansen (2014) argued that while only 24% of Missouri students met all of the college readiness benchmarks in all four subject tests, there were an additional 10% of Missouri students who were within two ACT[®] points of meeting all four college readiness

standards. The students who were within two points of meeting those benchmarks could potentially change their performance with different course selections (Hansen, 2014).

Table 1.

Missouri High School Graduates Report

	2011	2012	2013	2014	10-Year % Change
Overall Enrollment	23,742	21,018	22,034	22,443	12.92%
Two-Year Enrollment	11,279	9,132	10,393	10,610	27.39%
Four-Year Enrollment	12,463	11,861	11,641	11,833	2.49%
Female	12,997	11,596	12,175	12,342	12.00%
Male	10,733	9,937	9,884	10,092	13.98%

Note: Adapted from the Missouri Coordinating Board of Higher Education Graduates Report 2014 by the Missouri Department of Higher Education <http://dhe.mo.gov/cbhe/boardbook/documents/BB0415.pdf>

The current study took place in the North Kansas City School District in Kansas City, Missouri. Within the North Kansas City School District, there are four high schools, and course access information and student results from all four schools were used in the current study. All students in the North Kansas City School District took the PLAN[®] test as sophomores, and results from that test were used to determine if a student was predicted to be successful in college. Students chose to take the ACT during their junior and/or senior year.

Statement of the Problem

A large percentage of high school graduates are not ready to complete college level work and are not on track to attend college. The National Association for College Admissions Counseling (NACAC) (2011) identified three factors in determining college admissions and readiness. The factors were grades in college prep courses (such as AP,

IB, dual credit, and/or honors courses), strength of curriculum (the number of multiple AP, IB, dual credit, and/or honors courses), and college readiness test scores (such as the ACT[®] or the SAT) (NACAC, 2011).

The National Center for Public Policy and Higher Education (NCPPEH) (2010) stated with fewer students prepared for college-level work, post-secondary schools began examining their admissions practices to see what need to be altered to ensure incoming students were college ready. The NCPPEH (2010) reported the “lack of readiness for college is a major culprit in low graduation rates, as the majority of students who begin in remedial courses never complete their college degrees” (para. 4). Despite some decreases in the level of remediation in open enrollment colleges and universities in Missouri, the percentage of students who require remediation remains high (Missouri Department of Higher Education, 2014).

Colleges and universities have traditionally emphasized student performance on college readiness tests such as the ACT[®] and SAT and class rank/GPA in determining admission, as these are considered the key indicators of overall college readiness (NACAC, 2011). Between 2006 and 2014, colleges reported they placed increased importance in two additional areas: strength of overall high school curriculum and grades in college preparatory courses. Colleges wanted to ensure the students they accept possessed the skills set necessary to stay enrolled at their school and eventually graduate (NACAC, 2011). The National Student Clearinghouse Research Center provided a report of the six-year graduation rate from the national class of 2009. In this report, Shapiro, et al. (2015) claimed that the total class size increased by eight percent from 2008 to 2009, but “the overall national six-year completion rate for the fall 2009 cohort was 52%, a

decline of 2.1 percentage points from the fall 2008 cohort” (p. 3). Despite more students enrolling in college after high school graduation, a smaller percentage of those students are graduating within five years.

Schools must take a proactive approach with monitoring individual student’s course selection, specifically related to AP, IB, and/or honors courses, and they must effectively provide support for students who are not on track to succeed in college (Conley, 2007a). Students determined not on track to meet college readiness standards must be afforded the opportunity to access more rigorous coursework (Conley, 2007b). Districts and schools have a responsibility to insure their graduating students are college ready, as measured by the ACT[®] or the SAT, in order for them to access higher learning opportunities and scholarship money (Clark, 2010; Clinedinst, Hurley, & Hawkins, 2012).

The fundamental problem is many high school graduates are not ready to complete credit-bearing courses during their first year at university, and therefore are immediately not on track to graduate with a college degree in five years. High schools need to effectively monitor student progress toward college readiness, and provide appropriate opportunities for students to close the readiness gap. Increased access to more rigorous curriculum could allow students to increase their content knowledge in individual subjects, perform better on college readiness assessments, and be prepared to take and earn credit in first-year college courses.

Purpose Statement

The purpose of this quantitative quasi-experimental study was to examine the difference in college readiness, as determined by ACT[®] scores of students, among

students enrolled in 0, 1, 2, or 3+ AP courses. Additionally, it focused on the impact of AP course completion for struggling students who were not predicted to be on track for college readiness. Data was evaluated both for students who were predicted to be on track to meet college readiness and students who were not predicted to be on track for college readiness.

Significance of the Study

Significant research has been conducted on short-term strategies to improve college readiness scores, such as improving individual ACT[®] and SAT college entrance assessment performance, though most of that research has been on strategies such as student's completing ACT[®] prep classes, or on explicitly teaching test-taking skills in core classes (Lesser, 2010; Rost, 2012; Saluri, 2012). Much less research has been conducted on longer-term approaches to helping students improve college readiness through means such as course selection and access to a more rigorous curriculum. The current study could help districts improve college readiness of high school students. This work has an additional practical application to support open access to AP, IB, or dual credit courses for all students.

Delimitations

According to Lunenburg and Irby (2008), "delimitations are self-imposed boundaries set by the researcher on the purpose and scope of the study" (p. 134). Several delimitations have been identified.

The delimitations were as follows:

1. The location of this study was the North Kansas City School District in Kansas City, Missouri.

2. The PLAN[®] test data was from the test administered during the first semester of the students' 10th grade year.
3. Students who did not have the opportunity to take the PLAN[®] test, or who took the PLAN[®] test in a different school district, were excluded from the study.
4. The ACT[®] test data was from the date of the highest score when the student took the test, and does not account for the number of times students took the test.
5. Students who chose not to have their ACT[®] results sent to the school district were excluded from this study because the data warehouse would not have proof of their score.
6. Students were not required to take the AP exam at the conclusion of completing the AP course.

Assumptions

Lunenburg and Irby (2008) defined assumptions as “postulates, premises, and propositions that are accepted as operational for purposes of the research” (p. 135).

Therefore, key assumptions must be disclosed.

The assumptions were:

1. Accurate student ACT[®] scores were provided by the data warehouse at the North Kansas City School District.
2. ACT[®] accurately provided student reports for the PLAN[®] and ACT[®] tests.
3. All AP courses were taught with fidelity by teaching faculty, as the North Kansas City School District requires that teachers attend formal training by the College Board in order to teach the course.
4. Students performed their best on both the PLAN[®] and ACT[®] assessments.

5. Evaluation of students eligible for this study was done accurately and completely.

Research Questions

According to Lunenburg and Irby (2008) research questions, “explore the relationships between and among variables” (p. 126). The purpose of this study was to determine the effect of using AP courses to help students increase college readiness as assessed by the ACT[®].

1. To what extent is there a difference in college readiness, as determined by ACT[®] composite scores, among students enrolled in 0, 1, 2, or 3+ AP courses?
2. To what extent is there a difference in college readiness, as determined by ACT[®] composite scores, among students predicted to be unsuccessful in college who enrolled in 0, 1, 2, or 3+ AP courses?

Definition of Terms

Lunenburg and Irby (2008) reported the definition of terms included “all key terms central to [the study] and used throughout the dissertation” (p. 118).

ACT[®]. The ACT[®] is a content knowledge college readiness assessment developed in 1956 to assess “practical knowledge rather than cognitive reasoning” (ACT[®], 2014a, para. 1). The assessment includes four required sections: English, mathematics, reading, and science. Each section is scored on a scale of 1-36, and the section scores are averaged to determine the overall composite score.

The scores on each subsection of the ACT[®] determines whether a student has “a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in corresponding credit-bearing first-year college courses” (ACT[®], 2011). The composite

score of 21 is the average of the scores on the individual test sections of the ACT[®] tests to minimally meet the college readiness standards (ACT[®], 2013a).

The breakdown of the four sections is as follows:

English. The English test measures grammar, usage and mechanics, and rhetorical skills. A score of 18 or higher indicates a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in the college freshman level English/composition class (ACT[®], 2011).

Mathematics. The mathematics test assesses pre-algebra, elementary algebra, intermediate algebra, geometry, and trigonometry. A score of 22 or higher indicates a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in college freshman level algebra course (ACT[®], 2011).

Reading. The reading test assesses a student's comprehension ability in prose fiction, social sciences, humanities, and natural sciences. A score of 22 or higher indicates a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in a college freshman level history or other social sciences class (ACT[®], 2011).

Science. The science test measures scientific reasoning through information presented in charts, graphics, and text, and it requires students to synthesize information from those different presentations. A score of 23 or higher indicates a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in a college freshman level science course with a lab (ACT[®], 2011).

ACT[®] core or more. This is the ACT[®] term that describes the encouraged minimum course requirements that ACT[®] research has determined is most likely to

support college readiness. According to ACT[®] (2014a) “A core curriculum is defined as four years of English and three years each of mathematics, social studies, and science” (para 1).

Advanced Placement (AP). A series of courses with a prescribed curriculum that are assessed by the College Board and are usually considered honors. AP courses were developed and offered by the College Board, and the courses serve as “a rigorous academic program built on the commitment, passion, and hard work of students and educators from both secondary schools and higher education” (College Board, 2014b, para. 5).

Aptitude test. “A standardized test designed to predict an individual’s ability to learn certain skills” (Aptitude test, para. 1).

Intelligence test. “A test designed to determine the relative mental capacity of a person” (Intelligence test, para. 1).

International Baccalaureate (IB) Diploma Programme (DP). This is a rigorous series of one and two years courses that “aims to develop students who have excellent breadth and depth of knowledge – students who flourish physically, intellectually, emotionally and ethically.” (International Baccalaureate Organization, 2014, para 2).

PLAN[®]. This is the second test in ACT[®]’s assessment series and is typically given to sophomores to determine if a student is academically on-track to meet college readiness standards and to predict a possible ACT[®] score. There is also an interest inventory section before the test (ACT[®], 2014b). The assessment includes four required sections: English, Mathematics, Reading, and Science Reasoning. Each section is scored

on a scale of 1-32, and the section scores are averaged to determine the overall composite score. This averages to a composite score of 18 to be on track to meet college readiness standards (ACT[®], 2015a).

The breakdown of the four sections college readiness benchmarks on the PLAN[®], is as follows:

English. The English test measures grammar, usage and mechanics, and rhetorical skills. A sophomore year score of 15 indicates on-track for college readiness and correlates with an ACT[®] English score of 18 (ACT[®], 2013b).

Mathematics. The mathematics test assesses pre-algebra, elementary algebra, and geometry. A sophomore year score of 18 indicates on-track for college readiness and correlates with an ACT[®] mathematics score of 22 (ACT[®], 2013b).

Reading. The reading test assesses a student's comprehension ability in prose fiction, social sciences, humanities, and natural sciences. A sophomore year score of 19 indicates on-track for college readiness and correlates with an ACT[®] reading score of 22 (ACT[®], 2013b).

Science. The science test measures scientific reasoning through information presented in charts, graphics, and text, and it requires students to synthesize information from those different presentations. A sophomore year score of 20 indicates on-track for college readiness and correlates with an ACT[®] science score of 23 (ACT[®], 2013b).

Postsecondary education. "Education beyond high school" (Postsecondary education, para. 1).

Struggling students. This is the term used in Missouri for students who attend class regularly, but are not on track to meet college readiness benchmarks. Additionally,

these students are not likely to successfully enroll in credit-bearing courses during the first year of college (Foushee & Sleigh, 2003). One measure of identifying these students is through a pre-ACT test such as the PLAN[®].

Overview of Methodology

This investigation evaluated to what extent there was a difference in college readiness, as determined by ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses. It also examined struggling students who were predicted to score below the national average on the ACT[®] based on their PLAN[®] scores. The dependent variables in this study are the ACT[®] composite scores earned by the student. The background variable is the initial PLAN[®] scores, and the independent variable is the number of AP courses the student completed. The populations examined were the classes of 2012 – 2013, 2013 – 2014, and 2014 – 2015 in the North Kansas City School District in Kansas City, Missouri. Historical data was used to determine the number of AP courses students took while attending high school.

Organization of the Study

This study is organized into five chapters. Chapter one introduced the study and addressed the needed background, statement of the problem, significance and purpose of the study, the delimitations, limitations, and assumptions of the study. Chapter one also included an overview of methodology and definitions of various terms. Chapter two includes a review of literature related to a history of college readiness, high school curriculum to prepare students for college, various means to assess college readiness, a history of the development of college readiness assessments, and finally ways to improve college readiness test scores. Chapter three describes the methodology of this study and

presents the research design, population and sample, instrumentation, measurement, data collection, and hypothesis testing procedures. Chapter four reports the results of the hypothesis testing. Chapter five provides a summary of the study, interpretation of the results of the data analysis, a comparison of the results to what was found in the literature, a statement of conclusions drawn, and recommendations for further study.

Chapter Two

Review of the Literature

The purpose of this quantitative study was to examine the extent of the difference in college readiness as measured by the ACT[®] among students enrolled in 0, 1, 2, or 3+ AP courses. Additionally, it focused on the impact of AP course completion for struggling students who were not predicted to be on track for college readiness. This chapter includes an overview of literature related to improving college readiness skills for high school students in the U.S. The first section includes information about the history of college readiness and various definitions, building toward the increased importance of college readiness in the 21st century. The next section examines the impact of high school curricular requirements on college readiness. The third section is information about various measurements of college readiness. The fourth section reviews a history of the development of college readiness assessments, including the SAT, the ACT[®] and PLAN[®] tests. The final section provides background for improving college readiness test scores.

History of College Readiness

The definition of college readiness is continually being revised and is a growing part of conversations about secondary education in the U.S. Conley (2007a) claimed that between the middle and end of the 20th century in the U.S., the concept of college readiness was tied to exclusively taking challenging courses. Schools tracked students based on their past academic performance courses into paths that were remedial, vocational, traditional, or college-bound. Students who were previously not placed in college-bound tracks were not prepared to meet the early 21st-century definition of

college readiness, as developed by Conley (2007a). Conley (2007a) defined college readiness as “the level of preparation a student needs in order to enroll and succeed – without remediation – in a credit-bearing general education course at a post-secondary institution that offers a baccalaureate degree or transfer to baccalaureate program” (p. 3). First-year college students who met college readiness standards would not be required to take courses that do not count toward a degree. Conley (2007a) also clearly defined success in these courses as “completing entry-level courses at a level of understanding and proficiency that makes it possible for the student to consider taking the next course in the sequence or the next level of understanding in the subject area” (p. 3). National legislation and state evaluation programs established in the early 21st century required secondary schools in the U.S. to increase college readiness skills for all students (Yoon, Duncan, Lee, Scarloos, & Shapley, 2007).

The focus on college readiness was not something originally emphasized among high schools in the U.S. when they were developed. The historical development of the K-12 educational system also varied significantly from state-to-state. According to Wherling (2007), the K-12 educational system and the comprehensive high school were primarily designed to educate all Americans and to produce an informed electorate. Kirst & Venezia (2008) claimed, “the U.S. comprehensive high school was designed for many often conflicting purposes, and it does not focus primarily on college preparation. College readiness was offered to a minority of students in a track of challenging courses” (p. 3). Barton and Conley (2011) stated, “a review of historical accounts of the purposes ascribed to the role of public education has not discovered the words ‘preparation for college and careers’” (p. 4). College readiness was nothing more than demonstrating

aptitude and taking the most challenging courses to develop the academic knowledge and skills necessary to succeed in college. The one exception to this was between approximately 1893 and 1920. Barton and Coley (2011) claimed:

In 1893, a dispute on what was to be taught to whom was settled, to a degree, by the Committee of Ten, a commission headed by Charles Eliot, President of Harvard College. Students should all study the same thing – a college-focused curriculum – said the Committee, no matter what their post-school ambitions and objectives. This was at a time when only about 10 percent of students went on to high school. (p. 6)

This approach changed during the 1920s when social trends led policy makers toward encouraging a shift to students being able to choose which educational path they would like to take: academic or vocational. These tracks were offered until the *A Nation at Risk* (1983) report highlighted the ineffective aspects of high schools in the U.S. As a result of the report, most states implemented the recommendation of increasing the required number of core classes all students must pass in order to graduate from high school.

Historically, an individual student's college readiness was measured by aptitude, and early assessments that measured college readiness were therefore aptitude assessments. Geiser (2008) claimed that originally these assessments, such as “the SAT provided a tool for prediction, giving admissions officers a means to distinguish among applicants who were likely to perform well or poorly in college” (p. 2). Many colleges and universities were interested in determining who had the potential for academic success at their school, not necessarily those who had already demonstrated success in high school or preparatory school. “A decade and a half ago, education reformers called

to define the mission of the high school as the preparation of students to succeed in college” (Barton & Coley, 2011, p. 3). Evaluating college potential on aptitude test scores theoretically provided equal opportunity among college-bound students who were educated in diverse educational environments.

In the late 20th century, the foundation for determining college readiness, and also more rigorous college admissions criteria, were established by post-secondary institutions in the U.S. Many of these factors directly tied to the original purpose of higher education. Conley (2005) asserted that purpose “was as much to develop the character traits necessary to assume one’s destined position of leadership in society as it was to acquire academic knowledge and skills or economically marketable skills” (p. 33). The measures used to determine college readiness were based on the student’s academic record in high school: course titles, grades, and class ranking. Since education has constitutionally been a state responsibility in the U.S., postsecondary schools found it difficult to compare student performance from one state to another, even with similar course titles, grades, and class ranking. With the evolution of this system in the U.S., college readiness tests were developed and employed to help universities compare all students among the various secondary schools. This system remained in place with little change throughout much of the first half of the twentieth century.

Significant changes in public education occurred in the U.S. during the early Cold War era (1945-1955). First, high school attendance and graduation became expectations as a direct result of mounting competition with the Soviet Union. According to Gaddis (2005), the space race during the early Cold War also accentuated the need for additional work in science and mathematics for young Americans and began increasing the role of

government in the U.S. educational system. College was also becoming more affordable for many high school graduates who had served their country with the passage of the Servicemen's Readjustment Act (known as the G.I. Bill) by providing grants to students when they returned from World War II (Conley, 2005). Additionally, advanced and college preparatory courses were becoming increasingly standardized across the U.S. with the proliferation of programs supported by organizations such as the College Board. The College Board, founded in 1900, was created "to expand access to higher education" (College Board, 2015a, para. 2). It has slowly built a repertoire of challenging and advanced courses between its inception and the middle of the 20th century. Still, the notion of college readiness was not something heavily examined until much later in the 20th century.

Adelman (1998, 1999) was a key scholar who worked to examine college readiness quantitatively by looking at college remediation, retention, and graduation rates before, during, and after the time he was employed by the U.S. Department of Education (DOE). His stated goal was to determine what factors effected successful two-year and four-year graduation rates within a period of ten years from the time students had graduated from high school. Adelman (1998) relied on data from the National Center for Education Statistics (NCES) which had followed the national graduating class of 1982 through 1993 to evaluate remediation, retention, and graduation rates. The results can be seen in Table 2.

Table 2.

Remediation and college graduation rates by age 30 for the high school class of 1982

Number of Remedial Courses	Earned Bachelor's	Earned Associates	Total Percentage
No remedial courses	54%	6%	60%
One remedial course	45%	10%	55%
Two remedial courses	31%	14%	45%
Three or four remedial courses	24%	20%	44%
Five or more remedial courses	18%	17%	35%

Note: Adapted from *The kiss of death? An alternative view of college remediation*, by Adelman, 1998, from information collected by the NCES <http://www.highereducation.org/crosstalk/ct0798/voices0798-adelman.shtml>

Adelman (1998) took these results and cross-referenced them with the self-reported information from the same students regarding their high school academic history including course selection, GPA, class rank, and college readiness test score. Adelman began to argue that high school curriculum, above all else, was the best indicator of college readiness based on the remediation, retention, and graduation rates of college students. Adelman (1998) claimed “the nature of students’ high school curriculum (not grades or class rank, not test scores) is the best advanced warning sign” to determine if a student is not on track for college readiness (para. 15).

Adelman (1999) followed up his previous report with the *Answers in the Toolbox* study. In this report, Adelman (1999) continued the work of analyzing the rigor of high school student coursework using additional data from the U.S. Department of Education (DOE). He determined that course level and rigor (including AP course enrollment) had a statistically significant correlation with college graduation. Between the two studies,

Adelman (1998, 1999) asserted that not only does a challenging high school curriculum position students for rigorous collegiate coursework, but also leads to a higher postsecondary graduation rate.

In the late 20th and early 21st centuries, scholars began to combine the quantitative analysis of college readiness started by Adelman, and evaluate what additional factors and indicators schools could use to determine college readiness. Among the leading scholars in this movement was David Conley. Conley (2007a) explained that college readiness in the modern context includes four key concepts: content knowledge, core academic skills, non-cognitive skills, and college knowledge. Conley (2007a) developed this deeper explanation of college readiness including both qualitative and quantitative characteristics and eventually to hard knowledge, grit, and affective characteristics of students. Conley (2007a) found that there are currently no traditional measures of college readiness assessing all four of these key concepts. More affective characteristics, such as these non-cognitive skills and knowledge of how to access college and how to pay for college, are being examined and added to the profile of what it means to meet college readiness standards. The same affective characteristics could be applied to students at different grade levels regarding their readiness for the next grade or school throughout the system.

Conley (2007b) asserted that colleges need to consider alternate ways to measure college readiness. For content knowledge, he claimed that effectively written end-of-course exams were a better way to measure knowledge than aptitude tests. Conley (2007b) argued that the “advantage of these tests is that they can be carefully geared to identify standards and expectations for what will be taught in the college course” (p. 17).

Conley (2007b) was not advocating for using state-developed end of course tests; instead he claimed these content-knowledge tests already exist in the form of AP and IB exams. Conley (2007b) claimed that allowing access to rigorous courses with a prescribed national/international curriculum and encouraging students to sit for challenging and meaningful exams was the best way to measure content area knowledge. Conley's argument about assessing the content knowledge required to determine college readiness is no different than what Adelman (1998) had argued earlier in the college readiness movement.

Other scholars have examined the curricular aspect of college readiness from a different perspective. Kirst and Venezia (2008) examined the disconnect existing between K-12 institutions and postsecondary expectations as little collaboration exists between K-12 and post-secondary schools to bridge standards. "The coursework between high school and college is not connected; students graduate from high school under one set of standards and, three months later, are required to meet a while new set" (Kirst & Venezia, 2008, p 3). Much of this problem exists because of the separate historical development of the two institutions, and the current existence of two different organizations at both the state and federal level for K-12 and higher education. For this reason, Kirst and Venezia (2008) claim there are 51 different K-12 and 51 different higher educational departments considering all states and the federal government.

Many of the elements of the definition of college readiness have been synthesized by those who have developed college readiness measurements. ACT[®] (2005b, 2007b, 2011) also defined college readiness and determining college readiness standards as

measured by the ACT[®] test. In the 2011 report *A First Look at the Common Core and College and Career Readiness ACT[®]* stated:

ACT[®] has long defined college and career readiness as the acquisition of the knowledge and skills a student needs to enroll and succeed in credit-bearing, first-year courses at a postsecondary institution (such as a two-or four- year college, trade school, or technical school) without the need for remediation. (p. 1)

The ACT[®] definition was similar to the Conley definition in that both were tied to performance standards in post-secondary school.

In 2005 ACT[®] provided one of the first in-depth reports identifying a primary concern that too many first and second year college students were dropping out, and those students who were directly entering the workforce lacked the skills necessary for success. Relying on extensive research (Adelman, 1998; Adelman, 1999; Hallinan, 2002; Ziomek & Harmston, 2004), ACT[®] argued that the same rigorous curriculum was needed for high school students who either plan to attend college, or who plan to go directly into the work force. It was discovered much of the problem was only 58% of females and 54% of males were taking the full allotment of the ACT[®] core or more prescribed courses (ACT[®], 2005b, p. 10). This information was gathered through the curriculum that students self-reported when they filled out their registration information before taking the ACT[®].

In the *Crisis at the Core* report, ACT[®] (2005b) argued all students can meet the challenge of taking difficult courses. “Assigning students higher-level mathematics coursework improved student performance regardless of their level of prior achievement... and the lowest achievers made the most dramatic progress moving from

the 27th to the 51st percentile” (pp. 23-24). The ACT[®] (2005b) report goes on to explain the fundamental factors in closing this gap are student ability and access, providing a common focus, high expectations for all students, encouraging a rigorous curriculum, student guidance, and measured progress. These best practices need long-term implementation to begin closing the readiness gap, and in turn, increasing students’ ACT[®] scores and readiness level for college and career.

In an ACT[®] (2007b) follow-up report, the organization determined that the traditional core curriculum today (four English courses, and three each of the other core classes) does not adequately prepare high school students for the academic rigors of being a first-year college student. This argument is built on the required remediation needed for students who did not take a challenging enough curricula while in secondary school. Remedial college courses are not only a financial burden on students and families, but also required students spend time in classes that do not count toward a degree. The ACT[®] (2007b) report supported the early work Adelman (1998) had produced regarding the twelve-year graduation rate of the national high school class of 1982.

ACT[®] (2007a) prepared a report titled *On Course for Success: A Close Look at Selected High School Courses that Prepare All Students for College and Work* that identified a common set of factors that affected student learning. These factors included the following common components: “(1) high-level college-oriented content, (2) well-qualified teachers, (3) flexible pedagogical styles, and (4) tutorial support” (ACT[®], 2007a, p. vi). The report then recommended the implementation of those common components in all high school educational environments. Overall, this report emphasized

what teachers and administrators should do to help close the achievement gap between high school and college academic expectations.

Conley (2007a) asserted that teachers, counselors, and administrators must first have a good understanding of college readiness. These adults who work directly with students in high schools can begin fostering a culture within their building that improves college readiness for all students. “The most important thing a high school can do is create a culture focused on intellectual development of all students” (Conley, 2007a, p. 20). Conley (2007a) further stated all students must have access to “challenging academic content” (p. 21). In addition to access to this content, students must be challenged to develop the skills for independent learning.

Teachers must have an understanding extending well beyond the specific content of the course they teach, and they need to emphasize how to refine the skills needed for that discipline at the collegiate level. Teachers could not do this work alone, and thus there was an even greater need for administrators to cultivate a collaborative culture across grade levels (including university professors). Conley (2007a) recognized that all teachers would not be able to participate in this intense level of professional development, but a critical mass could share what they had learned with others.

Conley (2007a) also claimed there were means of assessing any of the soft skills students need for college success. These skills included habits of mind, academic behaviors, and contextual skills. Conley (2007a) said:

The ‘holy grail’ of college readiness would be an integrated system that provided all of this information to students in a progressive, developmentally appropriate

fashion so that they had a continuous feel for how well they were being prepared and preparing themselves for college. (p. 19)

Conley (2007a) specifically referenced the “college knowledge” aspect under these broader standards. This integrated system could provide a much better predictor of the overall ability to succeed in entry-level college courses, and also to predict a student’s likelihood of remaining enrolled at the university through graduation.

Conley (2007a) argued that high school freshmen could improve their college readiness by being exposed to this broader definition of the concept, and by being guided by teachers and counselors to make effective choices that could increase their probability of college success. “They must, first and foremost, understand that college admission is a reasonable and realistic goal that can be attained through planning and diligent attention to necessary tasks” (Conley, 2007a, p. 23). General college awareness, early action, and mindset are key to improving college readiness for all students.

The Partnership for 21st Century Skills (2014) reported that “the Framework (for P21) presents a holistic view of 21st century teaching and learning that combines a discrete focus on 21st century student outcomes (a blending of specific skills, content knowledge, expertise and literacies) with innovative support systems” (P21, 2014, para. 3). The content knowledge included reading for information, writing, and mathematics; the specific skills included critical thinking, communication, collaboration, and creativity. These P21 skills related directly to findings reported by ACT[®] (2005b; 2007b) and Conley (2005b, 2007b). Additional studies (Conley, 2007a; Dweck, Walton, & Cohen, 2011; Hansen, 2014) discovered an increased importance on non-cognitive factors

including motivation, maintaining a positive attitude, and drive as equally important indicators in determining college readiness as college readiness test scores.

Roderick, Nagaoka, Coca, and Moeller (2008), and Roderick, Nagaoka, and Coca (2009), from the Consortium on Chicago School Research (CCCR), followed several cohorts of students who had graduated from the Chicago Public School (CPS) system as they matriculated into various post-secondary schools to evaluate the findings of Adelman (1998; 1999), Kirst and Venezia (2008), and Conley (2007a). The CCCR not only verified the importance of high school grades, taking a rigorous curriculum, and test scores, but also uncovered additional college readiness challenges among CPS students. These challenges included not understanding how to research college, how to apply to college, and how to access financial aid to help pay for college. Not understanding these factors leads to students making poor choices on where to actually attend. These findings reinforced what Conley (2007a) had begun uncovering with his “college knowledge” aspect of college readiness. These requirements include how to search and apply for colleges, and how high school teachers could support this process. Roderick, et al. (2008) argued that students who were not explicitly taught how to search, apply, and access financing were not college ready because they did not understand how to actually make it to the first year of college, even if they had met other readiness standards.

Curriculum Requirements to Prepare Students for College

During the late 1990’s, several studies conducted by the U.S. government determined the primary factor in determining immediate success in college and preventing remediation was the number of challenging courses students took in high school. Additional studies conducted during the first decade of the 21st century came to

the same conclusion (Andrews, 2003; Conley, 2005; Kazis, 2006). Simply labeling a course as advanced, honors, or college prep was not enough to verify a student had actually taken a course rigorous enough to be considered college-ready. Conley (2005) claimed that “the single most important factor in determining college success is the academic challenge of the course students take in high school” (p. 38). Kazis (2006) determined “the percentage of college students actually completing a two or four-year degree has not significantly increased in more than 30 years” (p. 13). Kazis (2006) continued that “the message that isn’t yet getting through to students, their parents, and their schools is that to succeed in college, you need to be academically ready to do college-level work” (p. 13). Certainly, a lack of a strong, academically challenging curriculum continues to hinder college readiness. Challenging courses, whether deemed honors, accelerated, AP, or IB, could be an important factor in preparing students for college level coursework.

One area of emphasis related to college readiness focused on mathematics courses, both in terms of rigor and number of courses completed. Haycock (2001) argued students who complete four years of challenging math courses perform much better than those students who complete fewer years, or complete vocational mathematics courses. Haycock (2001) also argued that innate math ability did not matter in terms of performance in more challenging courses. “Careful research shows the positive impact of more-rigorous coursework even on formerly low-achieving students” (Haycock, 2001, p. 8). Conley (2005) subsequently argued that in terms of mathematics curricular requirements, students must take four years of as challenging math courses as possible. Relying on information from studies conducted by the U.S. government, Conley (2005)

claimed “an interruption of math in high school can have large-scale ripple effects when a student reaches college” (p. 38).

The curricular requirements to improve college readiness in English Language Arts (ELA) and writing overlap. Conley (2005) previously outlined some specific characteristics that these ELA challenging courses demonstrate:

When students engage in a four-year sequence of language arts courses that is carefully designed around and focused on expanding their repertoire of skills to analyze literary and informational texts, they acquire more of the tools and habits of mind they will need to succeed in entry-level college courses across the discipline. (p. 39)

The key for students to improve college readiness is to take challenging courses that focus on higher-level reading and writing. One can argue reading for information, and the ability to communicate those findings, is the foundation for success in any subject area and most professions. Conley (2005) followed up his claims with this recommendation for intentional scaffolding:

Reading progressively more complex and challenging books and texts from a wide range of literary traditions and textual styles. Deep understanding of a few texts, not all of them necessarily literary, in addition to awareness of the characteristics of a wide range of publications improves the skills. (p. 39)

Before accessing challenging coursework as an upperclassman, students must be positioned to succeed in challenging coursework during middle school and the first two years of high school. Turner (2008) argued that access to challenging courses must begin early on during high school with pre-AP or pre-IB courses that students can universally

access without the traditional gatekeepers preventing their enrollment. These courses, in addition to being labeled as a variation of honors, are reading and writing intensive and aligned to universally accepted standards set by the College Board or IB.

Making the senior year count serves as a capstone experience for students to ensure college readiness. Conley (2007a) determined many students choose to take the absolute minimum courses required for graduation during their senior year. However, missing a year of instruction in mathematics, language arts, science, and/or social studies allows students who may have been on track for college readiness to regress. While AP courses can be beneficial for sophomore and junior students, offering and encouraging students to take AP courses is one potential means of making the senior year more effective for high school students.

College Board has offered AP courses since 1955 though the number and design of the courses have significantly changed over the past 60 years. DiYanni (2007) stated, “from the beginning the AP program was seen as an opportunity for well-prepared college students to demonstrate proficiency in subject areas” (p. 2). Historically, access to AP courses was reserved for the top students. DiYanni (2007) claimed that originally there was a belief within the College Board “that [new college] students should be exempt from preliminary courses and accelerated into appropriate advanced courses” (p. 2). These AP courses included an established rigorous curriculum culminating with an exam administered at the end of each school year. In addition to a rigorous curriculum within the chosen discipline, some scholars argue that AP courses help increase other aspects of what became known as college readiness. Conley (2005) argued:

AP courses that are properly taught improve students' readiness for college success rather than simply allow them to earn college credit. This creates an incentive for AP teachers to build a challenging curriculum clearly focused on the knowledge and skills necessary for college success. (p. 50)

Therefore, encouraging students to take challenging courses increases their personal rigor, provides an opportunity to earn college credit (based on their performance on the AP test), and in general provides the teacher with incentives to challenge the students even further.

In addition to AP courses offered by the College Board, IB courses also offer students a challenging curriculum to help increase college readiness. Halic (2013) claimed "the International Baccalaureate's Diploma Programme (DP) is a rigorous academic curriculum aiming to prepare students in the last two years of high school to succeed at the postsecondary level and beyond" (p. 2). Schools offering IB can either be DP-only schools, or they can be schools offering both the full DP as well as the IB certificate program (which allows students to take individual IB courses similar to AP instead of the full diploma). IB courses are also offered both at one-year Standard Level (SL) or a two-year Higher Level (HL) with different assessment expectations at the end of each course.

The impact on college readiness of both IB and AP courses has been researched. Conley, et al. (2014) conducted a study on the impact of IB that included several key questions, including "To what extent are IB/Honors students academically prepared for college?" (p. 4). The study relied on two populations of students at the University of Oregon: those who took at least four IB courses in high school, and those who did not

take any IB courses in high school. “The results indicated a statistically significant relationship between group membership (IB/Honors) and math placement scores while controlling for gender and minority status” (Conley, et. al., 2014, p. 11). They also discovered that “students’ persistence in college was dependent on IB/Honors or Non-IB/Honors group membership” (Conley, et. al., 2014, p. 12). Overall, there was a positive correlation between taking IB courses and math readiness as well as collegiate persistence, and ultimately graduation. These challenging academic course not only supported core academic skills, but also the non-cognitive skills such as motivation and grit.

Studies have also been conducted on the effectiveness of AP courses in improving college readiness. Sadler and Tai (2007) examined the impact of AP course enrollment as a predictor of college success, specifically in the sciences. Sadler and Tai (2007) conducted a survey of 18,000 college students who took at least one AP science courses during the 2004-2005 school year and also had completed at least one college-level science course. Sadler and Tai (2007) discovered students who scored well on AP exams “consistently reported higher grades, in-discipline science grades for regular or honors courses, and grades in other science courses” (p.7). They also reported “students in our sample who chose not to take the AP exam, even after taking the AP course, reported academic performance measures similar to the students” who scored a 3 on the AP exam (Sadler & Tai, 2007, p. 8). They were unable to determine any substantial effect on AP students who scored poorly on the AP exam, considering many students who enroll in AP had previously completed an honors course in science. Sadler and Tai (2007) argued that this finding conflicted with the “belief espoused by many that it is always better to take a

more rigorous course and earn a low grade than an easier course and earn a high grade” (p. 13). Sadler and Tai’s (2007) findings demonstrated that AP science course helped improve academic and non-cognitive skill development.

Stoker (2010) studied several urban Chicago area high schools to determine the effect AP courses had on student performance on standardized tests, college readiness, and eventually postsecondary graduation rates. The primary focus was the effects AP classes had on minority and lower socio-economic status (SES) students. The key question guiding the research was whether urban high school students completing AP courses improved test scores and ultimately college success. Stoker used data from the graduating classes of 2006 – 2007, 2007 – 2008, and 2008 – 2009 from the Chicago Public Schools for the study. The results of the study were that AP participation had a direct positive effect on ACT[®] composite scores for minority and lower SES students, as well as an increase in four-year college enrollment and university retention. Additionally, Stoker (2010) found that AP participation in any subject had the largest effect on increasing student performance on the ACT[®] Science section scores.

Lesser (2010) investigated whether AP courses were an effective means of improving student performance on the SAT exam and end of course exams in New York. Lesser (2010) examined the performance of over 5,100 high school graduates of 2007 – 2008 and 2008 – 2009 in New York and compared them with graduating seniors from surrounding states. The primary research question was whether states that mandated high stakes testing experienced increased enrollment in AP courses and increased performance on the SAT test. The study also examined the relationship among all AP courses and SAT sub-scores. Finally, Lesser (2010) examined the performance of low SES and

students with disabilities. The overall finding was states that maintained high-stakes end-of-course testing did not outperform states with no such mandates when correlated with performance on AP exams. Lesser did find that states with mandated high-stakes testing had a 4% higher participation rate in AP courses taken. Lesser (2010) also suggested state policies should be shifted from mandating high-stakes end-of-course testing of students to districts ensuring the delivery of a high-quality, challenging, and viable curriculum such as AP.

Warne, Larsen, Anderson, and Odasso (2015) evaluated the impact of participation in AP English and AP math courses on college readiness assessment tests using data from all 90,044 high school graduates over a period of the 2009 – 2010 and 2010 – 2011 school years in the state of Utah. Warne, Larsen, Anderson, and Odasso (2015) discovered “students who take and pass the AP exam obtain higher ACT[®] scores, even after controlling for a wide variety of academic, socioeconomic, and demographic variables” (p. 400). More specifically, Warne, et. al. (2015) determined that for students who sat for the respective AP tests:

The impact is not slight: for AP English the marginal mean outcome value was about 2.8 – 4.1 points for the ACT[®] composite scores; for AP calculus, the impact was about 1 – 2.7 points for ACT[®] composite scores. (p. 413)

For the two cohort groups in Utah, however, students who did not sit for the test did not experience the same improvement. They discovered students who did not sit for the test experienced gains of “less than one raw score point” and that “merely enrolling in an AP course is not very beneficial for students” (Warne, Larsen, Anderson, & Odasso, 2015, p.

413). This study concurred with the findings of other analysis of AP student performance conducted by Dougherty and Moeller (2010).

It is significant to note that Warne, et. al. (2015) conclude the discussion portion of their analysis by acknowledging:

We are still unable to say that participation in the AP program caused students to have higher ACT[®] scores. Such conclusions can only be drawn from true experiments in which students are randomly assigned to AP courses. (p. 413)

Addressing this issue would be extremely difficult, as Warne, et. al. (2015) indicate they were unable to find any district or school that did any random assignments into AP courses, as students are generally either recommended or self-select AP course enrollment.

Despite many of the positive findings regarding the AP and IB programs in terms of increasing college readiness, some studies have drawn different conclusions. The National Research Council (NRC) conducted a study in 2002 on the effects of AP science and AP math courses impacting college readiness. According to the NRC (2002), “While the College Board and a few colleges that receive IB students have conducted some isolated studies that examine how AP or IB students perform in college, the inferences that can accurately be drawn from the findings of these studies are ambiguous” (p. 2). Geiser and Santelices (2004) conducted research examining 81,455 students who entered the University of California system between 1998 and 2004 who had taken AP courses in high school. They determined using a regression analysis that while taking AP courses really contributed nothing to college performance as measured by GPA, scores on the AP exam were among the best predictors of college performance as measured by GPA.

Warne, et. al. (2015) also discovered AP students who sat for an AP test had a higher GPA in first-year college classes, while AP students who did not sit for an AP test actually had a lower GPA during their first-year college courses. This conflicts with the Geiser and Santelices (2004) findings that there is no significant difference in first-year college GPA after accounting for SES and academic variables.

There are some additional criticisms of the AP Program. Conley (2014) synthesized some of these issues. First, AP courses do not necessarily align to a district's sequence of courses required for graduation. Because individual states and school districts set their own graduation requirements, as well as scope and sequence of courses, some districts have students who do not have the curricular background for AP courses. Simply substituting an AP course for a senior year course in a discipline does not ensure a student will be successfully prepared for college courses. Additionally, there is virtually no link among AP courses. Unlike IB with the Diploma Programme (DP), there is no expectation for collaboration among AP teachers regarding instruction, content, or assessments. While they are all individually rigorous, there is no cohesion among them. A system or structure must be in place in advance of the senior year to help support student academic growth.

Lack of access to AP courses is a drawback in many U.S. high schools. Not all students can access AP courses, and the level of access varied from building-to-building and district-to-district (Lesser, 2010; Roderick, et. al., 2009; Stoker, 2010). This problem is partially because of the cost of administering assessments (which is often the responsibility of students and their families), and partially because some individual course syllabi developed by classroom teachers do not meet the College Boards standards

for approval. Therefore, these courses could not be officially labeled AP on a high school transcript. Schools where AP courses are only available through teacher recommendations or grades in previous courses also restrict academic growth and college readiness. These gatekeepers are generally designed to prevent struggling students from accessing AP (or IB) courses and are often championed by teachers who want to restrict access.

ACT[®] has also been one of the leading research organizations working to provide suggestions to improve college readiness through curriculum evaluation and improvement. ACT[®] (2005b) determined that upper level science (such as chemistry, physics, and biology) and upper level mathematics courses (beyond algebra II) “have a startling effect on student performance and college readiness” (p. i). This was determined through the examination of historical ACT[®] performance data over a ten-year period relying on the self-reported information that students provided when they registered for the ACT[®] test. ACT[®] (2005b) referred to these courses as “Courses for Success” and recommended all students take them no matter what college or career path they were following (p. i).

College Readiness Measurements

The oldest measurements of college readiness were a student’s high school GPA, class rank, and transcript. However, because expectations and course outcomes vary by district, this did not provide an equitable measure to determine if a student was college ready. Geiser (2008) claimed that “admissions criteria that tap mastery of curriculum content, such as high-school grades and achievement tests, are more valid indicators of how students are likely to perform in college” (p. 2).

Some states, such as New York, developed a combined index systems used for evaluating districts, awarding state-determined College Preparatory certification, and helping state universities determine if a student is ready for college-level coursework. The New York City Department of Education (NYC DOE) (2013) developed a metric that included a combination of college readiness factors. More specifically, the NYC DOE (2013) used results from the state Regents test of a 65 or above; passing and scoring four or above on any IB test; passing and scoring three or above on any AP exam; earning a grade of a C or better in any dual credit course; or earning a diploma with an art, technical, or CTE endorsement as factors indicating college readiness. NYC uses this metric, including the results from tests, to help determine the college readiness of its high school graduates.

The John W. Gardner Center for Youth and Their Communities at Stanford University (JWGCRYC) (2014) promotes a “menu of college readiness indicators and supports” to provide guidance to post-secondary institutions in making college readiness decisions of applications. The JWGCRYC (2014) encouraged measuring college readiness in terms of three areas that are similar to Conley’s (2007b) claims. These areas of measurement are academic preparedness, academic tenacity, and college knowledge. To evaluate these readiness areas, the JWGCRYC (2014) recommends relying on a combination of factors including the traditional GPA, ACT/SAT scores, and curricular rigor. However, the JWGCRYC (2014) also encourage examining student performance in transition years (such as the first year of middle school and first year of high school), ensuring all cores classes have a passing grade, student attendance, discipline record, and individual study skills combined to determine college readiness.

The traditional problems associated with relying on high school student's GPA, and the high school transcript were addressed differently for state universities in California. As reported by Fensterwald (2015), the California State University's Early Assessment Program was developed to inform high school juniors if they were prepared for college, and also what action steps they should take if they were not ready. These action steps included "taking a special writing class or other challenging English and math course[s] in order to avoid spending hundreds of dollars on remedial courses as college freshmen" (Fensterwald, 2015, para. 5). California sought to close the college readiness gap by encouraging remediation for high school juniors that they could complete before high school graduation.

Despite the success experienced by some states in improving student achievement and identifying students who were not college ready through their individual assessments, most states still have not internally developed appropriate readiness measures. According to Kirst and Venezia (2008), "state high school exit exams typically send students the message that 10th grade or lower skills comprise an adequate preparation for college" (p. 2). Additionally, the wide range of variance of existing state assessments does not provide an adequate and consistent foundation for colleges to determine readiness related to academic knowledge.

Student performance on college readiness assessments continues to serve as a primary factor in determining college admissions. Alexander, Pallas, and Holupka (1987) were among the first to examine the correlation between college readiness test scores and college enrollment. They determined this relationship increased when comparing the graduating classes of 1972 and 1980, even when controlling for the other

academic or SES differences. This relationship has been replicated repeatedly (King, 1996; Perna, 2000; St. John, 1991) with similar results.

The ACT[®] and the SAT have served as primary assessments to determine college readiness since the middle of the 20th century (Amos, 2014). Approximately 57% of high school graduates in the 2013 – 2014 school year took the ACT[®] to assess college readiness (Amos, 2014). The states in the Midwest and upper Midwest including Illinois, Iowa, Kansas, Missouri, Minnesota, and Michigan report even higher percentages of graduates complete the ACT[®] assessment, as opposed to the SAT assessment (Amos, 2014). Some states, including Illinois, Kentucky, Missouri, South Carolina, and Wisconsin have recently moved to testing all second semester juniors in their states to better assess college readiness. According to Harris (2015), states such as Connecticut and New York, where the SAT is the primary college readiness test, have also worked to increase student access to the test. In Connecticut, the SAT replaced several other tests students previously took at the end of courses. Beginning with the 2018 high school graduating class in New York City, all juniors will have the option to take the SAT during the regular school day at no cost. “Education officials said that by removing barriers to entry – like the required fee and the very act of signing up – the hope is that students who might not otherwise have taken the test will do so” (Harris, 2015, para. two). With this increasing importance placed on college readiness assessments throughout the late 20th and early 21st centuries, an examination of the development of the assessments is necessary.

Development of Assessments that Measure College Readiness

The first college readiness assessment was developed by the organization that eventually became the College Board. This first test was developed as an achievement test and administered in 1901 (College Board, 2014c, para. 1). This exam was created to assess whether students were ready for the expectations of college, as well as to provide an exam that students could take in one sitting. Many schools, especially Harvard, were unhappy this initial assessment was not considered an intelligence test, and instead a measure of the quality of the school the student attended. While these “older ‘College Boards’ had tested knowledge of college-preparatory subjects, the ‘Scholastic Achievement Test,’ (SAT) introduced in 1926, purported to measure a student’s capacity for learning” (Geiser, 2008, p. 1). The new SAT introduced in 1926 was an aptitude test. In 1938, Harvard president James Bryant Conant convinced the members of the College Board to use the SAT for scholarship determination. During World War II, the SAT essentially replaced all other existing college entrance exams because of its low cost and widespread acceptance. The U.S. Army and the U.S. Navy also used the SAT test during the war as a means of determining intelligence for specialized operations (Frontline PBS, 2014). The SAT served as the standardized college admissions test through the 1950s in the U.S. Though there were changes in the organization and structure of the SAT, it essentially remained an aptitude test until it underwent significant changes to prepare for the March 2016 administration, when it was redesigned as an achievement test (College Board, 2015b).

Between 1940 and 1969, high school enrollment increased 103%, and college enrollment increased 433% in the U.S. (ACT[®], 2009a, p. 5). This sharp increase in

college applications and enrollment necessitated the need for a different type of exam than could be provided by the College Board. Universities wanted to maintain the academic integrity of their institutions while also ensuring individual students matched their school's program offerings (ACT[®], 2009a). At that time, the College Board's SAT exam was the primary standardized test taken by high school students who wanted to attend college. The SAT test "had more to do with exclusion than admissions" (ACT[®], 2009a, p. 8). The SAT test also included several essay prompts assessing specific disciplines. Marking of the essays was subjective, and this issue reinforced the contention that the exam was designed for exclusion (ACT[®], 2009a).

In 1956, Professor Lindquist from the University of Iowa developed the ACT[®] as an alternative to the College Board's aptitude SAT in 1959 (Atkinson & Geiser, 2009). Lindquist and his colleagues struggled to deal with the rapidly increasing number of students who graduated from high school and were applying for college, and they "regarded the SAT as an entrance exam designed primarily for elite universities in the Northeast" (Atkinson & Geiser, 2009, p. 86). Lindquist "after establishing numerous testing programs within the state of Iowa as well as the Armed Forces tests of General Educational Development (GED)... developed the national stature, research base, and organizational structure necessary to found a new admissions tests" (Saluri, 2012, p. 28). Lindquist developed the ACT[®] that differed from the SAT as it assessed "practical knowledge rather than cognitive reasoning" to allow "institutions to improve student success" (ACT[®], 2014d, para. 1). The earliest form of the ACT[®] had four sections, including English, mathematics, social sciences reading, and natural science reading.

Lindquist's test differed from the SAT in that the ACT[®] assessed "practical knowledge rather than cognitive reasoning" (ACT[®], 2014d, para. 1). The ACT[®] was designed to aid post-secondary schools identifying candidates for admissions who may have been overlooked when the SAT was the only college entrance exam. Lindquist wanted universities to have access to additional information about prospective students in order to make better decisions regarding college admissions (FitzGerald, 2014).

Lindquist launched the Standard Research Service in 1961 "for constructive use and interpretation of the data reported" (ACT[®], 2009a, p. 18). Initially, this service focused on extensive packages of information for universities regarding student performance. The Standard Research Service eventually began using its vast amounts of data to research and provide recommendations for high schools to help ease the transition to college. As early as 1962, ACT[®] began research initiatives related to minority student performance and the community college movement (ACT[®], 2009a). Through the introduction of these research initiatives and multiple assessments, the mission of the ACT[®] Corporation eventually evolved to help all people achieve education and workplace success. The vision was to ensure lifelong success for individuals (FitzGerald, 2014).

In 1985, ACT[®] developed a 'pre-ACT[®]' assessment that eventually became the PLAN[®] test. ACT[®] (2009a) indicated the first administration of the P-ACT+ was in October 1987. The P-ACT+, renamed the PLAN[®] in 1992, included a student interest inventory, a survey of student's educational background, and a four-section assessment mirroring the four sections of the ACT[®]. "ACT[®] offers the PLAN program as a way for tenth-grade students to review their progress toward college readiness while there is still

time to make necessary interventions” (ACT[®], 2009b, p. 1). Additionally, the PLAN[®] test has been correlated with student performance on various AP tests, and was eventually used by many schools and districts to help make student course recommendations. The PLAN[®] test remained in prominent usage to determine if students were on track to meet college readiness standards until ACT[®] retired it from mainstream administration in 2013 and introduced a new series of assessments.

Daugherty (2010) examined which data pieces are most helpful in identifying students who are not on track to meet college readiness standards as early as their freshman or sophomore years in high school. The PLAN[®] test was one of the major assessments. “In earlier years, when students entered high school with low levels of academic preparation, most educators did not attempt to make those students college ready. Instead, they were assumed to be unsuitable for challenging academic work” (Daugherty, 2010, p. 2). Educators and counselors now work to identify these students early during high school, and the PLAN[®] test is one assessment used to predict college readiness based on the current coursework a student is on track to take. Since benchmark scores and linkage reports are available for the PLAN[®] and the ACT[®] tests, college-readiness benchmarks have been determined for students in the ninth and tenth grades (Daugherty, 2010, p. 3). The benchmarked results from the PLAN[®] test include a predicted ACT[®] score assuming students continue on the same educational path. ACT[®] qualified this prediction indicating improving study habits and taking challenging courses should improve the actual ACT[®] score (ACT[®], 2007c, p. 3). Table 3 presents the benchmark scores for both the PLAN[®] test and the ACT[®] test, and these benchmarks

indicate if a student is on track to meet the college readiness standards by the time the student graduates from high school.

Table 3.

ACT[®] College Readiness Benchmarks

College Course	ACT [®] Test	PLAN [®] Score	ACT [®] Score
English/Composition	English	15	18
College Algebra	Mathematics	19	22
Social Sciences	Reading	17	21
Biology	Science	21	24
	Composite	18	21

Note: Adapted from What are the ACT's college readiness benchmarks? by ACT[®], 2014
<http://www.ACT.org/research/policymakers/pdf/benchmarks.pdf>

The ACT[®] test has been continually revised and refined based on results of first regional, and later national, curriculum surveys of states and school districts. According to ACT[®] (2013c), they conduct a National Curriculum Survey[®] every three to five years to gather information from “educators about what they teach (or don’t teach) in their courses and how important they feel various topics in their discipline are for students to know and be successful in these courses and future coursework” (p. 1). Atkinson and Geiser (2009) determined the most significant revision to the ACT[®] as a result of these surveys was in 1989 when the test dropped the social sciences reading test in place of a general reading test; at that time, ACT[®] also eliminated the science reading test in favor of a science reasoning test.

While the National Curriculum Survey[®] (ACT, 2013c) was previously given to both high school and postsecondary teachers, the most recent survey in 2012 included information gathered from teachers beginning in elementary school. A total of 9,937 participants responded to the survey, including 4,135 collegiate teachers, 2,943 high school teachers, and 2,858 combined elementary and middle school teachers. Among the ACT[®] (2013c) findings was the following:

A large gap still exists between how high school teachers perceive the college readiness of high school graduates and how college instructors perceive the readiness of their incoming first-year students. This suggests a continuing lack of curricular alignment between the K-12 and postsecondary educational systems.

(p. 4)

The existence of such a gap in expectations leads to a readiness gap in the U.S., despite the previously discussed state and federal government programs intended to improve college readiness.

In 2000, ACT[®] established the Policy Research Program to begin providing targeted recommendations regarding diversity issues, college retention, and the relationship between high school courses taken and performance on standardized tests (ACT[®], 2009a, p. 122). This program included a series of policy papers written for audiences in secondary education, post-secondary education, state governments, and the federal government. In 2012, the ACT[®] surpassed the SAT as the college readiness assessment most frequently taken. The reason for this is the content of the ACT[®] was better tied to specific disciplines, as compared with the aptitude, linguistic, and skill-based SAT test (Strauss, 2012).

Geiser (2008) argued that the ACT[®] was a more effective measure of college readiness than the SAT. The ACT[®] test “content is based on periodic national curriculum surveys as well as review of standards of K-12 instruction” (Geiser, 2008, p. 6). Geiser (2008) emphasized the ACT[®] is an achievement test, instead of an aptitude test, and thus is a better measure of student current ability to succeed in college. Geiser (2008) also claimed “the ACT[®] appears less coachable than the SAT, and the consensus of students who have taken both tests is that the ACT places less of a premium on test-taking skills and more on content mastery” (p. 6). Finally, the ACT[®] offered a diagnostic series to determine if students were on track to meet college readiness standards as early as in eighth grade. However, Geiser (2008) determined that the ACT[®] still falls short of being the comprehensive readiness assessment since there is a lack of a national curriculum in the U.S. This ACT[®] diagnostic series, previously known as EPAS (EXPLORE[®], PLAN[®], ACT[®] series), was replaced during the 2014 – 2015 school year with the implementation of the series ASPIRE assessments provided by ACT[®] that serve as a series summative assessments measuring college readiness (ACT[®], 2015d).

Conley (2005) claimed, “ACT[®] offers a unique sequence of tests to help students gauge their college readiness and general academic skill” (p. 55). The results from the three ACT[®] assessments, EXPLORE[®], PLAN[®], and ACT[®], allowed students and schools to identify deficient skills and provide appropriate interventions to increase college readiness based on benchmarks. The ACT[®] has benchmark scores indicated for each of the sections of their college admissions test that they have proven effective at assessing college readiness. The benchmark scores were modified in 2013. ACT[®] determined that to have a 75% chance to earn a C or higher in a credit-bearing college course, and a 50%

chance to earn a B or higher, students needed to earn an 18 on the English test, a 22 on the mathematics test, a 22 on the reading test, a 23 on the science reasoning test, and an overall composite score of 21 (Fitzgerald, 2014). These findings are based on meta-analysis of readiness reports provided by colleges and universities in the U.S. that are issued to high schools, ACT[®], and the College Board on an annual basis.

The JWGCYC (2014) claimed that ACT[®] and SAT scores are the primary college readiness indicator to determine “key cognitive strategies necessary to succeed in college-level courses” (p. 5). However, instead of examining the admissions test as a stand-alone score, the JWGCYC (2014) recommends a comparison of the ACT[®] and SAT score with high school records in courses that include “benchmarks that ACT[®] and others have already developed across content areas” (p. 6). Additionally, students reporting preparation for the ACT[®] and SAT, and completing either of the assessments, is an indicator demonstrating one component of the college knowledge aspect of college readiness.

Conley (2015) cautions of relying on one indicator in determining college readiness, but indicates that results from standardized college readiness tests will continue to be used “for the foreseeable future” (para. 13). Despite this current situation, Conley works with the New Tech Network (NTN) and has been piloting project based learning college readiness assessments (CRAs) in “more than 175 elementary, middle, and high schools” nationwide to improve college readiness evaluation (Conley, 2015, para. 2). The CRAs being used in these schools relies on students to demonstrate what critical thinking skills look like, to “collaborate effectively, to speak and listen effectively, and to take ownership of and control over their own learning” (para. 7).

Conley (2015) contends that in these schools, “teachers now have far more information on the readiness of their students for college-level work” (para. 5). Conley (2015) claimed:

We should be careful what we wish for if we think these assessments are a panacea that will solve all our testing problems. But if we use these complex measures as an additional source of insight into college readiness. And as a way to reshape instruction, they may be able to support transformation in teaching and learning and improve postsecondary success for more students (para. 13)

Conley asserts that this form of instruction, and these forms of assessments, could be an additional means of measuring other college readiness factors beyond academic knowledge.

States in the Midwest have been moving to using the ACT[®] to assess all students as a part of the state-directed school evaluation process in addition to it serving as a college-readiness assessment (Fitzgerald, 2014; Steeley, 2014; Strauss 2012). The first state to implement full population testing was Illinois. When Illinois implemented statewide ACT[®] testing during the 2001-2002 school year, the average composite score for the state dropped from 21.6 to a 20.1. For the first five years of this census testing in Illinois, the state composite score improved based off item analysis and curriculum assessment (Fitzgerald, 2014). For the graduating class of 2002, 18% of Illinois students who had not planned to attend college at the time of testing did enroll in college (Fitzgerald, 2014). Between 2002 and 2007, the percent of students attending college increased an additional two percentage points per year (Fitzgerald, 2014). Fitzgerald (2014) argued that in effect, universal testing leveled the field for all students to access

information about college readiness and access to college overall since universal testing removed gatekeepers from testing access. Therefore, more students overall had the opportunity for college acceptance, for scholarship money, and ultimately for attending college.

While presenting at the annual ACT state conference in Missouri, Fitzgerald (2014) argued that while the composite scores for schools, districts, and the states of Colorado, Illinois, Kentucky, Michigan, and Wyoming went down overall when they moved to compulsory universal testing, a higher number of students who previously may not have tested discovered that they met the college-readiness standards. Additionally, this increased the number of males, minority, lower-SES, and first-generation college students who enrolled in either 2-year or 4-year schools (Fitzgerald, 2014). During the 2014 – 2015 school year, the state of Missouri began requiring all high school juniors to take the ACT[®]. This was a significant change from the previous decade. Between 2005 and 2013 approximately 70% of high school graduates in Missouri took the ACT[®] (Fitzgerald, 2014). The high school graduating class of 2016 will be the first to have nearly 100% of students tested.

Improving College Readiness Test Scores

After 20 years of improving upon the college admissions test and building a research base, ACT[®] and the nation were awakened by the startling findings of *A Nation at Risk* when it was published in 1983. The report, developed by The National Commission on Excellence in Education, claimed that U.S. schools were not adequately preparing students for college as determined by assessments. Several recommendations were proposed to rectify this issue, including an increase in graduation requirements for

core classes, and that post-secondary institutions increase their minimum requirements for college admission.

According to Conley (2005), nonprofit organizations such as the College Board, ACT[®], and IB provide both college readiness testing as well as programs designed to bridge the gap between high school and college. ACT[®] (2007b) made several recommendations in the *Rigor at Risk* report, including that “much of the loss of momentum appears to be occurring during the last two years of high school” (ACT[®], 2007b, p. 13). This is a societal issue, as many incoming high school seniors believe they should be allowed to relax or enjoy their senior year, and not take challenging courses (ACT[®], 2007b). The *Rigor at Risk* report, published by ACT[®] (2007b) also identified several misalignments existing in the public school system. First, diploma requirements often do not specify core courses. Next, there was little alignment between secondary and postsecondary educators’ expectations. ACT[®] (2007b) determined that generally speaking, state standards do not define essential course-level outcomes for high school courses. Overall, students lacked skills ready for success beyond high school. Finally, ACT[®] (2007b) argued that highly qualified teachers are not being assigned to high school students who need them most. The last section of the report analyzed the differences between students who took more rigorous courses and those who took the general curriculum as evaluated by the ACT[®] test. ACT[®] (2007b) determined that on average, for students who took more rigorous courses there was a difference of 2 points on a student’s section score in that subject and a much higher percentage of those students qualified as meeting the benchmark section and composite scores for college readiness.

Rost (2012) conducted a study of approximately 300 high school seniors in suburban St. Louis, Missouri at Hancock High School between 2009 and 2011. The primary research question of the study was to determine the best methods to improve college readiness as measured by ACT[®] scores for both school evaluation and student performance. The secondary questions focused on the refinement of these strategies. This mixed methods research relied on ACT[®] performance data, a survey developed by the researcher, and interviews with students and parents. The goal was to determine the most effective steps teachers and administrators could take to improve student college readiness. The data collected was then triangulated to determine results. Over the course of the study, the number of students who chose to test increased as the school board decided to pay for one ACT[®] test for each student. The composite score for the school did not increase over the three-year period (Rost, 2012). Based on the results of the study, Rost recommended long-term test taking practices, strategies, and ACT[®]-style questions be implemented into all courses in the school. Rost (2012) recommended high school curriculum be revised to ensure that the delivered curriculum is aligned with ACT[®] standards, and further argued that students should be assessed on a practice ACT[®] reading test quarterly beginning during the freshman year.

While developing recommendations for the U.S. DOE, Kirst and Venezia (2008) provided suggestions to improve college readiness test scores. First, they recommended state high schools and colleges needed to align their curricular requirements and method of assessment of students. “The quality and level of the coursework and instruction, and their degree of alignment with postsecondary expectations, are the key elements of effective reform” (Kirst & Venezia, 2008, p. 4). Kirst and Venezia (2008) also suggested

that while the high school exit standards and collegiate entrance standards needed to be the same, there must also be different paths for students to take that would “lead toward the development of the same set of knowledge and skills. This change would send a crucial signal about college readiness to all students and particularly to students whose parents did not attend college” (Kirst & Venezia, 2008, p. 5). An additional recommendation was that readiness assessments need to take into account the expectations from both K-12 and postsecondary schools, and they especially emphasized the previously discussed California State University’s Early Assessment Program. Kirst and Venezia (2008) suggested action to “ensure that students do not waste their final year in high school” (p. 5).

Kazis (2006) also argued that the divide between the K-12 and higher educational systems needs closing to improve college readiness for all students. Kazis (2006) claimed:

The disconnects between these systems – with their distinct and discontinuous academic standard, financing, accountability mechanisms, information management, and governance – create significant obstacles to successful transitions through college, particularly for students with little or no family experience with college-going. (p. 13)

This gap between the systems is not only in the academic or curricular skills, but also in access and support. Kazis (2006) claimed some states and foundations are working to close the gap by considering their educational systems as K-16 and also by allowing early access to college courses for students at a younger age. Kazis (2006) reported that Jobs for the Future, with support from the Bill & Melinda Gates Foundation, has found “one

way to jumpstart policy discussion about improving alignment is to simulate the creation of more, and more varied, quality learning environments that combine secondary and postsecondary learning” (p. 14).

Annually, families spend a tremendous amount of time and money on short-term attempts to improve college readiness test scores with few overall gains. Even ACT[®] (2005c) and College Board (2014b) argue that short term test preparation is not as impactful as many students and parents believe it is. “Increases in ACT[®] Composite score associated with high school coursework are substantially larger than those associated with these short-term test preparation activities, regardless of the type of activity” (p. 1). The ACT[®] (2005c) report indicates the a one to two-point gain may be earned from the short-term preparation while gains upward of five to six points can be gain from long-term challenging course selection. According to the National Association for College Admissions Counseling (NACAC) (2008), “preparation for standardized admissions test in the high school classroom detracts from the most important element of a student’s college preparation – understanding core subject matter” (p. 27). The NACAC’s argument is that strong curriculum is the key to improving college readiness scores, and not short-term standardized test preparation.

Summary

Chapter two identified and reviewed relevant literature related to improving student college readiness, and it also examined means of helping students increase their college readiness-assessment performance. The first section included information about the evolution of college readiness, including an historical examination of college readiness and various definitions and the importance of college readiness in the 21st

century. While college readiness was not an initial objective of high schools in the U.S., it has become a primary goal. The second section detailed the curricular requirements research has identified as preparing students for college. Challenging courses (honors, accelerated, dual-credit, AP, or IB) are important factor in preparing students for college-level coursework. The third section included information about various measurements of college readiness. This information included a look at how various colleges and states determine college readiness, including traditional means such as a students' GPA, an examination of courses taken in high school, and various assessment results. Fourth, a history of the development of college readiness assessments, including the SAT, the ACT[®] and PLAN[®] tests was reviewed. This section included a brief history of the primary college-readiness tests used in the U.S. as well as an overview of college readiness benchmarks. The last section provided background on improving college readiness testing scores. The suggestions focused on tightening the relationship between the expectations of colleges and secondary schools. Chapter 3 provides a detailed overview of the methodology used in this study.

Chapter Three

Methods

The purpose of this quantitative quasi-experimental study was to examine the difference in college readiness, as determined by ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses. Additionally, it focused on the impact of AP course completion for struggling students who were not predicted to be on track for college readiness. Data was evaluated for both students who were predicted to be on track to meet college readiness and students who were not predicted to be on track for college readiness. Chapter three is divided in the following sections: research design; population and sample; sampling process; instrumentation, measurement, reliability and validity; data collection; data analysis and hypothesis testing; and limitations of the study.

Research Design

The design for the study was quantitative quasi-experimental. The methodology used student baseline PLAN[®] test results that included a predicted ACT[®] score, and examined the effect of student high school course completion in 0, 1, 2, or 3+ AP courses. The background variable was student PLAN[®] test results taken during sophomore year in high school, and the independent variable was the number of AP courses in which the student was enrolled and completed. The dependent variable was the highest composite ACT[®] score earned by the student.

Population and Sample

The population for this study was composed of seniors who completed four years of public high school and planned to attend a postsecondary institution. The sample for this study consisted of the students from the four high schools in North Kansas City

School District in Kansas City, Missouri, who had a reported PLAN[®] score and took the ACT[®] at least once during high school. Data from the 2012 – 2013, 2013 – 2014, and 2014 – 2015 school years was collected using ACT[®] results from the respective school years, and this included 4,029 students in the sample.

The annual *Superintendent's College Readiness Report* provided by ACT[®] for the North Kansas City School District (see Appendix A) indicated that during the 2012 - 2013 school year, 827 graduates took the ACT[®] and the district composite average was 21.2 while the Missouri state average was 21.6. For the 2013 – 2014 school year, 851 graduates took the ACT[®] and the district composite average was 21.1 while the Missouri state average was 21.8. The report for the 2014 – 2015 school year indicated 816 graduates completed the ACT[®] and the district composite average was 21.2 while the Missouri state average was 21.7.

Sampling Procedures

Lunenburg and Irby (2008) defined purposive sampling as the researcher targeting characteristics of a population to identify individuals with desired characteristics. Nonrandom purposive sampling was employed. The first established criterion for the study was students who had taken the PLAN[®] test during the fall semester of the sophomore year, and then took the ACT[®] test before graduation from high school. The second established criterion was students not predicted to be on track for college readiness by their performance on the PLAN[®] test taken during the first semester of their sophomore year of high school.

Instrumentation

The instruments used in this study were the PLAN[®] and ACT[®] tests. The PLAN[®] test was developed by ACT[®] to serve as an early opportunity to determine if students were predicted to be college ready (ACT[®], 2009b). The ACT[®] was selected because colleges and universities in the United States (that require a college-readiness test score) universally accept it as an indicator in determining college admissions (ACT[®], 2015b). Since benchmark scores and linkage reports are available for the PLAN[®] and the ACT[®] tests, college readiness benchmarks have been determined for students in the ninth and tenth grades (Daugherty, 2010, p. 3).

The PLAN[®] test includes four required multiple-choice sections assessing English, mathematics, reading, and science reasoning. The first section is the English test, and it is comprised of 30 questions students answer in 30 minutes. The English test is composed of questions focused on grammar, sentence structure and usage, and rhetorical skills (ACT[®], 2013b). The second section is mathematics test with 30 questions students complete in 30 minutes. The mathematics test assesses content from pre-algebra, algebra I, and geometry (ACT[®], 2013b). The third section is the reading test, which is comprised of three reading passages and 22 questions. Students have 20 minutes to complete this section (ACT[®], 2013b). The final section is the science reasoning test, which is focused on determining student's ability to learn science through a series of reports of experiments. This test has 30 questions, which students answer in 25 minutes (ACT[®], 2013b). Each of the sections on the PLAN[®] are scaled to a score ranging from 1 to 32; the composite score is determined by averaging the scaled scores from those four sections (ACT[®], 2013b).

The ACT[®] test also includes four required sections, and one optional writing section. The required multiple-choice sections assess English, mathematics, reading, and science reasoning. The first section is the English test, which is comprised of 75 questions students have 45 minutes to answer. The English test asks questions focused on grammar, sentence structure and usage, and rhetorical skills (ACT[®], 2011). The second section is the mathematics test with 60 questions students answer in 60 minutes. The mathematics section asks questions from pre-algebra, algebra I, geometry, algebra II, and trigonometry (ACT[®], 2011). The third section is the reading test, which includes four reading passages with 10 questions each and a total of 40 questions. Students have 35 minutes to complete the section. The four types of reading passages on the ACT[®] are the following: prose fiction, social sciences, humanities, and natural sciences (ACT[®], 2011). The final section is the science reasoning test, also containing 40 questions that must be completed in 35 minutes. The science reasoning test presents the results of seven different experiments, and the questions ask students to draw conclusions and make comparisons (ACT[®], 2011).

Each of the sections on the ACT[®] are scaled to a score ranging from 1 to 36, and a composite score is determined by averaging scaled scores from those four sections. This composite score is the college admissions score used by all colleges and universities in the U.S. (that require a college-readiness test score) as one factor to determine admission (ACT[®], 2015b). Each college and university determines its minimum admissions score, as well as scores for scholarship tiers. The national average composite score on the assessment for 2010 – 2011 and 2011 – 2012 was a 20.9, and the national average

composite score for 2012 – 2013 and 2013 – 2014 was 21.1 (ACT[®], 2013b). The national average composite score for 2014 - 2015 was 21.0 (ACT[®], 2015c).

The ACT[®] series of assessments, including the PLAN[®] test and the ACT[®] test, measure the core academic knowledge and skills necessary for success as a first-year college student (ACT[®], 2014c). These tests were “designed to determine how skillfully students solve problems, grasped implied meanings, drew inferences, evaluated ideas, and made judgments in subject-matter areas important to success in college” (ACT[®], 2014e, p. 3). The ACT[®] assessments are all content-based assessments and are not “intelligence or aptitude” tests (ACT[®], 2014e, p. 1).

Measurement. The ACT[®] is assessed on a scaled score that ranges from 1 to 36. The College Readiness Benchmarks on the ACT[®] test indicate the minimum score needed to be successful in a first-year credit-bearing collegiate course. The measure of college readiness for this study was the composite ACT[®] score, with the benchmark of 21. The benchmark standard for the ACT[®] English test is 18. For the ACT[®] mathematics test, the benchmark score is 22. For the ACT[®] reading test, the benchmark score is 22. For ACT[®] science reasoning, the benchmark score is 23. Students who meet the minimum for each of the areas end up with a score of 21.3, though ACT[®] applies standard rounding rules when reporting the composite scores to students (ACT[®], 2014e). For this study, the ACT[®] is the dependent variable.

The PLAN[®] test has similar benchmark standards to the ACT[®], though the assessment is scaled to a maximum score of 32. The College Readiness Benchmarks on the PLAN[®] test taken during students’ sophomore year in high school indicate the minimum score needed to be predicted for success in a first-year credit-bearing collegiate

course. The predicted measure of college readiness for this study was the composite PLAN[®] score, with the benchmark of 18. For the PLAN[®] English test, the benchmark score is 15. For the PLAN[®] mathematics test, the benchmark score is 18. For the PLAN[®] reading test, the benchmark score is 19. For PLAN[®] science reasoning, the benchmark score is 20. The average composite PLAN[®] score for a student on track to meet college readiness is a composite score of 18 (ACT[®], 2013b). For this study, the PLAN[®] test results provided the baseline data before examining the impact of AP course completion. Students who scored below 18 on the PLAN were predicted not to meet college readiness standards by the time they graduated from high school, and those students were labeled as “struggling”. Students scoring at or above 18 were predicted to be on track to meet college readiness standards by the time they graduated from high school.

The categorical variable used to group college readiness, as measured by composite PLAN[®] and ACT[®] scores, was the number of AP courses taken (0, 1, 2, or 3+). For this study, AP course enrollment was simply counted and categorized initially into those four categories. All College Board approved AP courses offered in the North Kansas City School District were included, and course and subject title did not matter beyond being officially labeled as AP.

Validity and reliability. The validity and reliability of both the PLAN[®] and the ACT[®] have been examined. According to ACT[®] (2014e), their rationale in producing the test is “the best way to predict success in college is to measure as directly as possible the degree to which each student has developed the academic skills and knowledge that are important for success in college” (p. 64). Therefore, “ACT tests contain a proportionally

large number of complex problem-solving exercises and few measures of narrow skills” (ACT, 2014e, p. 64). The ACT[®] is a content knowledge assessment instead of an aptitude test. ACT[®] claimed that the assessment items are examined “at least sixteen times”, and all versions of the test are checked to verify that they match the “current high school and university curricula” (ACT, 2014e, p. 64). The ACT[®] is a valid assessment to determine content-area college readiness.

ACT[®] (2014e) has provided a scaled score reliability report for the ACT[®] test administered throughout the 2011-2012 school year that examined the reliability information on the four ACT[®] section tests, the section test indicators, and the composite score over the course of all administrations during that year. According to ACT[®] (2014e), “reliability coefficients are estimates of the consistency of test scores. They typically range from zero to one, with values near one indicating greater consistency” (p. 51). Table 4 contains the correlations among the subtests of the ACT[®] from the six test administrations during the 2011-2012 school year.

Table 4.

Scale Score Reliability for the 2011-2012 ACT[®] Test Administrations

	English	Mathematics	Reading	Science
English	1.00	.74	.80	.75
Mathematics		1.00	.66	.77
Reading			1.00	.74
Science				1.00

Note: Adapted from ACT[®] *Technical Manual*, by ACT[®], 2014e, p. 63.

For each of the six test administrations, the sample included about 2,000 examinees per testing administration. The reliability coefficients are $>.70$ provides strong evidence the ACT[®] is a reliable assessment.

The PLAN[®] test serves as an effective predictive measure of ACT performance considering that all of “the tests in the ACT[®] are designed to be developmentally and conceptually linked” (ACT[®], 2014e, p. 5). ACT[®] (2007d) provided a scaled score reliability assessment for the PLAN[®] test that provided reliability information on the four PLAN[®] section tests, the section test indicators, and the composite score. The scale score reliability was provided both for the entire national sample and the students who indicated they were college-bound as of their sophomore year in high school. The college-bound sample was based on the students who self-selected that option during the interest inventory that precedes the assessment part of the PLAN[®] test. Table 5 below provides the scale score reliability for the PLAN[®] test.

Table 5.

National and College-Bound Scale Score Reliability for the PLAN[®] Test

Test	National Sample	College-Bound Sample
English	.86	.85
Mathematics	.81	.80
Reading	.80	.80
Science	.83	.83
Composite	.94	.94

Note: Adapted from *PLAN[®] Technical Manual*, by ACT[®], 2007g, p. 36.

The current study relies on the predicted ACT[®] score reported by the PLAN[®] as a background variable, and then uses the highest earned ACT[®] score as the dependent

variable. The correlational reliability of the two assessments was also examined. In 2004, ACT[®] conducted a correlational study that examined students who graduated in 2003 and took the PLAN[®] test as a sophomore, and the ACT[®] test as a junior or senior, to determine the reliability of the predicted ACT[®] score as determined by the PLAN[®] test. This study included data from 403,381 students and reported that the two scores being measured used a Pearson correlation coefficient. The coefficient provided evidence for a strong positive correlation between the scores ($r = .88$) (ACT[®], 2014e, p. 70). When ACT described predicting ACT[®] scores from PLAN[®] scores, they noted that, “a 1-point increase in ACT[®] Plan English score corresponded to about a 1.0-point increase in ACT[®] English score, and a 1-point increase in ACT[®] Plan Mathematics or Science score corresponded to about a 0.8-point increase in ACT[®] Mathematics or Science score, respectively” (ACT[®], 2014e, p. 71).

Data Collection Procedures

Before collecting the data, the researcher obtained permission to conduct the research study at the high schools in the North Kansas City School District (see Appendix B). After examination, Dr. Michael Pragman, the Director of Assessment and School Evaluation, and Dr. Jill Hackett, the Assistant Superintendent of Academic Services and School Accountability, approved the request on October 28, 2015 (see Appendix C). Subsequently, the researcher requested permission from Baker University to conduct the research study. An Institutional Review Board (IRB) request was submitted to Baker University on November 4, 2015 (see Appendix D). The Baker University IRB committee approved the research study on November 4, 2015 and provided the included letter (see Appendix E).

The PLAN[®] scores, ACT[®] scores, and AP course enrollment were all tracked in the North Kansas City School District's data management system. Using this information, an Excel spreadsheet was created containing student ID numbers, PLAN[®] composite scores, ACT[®] composite scores, and the number of AP courses completed. The data from the Excel notebook was then imported into the IBM SPSS Statistics Pack 23[™] for Windows.

Data Analysis and Hypothesis Testing

The level of significance used for the statistical analysis was $\alpha = .05$. The following research questions and corresponding hypotheses and data analyses guided this study:

RQ1. To what extent is there a difference in college readiness, as determined by composite ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses?

H1. There is a difference in student college readiness, as determined by composite ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses.

A one-factor analysis of variance (ANOVA) was conducted to test H1. The categorical variable used to group college readiness, as measured by composite ACT[®] score, was the number of AP courses taken (0, 1, 2, or 3+). The level of significance for the study was set at .05. A Tukey HSD post hoc was conducted as a follow-up test. The level of significance for the study was set at .05.

RQ2. To what extent is there a difference in college readiness, as determined by composite ACT[®] scores, among students predicted to be unsuccessful in college who enrolled in 0, 1, 2, or 3+ AP courses?

H2. There is a difference in college readiness, as determined by ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses as determined college readiness test scores.

A one-factor analysis of variance (ANOVA) was conducted to test H2. The PLAN[®] score data was filtered to examine students with a composite score less than 18. The categorical variable used to group the dependent variable, college readiness level as measured by ACT[®] for students who were not predicted to be on track for college readiness, was number of AP courses taken (0, 1, 2, or 3+). A Tukey HSD post hoc was conducted as a follow-up test. The level of significance for the study was set at .05.

Limitations

Lunenburg and Irby (2008) described limitations as those “factors that may have an effect on the interpretation of the findings or on the generalizability of the results” (p. 133). The limitations for this study were as follows:

1. All students may not have had open access to self-select AP courses based on the enrollment criteria of individual teachers in different schools.
2. The AP courses, though certified by the district, may not have been taught with fidelity to the College Board approved AP course syllabus.

Summary

In this chapter, the goal of research was restated. This chapter also provided information on the use of a quantitative quasi-experimental research design for the study. That information was followed by an examination of the population and sample, sampling procedures, instrumentation, and measurements with validity and reliability information. Finally, a section on data collection procedures, data analysis and

hypothesis testing, and limitations were included. The results of the data analysis and hypothesis testing are discussed in chapter four.

Chapter Four

Results

The purpose of this quantitative quasi-experimental study was to examine the difference in college readiness, as determined by ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses. Additionally, it focused on the impact of AP course completion for struggling students who were not predicted to be on track for college readiness. Data was evaluated both for students who were predicted to meet college readiness and students who were not predicted for college readiness. The following chapter presents the descriptive statistics and test results of the hypothesis testing for the research questions.

Descriptive Statistics

The population for this study consisted of all of high school graduates from the North Kansas City School District from 2012 – 2013, 2013 – 2014, and 2014 – 2015 (5,375 students). The resulting sample of 75% ($n = 4,029$ students) of the total population included graduates who had a reported PLAN[®] score from the fall semester of sophomore year and ACT[®] score taken before graduation from high school. The sample was obtained through compiling the composite PLAN[®] score data and ACT[®] score data that was provided by the district, and then purposive sampling by filtering out students who did not have either a PLAN[®] score from the student's sophomore year, or an ACT[®] score from a test taken before high school graduation. There were a total of 1,347 students who did not meet these criteria and were filtered out through purposive sampling. The categorical independent variable was the number of AP courses taken, and these were categorized as 0, 1, 2, or 3+ AP courses. The number of AP courses taken

was merged with the PLAN[®] and ACT[®] data using the value lookup function by student number in Microsoft Excel.

The following section contains the results of the hypothesis testing, and these results are supported by the tabled descriptive statistics.

Hypothesis Testing

RQ1. To what extent is there a difference in college readiness, as determined by composite ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses?

H1. There is a difference in student college readiness, as determined by composite ACT[®] score, among students enrolled in 0, 1, 2, or 3+ AP courses.

A one-factor analysis of variance (ANOVA) was conducted to test H1. The categorical variable used to group college readiness, as measured by composite ACT[®] score, was the number of AP courses taken (0, 1, 2, or 3+). The level of significance for the study was set at .05. The sample size for students who took one AP course was small ($n = 37$), and there was no statistically significant difference between the ACT[®] scores of students who took one or two AP courses, $F = 386.514$, $df = 3, 4025$, $p = .087$. Because of this, the categories for one and two AP courses taken were collapsed, and the ANOVA was re-conducted. The results of the analysis indicated a statistically significant difference between at least two of the means, $F = 576.363$, $df = 2, 4026$, $p = .000$. See Table 6 for the means and standard deviations for this analysis. A follow-up post hoc, the Tukey's HSD, was conducted to determine which pairs of means were different. Students who took one or two AP courses had a mean ACT[®] composite score ($M = 21.797$) that was higher than students who took zero AP courses ($M = 19.668$). Students who completed three or more AP courses had a mean ACT[®] composite score ($M = 24.419$) that was

higher than students who took zero AP courses ($M = 19.668$). Students who completed three or more AP courses had a mean ACT[®] composite score ($M = 24.419$) that was higher than students who took one or two AP courses ($M = 21.797$). The greater number of AP courses completed by the student indicated a higher average composite ACT[®] score. Students who took one or two more AP classes had a higher ACT[®] score than those students who did not take any AP courses. However, students who took three or more AP classes had the highest ACT[®] composite score. Overall, this supports H1.

Table 6.

Descriptive Statistics for the Results of the Test for H1

Number of AP courses	<i>M</i>	<i>SD</i>	<i>N</i>
0	19.668	4.047	2307
1 OR 2	21.797	3.683	454
3 OR MORE	24.419	4.189	1268

RQ2. To what extent is there a difference in college readiness, as determined by composite ACT[®] scores, among students predicted to be unsuccessful in college who enrolled in 0, 1, 2, or 3+ AP courses?

H2. There is a difference in college readiness, as determined by ACT[®] scores, among students predicted to be unsuccessful in college who enrolled in 0, 1, 2, or 3+ AP courses.

A one-factor analysis of variance (ANOVA) was conducted to test H2. Prior to conducting the hypothesis test, the PLAN[®] score data was used to create a filter for selecting students with a score of less than 18. The categorical variable used to group college readiness, as measured by composite ACT[®] score, was the number of AP courses

taken (0, 1, 2, or 3+). The level of significance for the study was set at .05. The sample size for students who took one AP course was small ($n = 7$), and there was not a statistically significant difference between the ACT[®] scores of students who took one or two AP courses, $F = 45.361$, $df = 3$, 1064 , $p = .355$. Because of this, the categories for students who took one and two AP courses taken were collapsed, and the ANOVA was re-conducted. The results of the analysis indicated a statistically significant difference between at least two of the means, $F = 68.039$, $df = 2$, 1065 , $p = .000$. See Table 7 for the means and standard deviations for this analysis. A follow-up post hoc, the Tukey's HSD, was conducted to determine which pairs of means were different. Three of the differences were statistically significant. Struggling students who took one or two AP courses had a mean ACT[®] composite score ($M = 18.965$), which was higher than the mean for struggling students who took zero AP courses ($M = 17.689$). Struggling students who completed three or more AP courses had a mean ACT[®] composite score ($M = 19.856$), which was higher than the mean for struggling students who took zero AP courses ($M = 17.689$). Struggling students who completed three or more AP courses scored a mean ACT[®] composite score ($M = 19.856$), which was higher than the mean for struggling students who took one or two AP courses ($M = 18.965$). Struggling students who took one or two more AP classes had a higher mean ACT[®] score than those students who did not take any AP courses. Struggling students who took three or more AP classes had the highest mean ACT[®] composite score. Overall, these results support H2.

Table 7.

Descriptive Statistics for the Results of the Test for H2

Number of AP Courses	<i>M</i>	<i>SD</i>	<i>N</i>
0	17.689	2.615	717
1 OR 2	18.965	2.192	115
3 OR MORE	19.856	2.542	236

Summary

This chapter presented the results of the two one-factor ANOVAs used to analyze the data collected in this study. The results of the hypothesis test indicated statistically significant differences among college readiness, as assessed by ACT[®] composite scores, of 0, 1, 2, or 3+ AP courses for all students (H1) and for struggling students (H2). Overall, the greater number of AP courses completed, the higher the composite ACT[®] score, regardless of a student's prior level of predicted college readiness. Students who took more AP classes demonstrate a greater level of college readiness, as measured by ACT[®] composite scores, than students who either did not take AP courses, or who took a fewer number of AP courses. Chapter five presents a summary of the study, research findings, how the findings related to the literature, implications for action, and recommendations for further research.

Chapter Five

Interpretation and Recommendations

According to the NACAC (2011), a large percentage of high school graduates are not ready to complete college level work. The NACAC (2011) identified three factors in determining college readiness. The factors were grades in college prep courses (such as AP, IB, dual credit, and/or honors courses), strength of curriculum (the number of AP, IB, dual credit, and/or honors courses), and college readiness test scores (such as the SAT or the ACT[®]).

The purpose of this study was to examine the difference in college readiness, as determined by ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses. Because the sample size for students enrolled in one or two AP courses was small, those categories were collapsed into a single category. This chapter contains a summary of the study, which includes an overview of the problem, purpose statement, research questions, and a review of the methodology. Additionally, the chapter presents major finding of the study, and how those findings connect to the literature. Finally, this chapter includes action recommendations, areas of future research, and concluding remarks.

Study Summary

The purpose of this quantitative quasi-experimental study was to examine the difference in college readiness, as determined by ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses. Additionally, it focused on the impact of AP course completion for struggling students who were not predicted to be on track for college readiness. Statistical analysis was conducted to determine if there was a relationship between AP participation and increasing ACT[®] composite scores. Because the sample

size for students enrolled in one or two AP courses was small, those categories were collapsed into a single category. Data was evaluated both for students who were predicted to be college ready and students who were not predicted to be college ready. Quantitative data were collected from North Kansas City Schools graduates in the 2012 – 2013, 2013 – 2014, and 2014 – 2015 academic school years. A one-factor ANOVA was used to address the research questions.

Overview of the problem. According to the NACAC in 2011, the top three factors in determining college admissions and readiness were grades in college prep courses, strength of curriculum, and college readiness test scores. Adelman (1998) argued that remediation rates remain high for first-year college students, and he also claimed that high school curriculum, above all else, was the best indicator of college readiness based on the remediation, retention, and graduation rates of college students. Early action to improve students' high school course selection based on students' PLAN[®] scores could improve college readiness. High schools must take a proactive approach monitoring students' course selection, specifically AP, IB, and/or honors courses, and effective course options must be provided for students who are not on track for college readiness. One option may be that students who are not on track to meet college readiness standards be afforded the opportunity to access more rigorous coursework. Conley (2007a) stated all students must have access to "challenging academic content" (p. 21) to improve college readiness.

Purpose statement and research questions. The purpose of this quantitative quasi-experimental study was to examine the difference in college readiness, as determined by ACT[®] scores, among students enrolled in 0, 1, 2, or 3+ AP courses.

Additionally, it focused on the impact of AP course completion for struggling students who were not predicted to be on track for college readiness. Statistical analysis was conducted to determine if there was a relationship between AP participation and increasing ACT[®] composite scores.

Review of the methodology. The design for the study was quantitative quasi-experimental. The methodology employed relied on student baseline PLAN[®] test results that included a predicted ACT[®] score, and examined the effect of enrollment in various numbers of AP courses. The sample for this study consisted of the students from the four high schools in North Kansas City School District who had a reported PLAN[®] score and took the ACT[®] at least once during high school. Data from the 2012 – 2013, 2013 – 2014, and 2014 – 2015 school years was collected using ACT[®] results from the respective school years. This included a total of 4,029 students in the sample. The instruments used in this study were the PLAN[®] and ACT[®] tests. The PLAN[®] test was developed by ACT[®] to serve as an early opportunity to determine if students were predicted to be college ready (ACT[®], 2009b). The ACT[®] was selected because colleges and universities in the U.S. (that require a college readiness test scores) universally accept it as an indicator in determining college admissions (ACT[®], 2015b). The validity and reliability of both the PLAN[®] and the ACT[®] have been examined and verified. The background variable was a students PLAN[®] test results taken during their sophomore year in high school, and the independent variable was the number of AP courses a student enrolled in during high school. The dependent variable was the highest composite ACT[®] score earned by the students.

Major findings. The greater number of AP courses completed, the higher the composite ACT[®] score, regardless of a student's prior level of predicted college readiness. Students who took more AP classes demonstrate a greater level of college readiness, as measured by ACT[®] composite scores, than students who either did not choose to take AP courses, or who took a fewer number of AP courses. Both of the hypotheses tests indicated that there is a difference in student college readiness, as determined by composite ACT[®] scores, among all students enrolled in 0, 1, 2, or 3+ AP courses. The results of the hypothesis testing provided evidence that there was a statistically significant difference among all students who took 1, 2, or 3+ AP courses as compared to all students who did not take any AP classes. Students who took zero AP courses did not meet college readiness standards as assessed by the ACT[®], and earned an average composite score of $M = 19.668$. Students who took more AP classes demonstrated a higher college readiness score than students who either do not choose to take AP courses, or who take a fewer number of AP courses. Students who took one or two AP courses earned an ACT[®] composite average ($M = 21.797$) that met the college readiness standards. Students who took three or more AP courses earned a mean ACT[®] composite score ($M = 24.419$) that also met college readiness standards.

The study also focused on the extent that there is a difference in college readiness, as determined by composite ACT[®] scores, among struggling students predicted to be unsuccessful in college who enrolled in 0, 1, 2, or 3+ AP courses. It was hypothesized that there is a difference in college readiness, as determined by ACT[®] scores, among struggling students enrolled in 0, 1, 2, or 3+ AP courses as determined college readiness test scores. Struggling students who took more AP classes scored higher on the ACT[®]

than struggling students who either do not choose to take AP courses, or who took a fewer number of AP courses. While there is progress toward meeting college readiness among struggling students who took more AP courses, none of the categories resulted a mean ACT[®] composite score that met all college readiness standards. The results of the hypothesis test proved that there was a statistically significant difference among struggling students who took 1, 2, or 3+ AP courses as compared with struggling students who did not take any AP classes. Struggling students who took zero AP courses did not meet college readiness standards as assessed by the ACT[®] ($M = 17.689$). Struggling students who took more AP classes demonstrated a higher college readiness score than struggling students who either do not take AP courses, or who took a fewer number of AP courses. Struggling students who took one or two AP courses scored a composite $M = 18.965$ on the ACT[®], and students who took three or more AP courses scored a composite $M = 19.856$.

Findings Related to the Literature

This section connects the findings of the hypothesis tests of the current study with the literature reviewed in chapter two. Standards of determining college readiness have continued to evolve throughout the 20th and early 21st centuries. Since the development of AP courses, students who completed those courses had admissions advantage over students who chose not to take challenging courses during their junior and senior years of high school (Conley, 2005). Districts face an increased emphasis on improving student college readiness. One way this can be done is by improving scores on college readiness exams. The current study supports the argument that taking

challenging courses can help overall college readiness and performance on the ACT[®] test.

Post-secondary schools want to ensure that the students they accept possess the skills necessary to stay enrolled and eventually graduate. Despite some decreases in the level of remediation in open enrollment colleges and universities, the percentage of students who require remediation remain remains high (Conley, 2007b). With increasing numbers of AP courses completed nationally, the higher the average composite ACT[®] score. However, students who were not on track to meet college readiness standards before taking AP courses did not, on average, meet those standards simply from completing any number of AP courses. Struggling students did perform better, according to composite ACT[®] average, by completing more AP courses.

Adelman (1999) analyzed the rigor of high school student coursework using data from the U.S. DOE. He determined high school course level or rigor (including AP course enrollment) had a statistically significant correlation with college graduation. Adelman (1999) asserted that not only does a challenging high school curriculum position students for rigorous collegiate coursework, but also helps increase college readiness scores. The results of the current study reinforce the argument that course rigor increases a student's college readiness as assessed by the ACT[®]. The more AP courses a student takes, the higher the average composite ACT[®] score.

ACT[®] (2007b) determined that the traditional core curriculum at present including all regular level courses (four English courses, and three each of the other core classes) does not adequately prepare high school students for the rigors of being a first-year college student, as students on average did not meet college readiness standards. The

results of the current study support that claim, as students who took zero AP courses scored an average mean composite ACT[®] scores of 19.668, below the college readiness benchmark of an ACT[®] composite score of 21.

Conley (2007a) explained that college readiness in the early 21st century includes four key concepts: content knowledge, core academic skills, non-cognitive skills, and college knowledge. Students accessing, and successfully completing, AP courses can improve both the content knowledge and the core academic skills components of this readiness explanation. The results of the current study determined that students who take AP courses, despite previous level of predicted readiness, did demonstrate an increase in content knowledge as assessed by the ACT[®]. Conley (2007a) also included an element of college readiness that were qualitative in nature, as they relate to grit and affective characteristics of students. The results of the current study indicate that even if a student was not predicted to be successful in an AP course, enrollment in such course could still help them close that readiness gap. Struggling students who took additional AP courses scored higher, on average on the ACT[®].

Conley (2007b) claimed that allowing access to rigorous courses with a prescribed national or international curriculum (such as AP and or IB) and encouraging students to sit for challenging and meaningful exams was the best way to measure content area knowledge. Conley's (2007b) argument about assessing the knowledge required to determine college readiness is not different than what Adelman (1998) claimed earlier in the college readiness movement. Conley (200b) asserted that the results of those exams could provide colleges additional information about their readiness in individual content areas. While the results of the current study did not rely on the results of AP or IB

exams, it did evaluate college readiness for students who had completed those rigorous courses. For the full sample, students demonstrated increased progress toward college readiness over students who did not take AP courses.

Stoker (2010) studied several urban Chicago area high schools to determine the effect AP courses had on student performance college readiness assessment scores. The primary question guiding the research was whether urban high school students completing AP courses improved college readiness tests. Stoker (2010) used data from the graduating classes of 2006 - 2007, 2007 – 2008, and 2008 – 2009 from the Chicago Public Schools for the study. The results of the study were that AP participation had a direct positive effect on ACT[®] composite scores for minority and lower SES students, as well as an increase in four-year college enrollment and university retention. The results of the current study concur with Stoker's (2010) findings, in that AP participation had a direct positive effect on ACT[®] composite scores for all students.

Lesser (2010) also investigated whether AP courses were an effective means of improving student performance college readiness exams. Lesser examined the performance of over 5,100 high school graduates of 2007 – 2008 and 2008 – 2009 in New York and compared them with graduating seniors from neighboring states. The study examined the relationship among all AP courses and SAT sub-scores. Finally, Lesser (2010) examined the performance of lower SES students and students with disabilities. The overall finding was states that maintained high-stakes end-of-course testing did not outperform states with no such mandates when correlated with performance on AP exams. Because of these results, Lesser (2010) suggested state policies should be shifted from mandating high-stakes end-of-course testing of students

to districts ensuring the delivery of a high-quality, challenging, and viable curriculum such as AP. The results of the current study also found that students who took a high-quality and challenging curriculum through the AP program outperformed students who did not take rigorous courses.

Warne, et al. (2015) discovered “students who take and pass the AP exam obtain higher ACT scores, even after controlling for a wide variety of academic, socioeconomic, and demographic variables” (p. 400). They discovered that “merely enrolling in an AP course is not very beneficial for students” (Warne, Larsen, Anderson, & Odasso, 2015, p. 413). These findings conflict with the findings of the current investigation, as there were statistically significant differences among students who took AP courses compared with those who did not take AP courses for all students.

Warne, et al. (2015) also claimed “we are still unable to say that participation in the AP program caused students to have higher ACT scores” (p. 413). However, this contradicts the results of the current study in which it was found that all students completing AP courses did see an improvement in ACT scores. The results of the current study indicate that even struggling students benefit from completion of AP courses. The sample of students in the current study included many students who chose to take AP courses, even without previously meeting college readiness standards. Specifically, the results of the current study indicate that for a population of students who are either on track or not on track for college readiness, that taking AP courses had a positive effect on ACT scores.

Finally, many schools and families see college readiness test score improvement as being something that is primarily coached. Both ACT[®] (2005c) and College Board

(2014b) argue that short term test preparation is not as impactful as many students and parents believe it is. “Increases in ACT[®] Composite score associated with high school coursework are substantially larger than those associated with these short-term test preparation activities, regardless of the type of activity” (p. 1). The ACT[®] (2005c) report indicates the a one to two-point gain may be earned from the short-term preparation while gains upward of five to six points can be gain from long-term challenging course selection. While the current study did not evaluate any short-term preparation program offered, it did find that students who took three or more AP courses scored almost five points higher ($M = 24.219$) on their composite ACT[®] score than students who took no AP courses ($M = 19.668$).

Conclusions

This section contains implications to help educators interpret assessment data leading them to draw more accurate conclusions and thus make recommendations for students regarding appropriate course selection to improve college readiness. The implications of this study could also be used to provide earlier support for students who are not on track for college readiness. Furthermore, the results of the findings from the current study and recommendations for future research are presented. Finally, concluding remarks close the chapter.

Implications for Action. The findings of this study have profound implications for districts, schools, and individual students. First, all students, including students who are not on track to meet college readiness standards, should be encouraged to take more challenging courses in high school. Sitting in these challenging and rigorous courses may not be enough to completely close the readiness gap, but it could signal to postsecondary

schools that the student has a desire to improve. Completing AP courses could support struggling students' college readiness by providing them the skills necessary for success during the first year of college. District policies could be changed to allow students to enroll in AP classes even if the student does not meet certain criteria. The results could also work to continue changing the mindset of teachers who may have previously served as gatekeepers to prevent some students from accessing AP, IB, or dual credit courses. There are still many AP (and other honors course) teachers who serve as gatekeepers to prevent struggling students with determination from accessing their courses (Conley, 2014). The results from the current study could be used to compel more teachers not only to encourage students to take AP courses, but also to begin implementing some learning experiences similar to those courses in all classes.

Recommendations for future research. The results of the current study showed a statistically significant difference, as determined by average composite ACT[®] scores, among students predicted to be successful in college who enrolled in 0, 1, 2, or 3+ AP courses. Additionally, the results also showed of the current study showed a statistically significant difference, as determined by average composite ACT[®] scores, among struggling students predicted to be unsuccessful in college who enrolled in 0, 1, 2, or 3+ AP courses. The recommendations below are made for others interested in conducting a study involving college readiness of high school students.

1. It is recommended that additional research be conducted on the specific characteristics of various AP courses in an effort to determine which AP courses and academic skills impact college readiness the most.

2. It is recommended that additional studies be conducted regarding students who take other challenging courses outside of the AP program, including IB and dual credit courses
3. It is recommended that additional research be conducted that correlates specific AP course enrollment with specific ACT[®] section scores. This could aid in the identification of which specific AP courses best support improving college readiness scores.
4. It is recommended that additional longitudinal research be conducted on the relationship among performance on state assessments, teacher quality, and college readiness exams such as the ACT[®] or SAT. This is a much more substantial study, but could uncover trends or approaches to improving college readiness that have not yet been considered.
5. It is recommended that additional research be conducted on additional support is needed for the qualitative aspects of college readiness, especially as it relates to Conley's (2007b, 2014) concept of college knowledge.
6. It is recommended that additional research be conducted on the actual college readiness effects of the sample of students from the current study, specifically if remediation rates were lower for students who took any number of AP courses compared with students who did not complete any AP courses.

Concluding remarks. The purpose of this study was to examine the difference in college readiness, as determined by ACT[®] scores among students enrolled in 0, 1, 2, or 3+ AP courses. Additionally, it focused on the impact of AP course completion for struggling students who were not predicted to be on track for college readiness.

Statistical analyses were conducted to determine if there was a relationship between AP participation and increasing ACT[®] composite scores, and the findings were statistically significant.

The push for preparing high school students for post-secondary experiences continues to grow in U.S. schools. As this happens, states, districts, and schools will strive to provide the best opportunities possible for their high school students. To meet this challenge, it will be essential for states, districts, and schools to consider what educational experiences students need to be college and career-ready. The current research provides evidence to giving all students opportunities to complete rigorous coursework without barriers, and to continually monitor progress toward achieving college readiness.

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Appendices

Appendix A: 2015 Superintendent's ACT[®] College Readiness Report



College Readiness Letter for:
NORTH KANSAS CITY SCHOOLS 74

August 26, 2015
Code: 267228

SUPERINTENDENT
NORTH KANSAS CITY SCHOOLS 74
2000 NE 46TH ST
KANSAS CITY, MO 64116



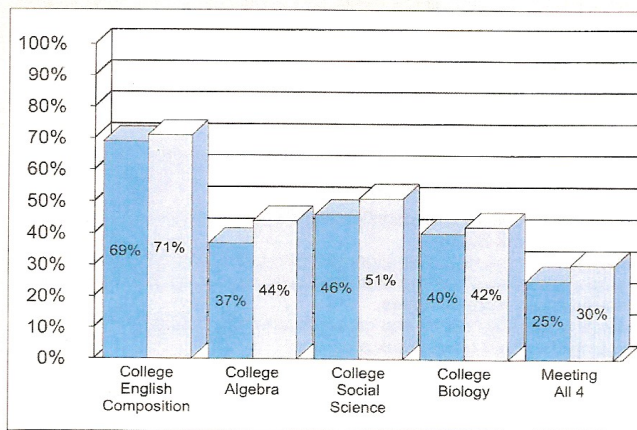
011062110

This report reflects the achievement of your graduates on the ACT over time and an indication of the extent to which they are prepared for college-level work. The ACT consists of curriculum-based tests of educational development in English, mathematics, reading, and science designed to measure the skills needed for success in first-year college coursework. Table 1 shows the five-year trend of your ACT-tested graduates. Beginning with the 2013 Graduating Class, all students whose scores are college reportable, both standard and extended time tests, are included in this report.

Table 1: Five Year Trends - Average ACT Scores

Grad Year	Total Tested		English		Mathematics		Reading		Science		Composite	
	District	State	District	State	District	State	District	State	District	State	District	State
2011	794	48,565	21.2	21.5	20.6	21.0	21.8	21.9	21.5	21.6	21.4	21.6
2012	890	49,222	20.8	21.4	20.4	21.1	21.4	21.9	21.3	21.5	21.1	21.6
2013	827	49,217	20.9	21.4	20.5	21.0	21.6	21.9	21.4	21.6	21.2	21.6
2014	851	48,865	20.9	21.6	20.3	21.1	21.5	22.3	21.3	21.7	21.1	21.8
2015	816	49,640	20.7	21.4	20.4	21.0	21.8	22.2	21.5	21.7	21.2	21.7

Figure 1. Percent of ACT-Tested Students Ready for College-Level Coursework



Are Your Students Ready for College?

Through collaborative research with postsecondary institutions nationwide, ACT has established the following as college readiness benchmark scores for designated college courses.

A benchmark score is the minimum score needed on an ACT subject-area test to indicate a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in the corresponding credit-bearing college courses.

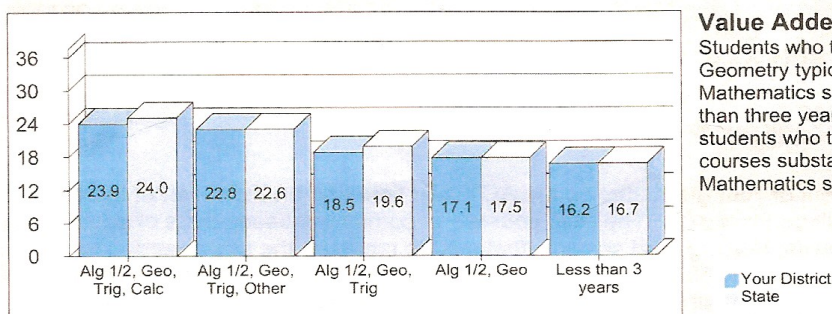
- * English Composition: 18 on ACT English Test
- * College Algebra: 22 on ACT Mathematics Test
- * Social Science: 22 on ACT Reading Test
- * Biology: 23 on ACT Science Test

A High School College Readiness Letter has been sent to the Principal of each high school with at least one ACT-tested graduate.

College Readiness Letter for: NORTH KANSAS CITY SCHOOLS 74

ACT Research has shown that it is the rigor of coursework - rather than simply the number of core courses - that has the greatest impact on ACT performance and college readiness. Figures 2 and 3 report the value added by increasingly rigorous coursework in mathematics and science respectively.

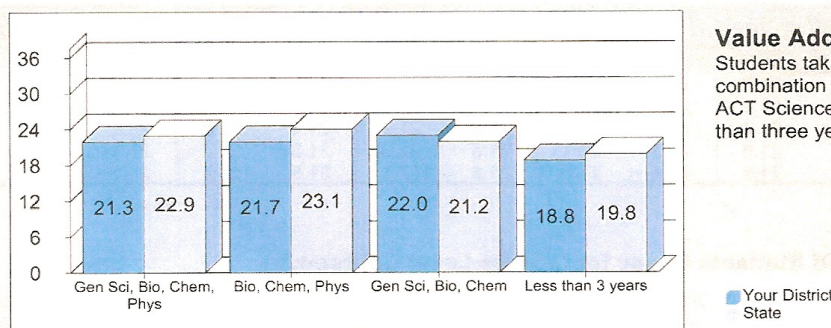
Figure 2. Average ACT Mathematics Scores by Course Sequence



Value Added by Mathematics Courses

Students who take Algebra 1, Algebra 2, and Geometry typically achieve higher ACT Mathematics scores than students who take less than three years of mathematics. In addition, students who take more advanced mathematics courses substantially increase their ACT Mathematics score.

Figure 3. Average ACT Science Scores by Course Sequence



Value Added by Science Courses

Students taking Biology and Chemistry in combination with Physics typically achieve higher ACT Science scores than students taking less than three years of science courses.

In order to ensure that all students are ready for college, an overview of vital action steps is provided.

College Readiness for All: An Action Plan for Schools and Districts

- 1. Create a Common Focus.** Establish collaborative partnerships with local and state postsecondary institutions to come to a shared understanding of what students need to know for college readiness. Use ACT's College Readiness Benchmarks as a common language to define readiness.
- 2. Establish High Expectations for All.** Create a school culture that identifies and communicates the need for all students to meet or exceed College Readiness Benchmark Scores.
- 3. Require a Rigorous Curriculum.** Review and evaluate the rigor and alignment of courses offered and required in your school in English, mathematics, and science to ensure that the foundational skills leading to readiness for college-level work are taught, reaffirmed, and articulated across courses.
- 4. Provide Student Counseling.** Engage all students in early college and career awareness, help them to set high aspirations, and ensure that they plan a rigorous high school coursework program.
- 5. Measure and Evaluate Progress.** Monitor and measure every student's progress early and often using college readiness assessments like ACT Aspire and the ACT. Make timely interventions with those students who are not making adequate progress in meeting College Readiness Benchmarks.

To learn more about these recommended action steps and ACT programs that will help improve college readiness for your students, contact ACT Customer Service at 319-337-1309 or customerservices@act.org.

Appendix B: North Kansas City Schools Request to Conduct Research

October 28, 2015

Dr. Michael Pragman
Director of Research, Evaluation, & Accountability
2000 NE 46th Street
Kansas City, MO 64116

RE: Request to Conduct Research

Dear Dr. Pragman:

In order to complete the requirements for the dissertation in my doctoral program at Baker University, I am requesting permission to access and utilize the following academic data for students in the North Kansas City School District for the graduating classes of 2012, 2013, 2014, and 2015: 1) Individual and district ACT PLAN score data, 2) Individual and district ACT score data, and 3) Individual and district Advanced Placement (AP) course enrollment and class roster information.

The proposed title of my dissertation is: Advanced Placement Courses Effectiveness in Improving College Readiness for Struggling High School Students. The data needed for the study must be compiled soon after receiving IRB approval for the study. Tentatively, the data will be compiled and analyzed by January 2016, and the final dissertation submitted during spring of 2016.

The data will be utilized to determine whether students who are not on track to meet college readiness standards, as determined by their sophomore year PLAN test score, experience significant increase in college readiness when taking any number of AP courses, as determined by the highest composite ACT score. All of the data used in this study are historical, and at no time will students, staff, or parents be involved in the study. Collection of the data will require little or no time for the North Kansas City School District staff. Furthermore, at no time during the research and subsequent publication of the study will any student names or identifiable information be released or published. At no time will information from the high schools, or the names of the high schools, appear throughout the study. Additionally, standard North Kansas City Schools confidentiality practices will be employed at all times while the data is being collected, compiled, and analyzed.

This study will benefit the North Kansas City School District as it will provide a statistical analysis of the existing AP program, and expand it to allow struggling students to access the program benefits. The analysis may be utilized to change some current criteria for allowing students to enroll in these courses. The study poses no risk to student or staff, as the data is historical and will be stripped of all identifying information. There is a slight risk to the District overall in terms of public exposure if the data indicates that AP courses have little effect on helping any student improve college readiness as determined by the ACT. However, the mission and vision of the North Kansas City School District can only be achieved by evaluating and enhancing our current programs.

Thank you very much for your time and consideration, and I welcome any additional questions you may have regarding this study.

Sincerely,



Kyle S. Anderson
Baker University Doctoral Student

cc: Dr. Verneda Edwards, Major Advisor, Baker University

Appendix C: North Kansas City Schools Approval to Conduct Research

Request to Conduct Research 2015-2016

Name of Applicant: <u>Kyle S. Anderson</u>
Employee of North Kansas City Schools? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
If yes, location and position <u>Staley High School, Teaching + Learning Coach</u>
Is the research in fulfillment of graduate program requirements and/or in partnership with an external organization (e.g., university, college, business, industry, agency, etc.)? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
If yes, name of external organization and lead contact person: External organization: <u>Baker University</u>
Lead Contact Person and Position: <u>Dr. Vermeda Edwards, Major Advisor</u>
Purpose of research: <u>To partially fulfil the requirements for the Ed.D. program (dissertation data)</u>

Submission Requirements

1. A copy of the complete application submitted for formal approval by a human subjects review board. This application should include, at a minimum:
 - a. A brief summary of the purpose and scope of the research including:
 - The extent to which the research addresses and/or aligns with the goals of the school district
 - Potential benefit of the research to positively impact district, building, or classroom practice
 - b. A brief summary of the research methods including:
 - Participants
 - Selection process
 - Remuneration procedures (if applicable)
 - Assurance of confidentiality of participant identification
 - Consent and assent procedures and documents
 - Activities related to the research, including proposed survey, interview, and/or assessment questions/instruments
 - Extent of intrusiveness/disruption regarding classroom instruction
 - Time/effort requirements of participants
2. Evidence to demonstrate that the proposed research has been formally approved through a human subjects review process.
3. Assurance from the researcher that building principals, teachers, students and/or their parents may opt out of participation without consequence even with approval by the district team.
4. Assurance from the researcher that results will be communicated back to the district upon completion of study. (Anticipated date of completion: April 1, 2016)

Date received by Director of Research, Evaluation & Accountability <u>[Signature]</u> <u>10/28/2015</u>
Team Review Date: <u>10/28/2015</u> Approved: <input checked="" type="checkbox"/> Not Approved: <input type="checkbox"/>
Signature of Associate Superintendent: <u>[Signature]</u> <u>10/28/15</u>
Signature of Principal(s) of building(s) impacted by research study: <u>[Signature]</u> <u>10/28/15</u>

A copy of this form must be returned to NKCS Director of Research, Evaluation, and Accountability with all necessary signatures before approval can be granted to conduct research.

Appendix D: Baker University IRB Application



School of education
Graduate department

IRB PROTOCOL NUMBER _____
(irb USE ONLY)

Date: 11/04/15

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

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

Department(s) School of Education Graduate Department

Name	Signature	
1. Dr. Verneda Edwards	_____	Major Advisor
2. Margaret Waterman	_____	Research Analyst
3. Dr. Dennis King	_____	University Committee Member
4. Dr. Michael Pragman	_____	External Committee Member

Principal Investigator: Kyle S. Anderson
 Phone: _____
 Email: _____
 Mailing address: _____

Faculty sponsor: Dr. Verneda Edwards
 Phone: _____
 Email: _____

Expected Category of Review: Exempt Expedited Full

II: Protocol: (Type the title of your study)

Improving College Readiness for Struggling High School Students Through Advanced Placement Course Completion

Summary

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

The purpose of this study is to contribute to and extend an existing body of research on improving college readiness for students who are not predicted to meet college readiness standards.

The study will determine the effects on struggling students of taking 0, 1, 2, or 3+ Advanced Placement (AP) courses. Struggling students will be identified through archived historical data on the PLAN test, which each student took during the first semester of his/her sophomore year in high school. Data will also be collected on Achieved historical results from the ACT test, as well as AP course completion.

The results from this study could be used by high schools to provide appropriate guidance in course selection for students who are not on track to meet the core academic college readiness standards.

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

There is no manipulation in this study. The research sample will consist of North Kansas City graduates from the following years: 2010-2011, 2011-2012, 2012-2013 and 2013-2014. After the data is compiled, all identifiable student information will be removed from the spreadsheet.

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

Two of the ACT assessments, the PLAN test and the ACT test, will be used to measure college readiness in this study. All sophomore students through 2014-2015 were required to take the PLAN test in the North Kansas City School District given during the regular school day. AP course enrollment, and sitting for the ACT test, were voluntary by the students. There will be no other questionnaires or instruments used in this study.

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

The subjects will not encounter any psychological, social, physical, or legal risks.

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

The subjects will not encounter any stress as the research involves historical data only.

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

The subjects will not be deceived or misled in any way.

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

The subjects will not be contacted as part of the study, and therefore will not be asked for any information, which would be personal or sensitive. The research will utilize historical data involving the PLAN test, the ACT test, and AP course requests and student schedules as reported to the North Kansas City School District.

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

The subjects will not be contacted as part of the study, and therefore will not be presented any materials which might be considered offensive, threatening, or degrading.

Approximately how much time will be demanded of each subject?

The subjects will not be contacted as part of the study, and therefore the study will not ask for any time from any of the subjects. Subjects will not actively participate in any aspect of this study.

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

All data used in this study will be from the achieved data warehouse in the North Kansas City School District. The subjects will not be contacted as part of the study.

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

No solicitation or participation will take place for this study, as all data is archived. The subjects will not be contacted as part of the study, and no inducements will be offered.

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

No consent is required for this study as all data is archived. The subjects will not be contacted as part of the study.

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

No aspect of the data will be identified with any of the subjects. No personally identifiable information will be used or presented in the results. The researchers will temporarily use student names or numbers to compile the archived data that currently exists in the North Kansas City School District's data warehouse. After the compilation of the data, student names will be removed from all Excel documents created as part of this study. No aspect of the data will be made part of any permanent record.

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

Since all data is archived without identifiable student information, no subject participation is necessary. No aspect of the data will be made part of any permanent record.

What steps will be taken to insure the confidentiality of the data? Where will it be stored? How long will it be stored? What will be done with it after the study is completed?

Confidentially will be maintained, as the researcher will work directly with the agents of the North Kansas City School District's data warehouse. The archived data that will be generated from the North Kansas City data warehouse will not be used for any other purposes. No names, or other identifiable information, will be used that could identify any subjects in the study. The data will be stored on a password protected external hard drive, and it will be kept in a locked fireproof safe. The data will be retained for one year, and afterwards destroyed.

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

There are no risks to any of the subjects involved in this study.

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

Archival data will be provided by the North Kansas City School District's data warehouse. It will include PLAN test results, ACT test results, and AP course selection rosters from the 2011-2012, 2012-2013, 2013-2014, and 2014-2015 graduating classes.

Appendix E: Baker University IRB Approval



Baker University Institutional Review Board

November 4, 2015

Dear Kyle Anderson and Dr. Edwards,

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

Please be aware of the following:

1. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
2. Notify the IRB about any new investigators not named in original application.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents of the research activity.
4. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.
5. If the results of the research are used to prepare papers for publication or oral presentation at professional conferences, manuscripts or abstracts are requested for IRB as part of the project record.

Please inform this Committee or myself when this project is terminated or completed. As noted above, you must also provide IRB with an annual status report and receive approval for maintaining your status. If you have any questions, please contact me at CTodden@BakerU.edu or 785.594.8440.

Sincerely,

Chris Todden EdD
Chair, Baker University IRB

Baker University IRB Committee
Verneda Edwards EdD
Sara Crump PhD
Erin Morris PhD
Scott Crenshaw