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Examining Predictor Measures for Students' Testing in the International Baccalaureate Diploma Programme

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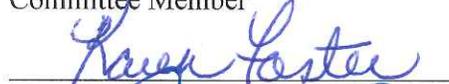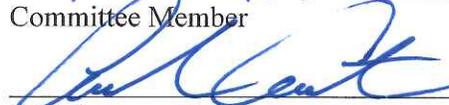
EXAMINING PREDICTOR MEASURES FOR STUDENTS TESTING IN THE INTERNATIONAL BACCALAUREATE DIPLOMA PROGRAMME

Dissertation

Submitted in partial fulfillment
of the requirements for the degree of Doctor of Education
in the Carter and Moyers School of Education
at Lincoln Memorial University

by

Shannon O. Siebe

October 2019

Dedication

This research is dedicated to my father, John O'Malley; my husband, Ryan Siebe; and my boys, Jake, Luke, and Tyson. Dad, you have been my biggest cheerleader throughout this journey. When the process felt overwhelming and I wasn't sure if I could finish, making you proud continued to be my biggest motivator. Ryan, I could not have done this without your amazing love, support, and willingness to let me write for hours on end while you managed the family. I love you. Finally, to my boys: I want you to always remember this journey for our family and that you can do anything in this life as long as you are willing to work hard and sometimes be relentlessly stubborn. When something seems impossible, dig in deeper and persevere. Be strong. It will all be worth it in the end… I promise.

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This study would not have been possible without the dedication of the faculty members of Lincoln Memorial University. I am extremely grateful to my committee members, Dr. Cherie Gaines and Dr. Karen Foster, for the amazing support each has provided. I am especially indebted to Dr. Andrew Courtner, my committee Chair, for his valuable feedback throughout the entire process and for his unwavering dedication to my success. You held me accountable each step of the way and for that I am grateful. Finally, I would like to extend my heartfelt thanks to the individuals who supported my study by providing me with the archived data that I requested.

Abstract

The purpose of this study was to explore the relationships between both student achievement and growth in 9th and 10th grade English and math courses and achievement on International Baccalaureate English and math exams. The researcher examined student end-of-course exam scores, student growth values, and International Baccalaureate English and math exam scores from an International Baccalaureate World School across 4 graduating cohorts, including 305 students. The researcher concluded that while 9th grade math end-of-course exam achievement does not significantly predict International Baccalaureate math exam scores, student growth in 9th grade math does. The researcher also concluded that Advanced Placement Language exam scores have a strong statistical relationship to International Baccalaureate English scores and can significantly predict International Baccalaureate English exam scores. Overall, the researcher concluded that both student end-of-course exam scores and student growth are statistically related to, and can predict, success on International Baccalaureate English and math exams.

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Chapter I: Introduction

In an ever-changing world, it has become immensely important for students to be exposed to global issues and to learn how to critically analyze information. All students, regardless of past academic achievement, should be encouraged to push themselves academically and to continuously grow intellectually throughout their educational career. Self-efficacy can have a significant impact on student course enrollment choices and subsequent performance (Lopez & Lent, 1992). Perhaps the most influential factor in student self-efficacy is past performance and the resulting confidence levels that are instilled in students from year to year (Lopez & Lent, 1992). When students have a low self-efficacy and academic self-concept due to past performance levels, they often do not choose to enroll in more rigorous coursework in later high school years (Lopez & Lent, 1992). Even when a student chooses to enroll in college level courses in the final years of high school, his or her past academic achievement and growth records might have an impact on his or her achievement in post-secondary level coursework and/or exams (Ghazvini, 2011).

In order to potentially identify 10th grade students that, based on a statistical analysis of past individual student data, have a higher chance of success on International Baccalaureate (IB) exams and encourage them to enroll college-level coursework, this study analyzed achievement levels on Tennessee (TN) state end-of-course exams in both English and language arts (ELA) and math in grades 9 and 10 among students testing in IB courses. These achievement levels were analyzed as possible indicators of student success on IB literature and math

exams. In addition, this study sought a correlation between individual student growth data records in ELA and math for grades 9 and 10 and achievement on IB exams.

Statement of the Problem

As educators around the country focus on continually improving education for our youth, due to low student self-efficacy and confidence levels, the challenge of encouraging some high school students in all subgroups to enroll and test in college level coursework remains (Bandura, 1997). Students who expose themselves to credit-based post-secondary academic transition programs such as the IB Programme have an increased chance to be accepted into a post-secondary institution and to be more academically successful once enrolled (Bailey & Karp, 2003). When students have a history of below proficient academic achievement, their self-efficacy and self-concept can suffer (Parker, Marsh, Ciarrochi, Marshall, & Abduljabbar, 2014). A student's belief, or lack thereof, in his or her own academic abilities can have a direct impact on that student's learning and ultimate academic achievement (Nicholson, Putwain, Connors, & Hornby-Atkinson, 2013). In addition, as a result of self-efficacy or self-concept, students can place limits on themselves due to repeated past academic disappointments or fear of failure (Lopez & Lent, 1992). These self-imposed limits can include not attempting rigorous coursework in the final years of high school. In addition to students' self-limiting academic enrollment choices, other factors can impact student achievement within the minority and low-socioeconomic subgroups. Factors such as parental involvement, language deficits, teacher quality, and

having minority teachers have been cited by both students and teachers new to the profession as reasons contributing to the achievement gap that exists between minority and Caucasian students, as well as low-socioeconomic students and their counterparts (Morales, 2016).

A student's past achievement scores are not always indicative of, or correlated to, his academic growth over a school year. A student may have low achievement scores on a summative assessment and may score in the below basic score range, but if he scores at or above the score predicted for them by the Tennessee Value Added Assessment System (TVAAS) projection model, he would have a positive growth score for that school year (Papay, 2011). The TVAAS system was created and designed by Sanders and colleagues at the University of TN, Knoxville (Page, Martín, Orellana, & González, 2017). By understanding the individual growth of a student by using multiple data points consolidated to view the academic growth history of each child, educators can then use this data to predict the probability of success by subject area. Value added data is commonly used as a predictor for achievement scores on end-of-course exams in all subject areas. When looking toward enrolling in more challenging courses such as Advanced Placement (AP) or IB courses, however, predictors for student success in these courses are uncommon. As a result, a problem in education today is that students with low to mediocre achievement backgrounds are often tracked into less rigorous coursework without consideration of past individual growth data (Papay, 2011). The purpose of this quantitative, non-experimental study was to examine the correlation between

student achievement on IB exams and individual student growth as well as state exam achievement data, ultimately to examine these student data as predictors for IB exam achievement.

Research Questions

Predicted success can serve to increase student enrollment in IB courses. By successfully completing IB coursework, students can increase the number of IB credits on their transcripts as well as increase their chances for college acceptance and possibly attain college credit as a result of scoring well on an IB exam. Based on this purpose, the study was guided by the following research questions.

Research question 1. What relationship, if any, exists between individual English Language Arts and math achievement on Tennessee State end-of-course exams in grades 9-10 and achievement on International Baccalaureate exams in 11th and 12th grades for years 2015-2018 at one high school?

Research question 2. Do individual English Language Arts and math achievement scores on TN State end-of-course exams in grades 9-10 predict achievement on International Baccalaureate exams in the 11th and 12th grades for testing cohorts in the years 2015-2018 at one high school, and if so, what predictor variables are statistically significant?

Research question 3. What relationship, if any, exists between individual student Tennessee Value Added Assessment System growth data in English Language Arts and math in grades 9-10 and achievement on International

Baccalaureate exams in 11th and 12th grades for years 2015-2018 at one high school?

      Research question 4. Do individual student Tennessee Value Added Assessment System growth data in grades 9-10 predict achievement on International Baccalaureate exams in the 11th and 12th grades for testing cohorts in the years 2015-2018 at one high school, and if so, what predictor variables were statistically significant?

Theoretical Framework

      The basis for this study stems ultimately from two theoretical frameworks: the framework of academic self-efficacy (Bandura, 1997) and the framework of academic self-concept (Baumeister, 1999). Both of these theoretical concepts can have a direct influence on student self-perception and, in turn, student achievement (Marsh & Martin, 2011). The way in which a student perceives himself or herself as a learner can result from a conglomerate of factors, such as past academic performance, family educational background, and relationships with adults that build up over the years of a student's educational career (Marsh & Martin, 2011). A student's self-belief can have a profound effect on his or her academic achievement and, while concrete research regarding these connections is very limited, it is very important to consider these psychological implications in these times of school accountability and a high rate of competition within any post-secondary path for students (Parker et al., 2014). Depending on the subject area, self-concept and self-efficacy can have variant levels in different fields of study. When conducting a study seeking a connection between both student

academic growth and achievement on post-secondary level exams such as those administered within the IB Programme, it is important for the researcher to understand how student efficacy and confidence is grounded in a strong theoretical framework that supports the connection between psychology and academic achievement.

The framework of academic self-efficacy stems ultimately from the work of Bandura (1997). Bandura (1997) defined self-efficacy as "the belief in one's ability to influence events that effect one's life and control over the way these events are experienced" (p. 2). More specifically, a child's cognitive self-efficacy can have a direct impact on academic achievement and growth over time. Self-efficacy can manifest in and impact multiple aspects of an individual's daily functioning. For instance, one's self-efficacy can impact health functioning from a biological standpoint as well as a behavioral standpoint. Self-management of habits that promote good health can stem from an individual's self-efficacy and level of self-worth. Also, clinical functioning and athletic functioning can be impacted by an individual's level of self-efficacy. Anxieties, phobias, depression, and eating disorders can all stem from the lack of self-efficacy. So many aspects of one's daily functioning is affected by self-efficacy, including cognitive functioning. "The beliefs held by students about their academic competence are considered particularly important by both educationalists and psychologists, as impacting and a range of key outcomes related to student learning and achievement" (Nicholson et al., 2013, p. 286). When it comes to academic achievement, students may perform poorly because they lack the necessary skill

set to be successful or because they have the skills but do not have the perceived self-efficacy necessary to use those skills to the optimal sense (Bandura, 1997). Efficacy beliefs are directly tied to cognitive performance.

In a study by Boufford-Bouchard, Parent, and Larivee (1991), they indicated that regardless of whether students had average or high levels of cognitive abilities, those with a high sense of efficacy were able to easily solve complex conceptual problems than children of equal cognitive abilities but lower perceived efficacy. Students with higher efficacy levels and higher aspirations were more accurate in evaluating the quality of their performances than those who believed they lacked such capabilities. Perceived efficacy exerts a more substantial impact on academic performance, both directly in affecting the quality of student thinking and indirectly through an increase in perseverance in problem solving and generating ideas. Self-efficacy can significantly influence various aspects of student self-regulation, including quality of work and academic persistence (Boufford-Bouchard et al., 1991). Furthermore, when a student believes that he will succeed on an upcoming task or assessment, this academic self-efficacy can define and drive his ultimate success in that task (Nicholson et al., 2013). This form of self-belief is well-grounded in the studies of educational psychology, but linking it to academic achievement is a connection that is unfortunately sparse within educational research studies (Parker et al., 2014).

The framework of academic self-concept stems from the work of Herbert Marsh (1993). Self-concept differs from self-efficacy in that it is an organized system that shapes how individuals feel about themselves holistically, instead of

specifically believing that one has a direct effect on the outcomes of his or her own life. Examining student self-concept can help with an understanding of student attitude and how these self-directed attitudes can have an impact on a student's general outlook on life. A positive self-concept can have a significant impact on academic behaviors, academic choices, educational aspirations, and, ultimately, educational achievement (Marsh, 1993). Student self-concept can, therefore, possibly impact decisions regarding a curriculum focus in secondary and post-secondary work, as a general outlook on life and life goals can drive said decisions. When a person has a more positive view of himself, he tends to report higher self-esteem" (Showers, Ditzfeld, & Zeigler-Hill, 2015, p. 1). Furthermore, the organization of self-concept within an individual can have a direct impact on one's self-knowledge. Organizations of self-concept can either be compartmentalized or integrated. When self-concept is compartmentalized, a student applies either all positive attributes or all negative attributes toward his self-image, depending on his surroundings or the facet of life on which he is currently focused. When self-concept is integrated, one applies a mixture of positive and negative attributes to his or her self-image, giving a more balanced and comprehensive outlook (Showers et al., 2015).

How students see themselves can have a profound impact on academic achievement as well as academic growth (Nicholson et al., 2013). This study seeks a connection between student achievement on TN state ELA and Math end-of-course exams as well as student growth levels as determined by the TVAAS Model on post-secondary level exams. This connection could serve as a predictor

of future success on IB exams. If a quantitative predictor exists, students with low self-efficacy and/or self-concept could be encouraged to enroll in post-secondary coursework such as IB courses. In order to have a comprehensive picture of the potential impact this predictor could have on student recruitment into rigorous coursework, self-efficacy and self-concept must be thoroughly understood. While the qualitative impact will not be specifically examined in this study, it is important to understand that student academic achievement can be directly affected by these two psychological frameworks.

Significance of the Project

Participation in high level academic coursework can have a significant positive impact on college admission and post-secondary academic success for high school students (Bergeron, 2015). If a statistical connection between IB exam scores and student achievement on TN state end-of-course exams or individual student academic growth could be established, this correlation could be used to better identify students who have a greater potential for success in college level coursework. Based on student data analysis, students could then be better identified and encouraged to enroll in these more rigorous courses. Particularly, participation in IB coursework in high school had shown to increase post-secondary academic performance (Caspary, 2011; Saavedra, 2016). The purpose of this study was to seek a correlation between both student ELA and math achievement scores and student statistical growth in grades 9 and 10 and achievement on IB exams in grades 11 and 12 as well as examine the ELA and Math achievement scores as possible predictors of IB exam achievement in grades

11 and 12. The researcher did not find any studies that have indicated significant predictors for success on higher-level, postsecondary credit course exams such as Advanced Placement (AP) and International Baccalaureate (IB). Due to an increase in acceptance of students with AP or IB credits on their high school transcripts as well as an increased number of college credits attained (Bailey & Karp, 2003), a statistically significant, data-based indicator for success on IB exams would help school leaders and teachers to identify and recruit students into higher level coursework based on a quantitative prediction of success. Currently, there is no statistically proven connection between state end-of-course achievement or student growth and IB exam scores. Such a connection could have a significant and positive impact on student recruitment into college level coursework in high school.

In addition to the positive impacts of IB coursework on college admissions and success in college, the school of focus in this study was also a magnet school for the IB Diploma Programme (IBDP). As a magnet school, this school had a limited number of available enrollment spots each year reserved for students who wanted to attend the school specifically for the IB Programme. These enrollment spots were filled by students who lived outside the school zone and would, otherwise, have attended a different high school. These students must have passed a short academic screening to ensure that they were on grade level in reading and writing. Magnet status was granted to the focus school as a way to provide access to the IB Programme for all students living within the district boundaries, as it was the only school in the district that offered IB curriculum.

Description of the Terms

In order to best understand the concepts explored in this study, certain terms were defined.

Advanced Placement (AP). Advanced Placement is a program in the United States and Canada created by the College Board that provides college level curricula and exams to high school students. The free-response portion of the external assessments are read and graded by AP trained teachers in Canada and the United States specifically trained to read and score AP exams (Bailey & Karp, 2007).

English and language arts (ELA). ELA courses focus on English and Language Arts studies

English Language Arts achievement. ELA achievement is the achievement score a student achieves on standardized, common ELA assessments written at the state level. Achievement levels are categorized as advanced, proficient, basic or below basic.

Higher level (HL) coursework. For the purpose of this study, higher level coursework at the high school level is defined as AP courses or IB courses being offered at either the higher level or standard level (SL) (Bailey & Karp, 2007).

HL IB courses. Courses written and offered by the International Baccalaureate Organization that must be taught over a two-year period and must span at least 240 instructional hours (IBO, 2017).

International Baccalaureate Organization (IBO). The IBO is a non-profit organization that offers a global curriculum to authorized World Schools around the globe. The IB curriculum is common to all schools offering it worldwide. The external assessments, which are wholly free response, are read and graded by trained exam readers employed by the IB around the world (IBO, 2018).

International Baccalaureate (IB): International Baccalaureate is used to describe curriculum and courses offered through the International Baccalaureate Organization (IBO, 2017).

International Baccalaureate Diploma Programme (IBDP): The IBDP is the flagship Programme of IBO, available for students in the 11th and 12th grades across the globe. Courses taken through the IBDP can result in college credit at postsecondary institutions around the world.

Standard level (SL) IB courses. Courses that can be taught over one academic year, however, IB encourages World Schools to span SL courses over two years as well. SL courses must meet for a minimum of 150 instructional hours (IBO, 2017).

Self-efficacy. As defined by psychologist Bandura (1997), self-efficacy is one's belief in one's ability to complete a task or to succeed in a specific situation.

Self-concept. An important concept in social psychology that is defined as an individual's belief about him or herself. These beliefs are impacted by personal experiences and can range from one's own body image, how they label

themselves in different situations, or exploration of gender identity. Self-concept

is a large part of

self-image and self-efficacy (Marsh, 1993).

Tennessee Value-Added Assessment System (TVAAS). The TVAAS

system measures student growth over one academic school year. TVAAS

measures student growth quantitatively and separate from assessment proficiency

measures. The calculation of the TVAAS score for each child compares a

student's performance on a standardized assessment as compared to their peers

who have performed similarly on past assessments (Amerin-Beardsley & Collins,

2014).

Tennessee state end-of-course exam. Exams written at the state level that

all students enrolled in the corresponding course sit for at the end of the course

curriculum. The exams are standardized and are used as a comparative tool for

student achievement as well as teacher effectiveness.

The College Board. An American not-for-profit organization that

develops and administers standardized tests and curricula that are used by K-12

institutions to promote college-readiness through access to post-secondary

curriculum in high school (Bailey & Karp, 2007).

Math achievement. Math achievement is the achievement score a student

achieves on standardized, common math assessments written at the state level.

Achievement levels are categorized as advanced, proficient, basic or below basic.

Chapter II: Review of the Literature

In order to explore possible predictors for achievement on IBDP external exams, multiple impact sources must be reviewed. A possible correlation between student achievement and annual growth measures on state exams with achievement on IB exams was explored in order to identify possible predictors for success on IB exams. These predictors could potentially identify and encourage students to enroll in IB Diploma coursework and take the exam when coursework is complete. Through a study of school desegregation history, the impact of school magnet status on school choice, and student body diversity, the researcher explored the impact that socioeconomic status and family culture can have on educational decisions and assumptions made by students regarding rigorous coursework and their enrollment options in high school.

History of Educational Legislation

For over 50 years, equal education opportunities have been the subject of legislation within in the United States. In order to best analyze the impact of educational programming on underrepresented students, the history of legislative initiatives that have directly impacted underrepresented students across the United States must be understood. The tracking of the progression of The Elementary and Secondary Education Act (ESEA) of 1965 through time can shed light on the evolutions of the United States' educational backbone as our country has strived to provide equitable educational opportunities for all students, regardless of school placement or cultural/socioeconomic background. The ESEA served as a turning point that led to an increased focus on educational opportunities for

underserved children within the American educational system. Enacted by United States President Lyndon B. Johnson, the ESEA served as ammunition for his War on Poverty and was the first and most impactful piece of federal legislation focusing on educational equity in the United States (Riddle, 2004). The primary provision under the ESEA was a block grant program designated under Title I, which aimed to provide more federal revenue to schools serving students from low-income families with the purpose of helping to equalize educational opportunities for the educationally deprived. At the time that the ESEA was enacted in 1965, there was a significant discrepancy in educational spending among the states (Riddle, 2004). Due to these distinct regional poverty concentrations, the ESEA aimed to equalize educational funding among states in order to provide the more impoverished regions with equal access to high quality educational programming and resources (Riddle, 2004). While Title I seemed to have "stimulated some convergence in school spending across states, it would have needed to be a much larger program to eliminate spending differences across richer and poorer states" (Cascio & Reber, 2013, p. 426).

The ESEA has gone through many evolutionary modifications with every reauthorization over the years since its inception. In its first reauthorization, the ESEA expanded to include new programs and titles including the Bilingual Education Act and incorporating programs that support migrant students and neglected or delinquent children. In 1978, the ESEA was reauthorized under United States President Jimmy Carter. Under this reauthorization, ESEA stated that schools with 75% or higher poverty rates can operate school-wide programs

in order to impact student learning, rather than solely focus Title I funding on low-income students (US Congress, 2011). When reauthorized under United States President Ronald Reagan in 1980, Title I was renamed Chapter 1 and was now a separate program that had decreased regulatory requirements for districts and states (US Congress, 2011).

In the years following the 1980 reauthorization of the ESEA, Chapter 1 moved toward an expansion of testing and accountability requirements, which drove the need for and basis of future reauthorizations (Klein, 2015). Districts were now required to examine annual progress, and if a school district did not make significant progress, it was required to submit improvement plans outlining what modifications would be implemented to further increase student achievement. In 1989, the Educational Summit in Charlottesville, Virginia, served as a catalyst for standards-based educational reform (Riddle, 2004). This summit was only the third time in history that a President had met with representatives from nearly every state with the sole purpose of discussing a single legislative policy. In 1994, the renewal of the ESEA was called the Improving America's Schools Act. Under this act, Chapter 1 reverted back to its original name, Title I, and new mandates required states to develop state teaching standards as well as assessments that were aligned with those standards (Klein, 2015).

A large shift on the ESEA came in 2002 under United States President George W. Bush. The ESEA's testing requirements were expanded significantly to include mandatory math and reading assessments for grades 3 through 12. If a

school failed to meet the expected Annual Yearly Progress (AYP), it was required to allow student school choice and provide free tutoring to all students using the workforce within the school's staffing allotment. In addition, every teacher was required to be highly qualified in the subject they taught. To be highly qualified, a teacher had to 1) have a bachelor's degree in the subject he taught, 2) hold full state certification or licensure, or 3) prove they know each subject he teaches by passing a competency test in the subject area at hand. In 2009, the Stimulus Aid for Education under United States President Barack Obama incorporated major education provisions through the American Recovery and Reinvestment Act, which was designed to create a significant economic stimulus for the United States. As a part of the Stimulus, the qualifying school poverty rate was decreased to qualify more schools for Title I funding for a three-year period. RTTT grants totaling $4 billion were also awarded to 12 states that articulated a clear plan to embrace the idea of school turnover, state data tracking, and a solid teacher evaluation system (Klein, 2015).

In 2002, President Bush signed the No Child Left Behind Act (NCLB) into law. The aim of this Act was "to ensure that all children have a fair, equal, and significant opportunity to attain a high-quality education and reach, at a minimum, proficiency in challenging start academic achievement standards and state academic assessments" (US Department of Education, 2004, para. 2). Government funding formulas were shifted to provide more resources to schools with a high number of students that are of low socioeconomic status and are struggling academically. As years passed, state waivers were granted, easing the

mandates of the NCLB. In exchange for these easements, states were required to put specific teacher evaluation guidelines in place, adopt standards for College and Career Readiness, and put an increased emphasis on improving the lowest achieving 15% of schools in the state; however, with these waivers, each state was given the freedom to designate its own intervention strategies and its own definitions of success (Klein, 2015).

Magnet Schools and School Choice

The focus school for this study has been designated as a magnet school with the IBDP serving as the unifying magnet theme. A magnet theme is an educational area of focus that a magnet school chooses (Jennings, 2010). This area of focus may be exclusively offered by the magnet school, or it may be a focus on specific areas of study such as Science, Technology, Engineering and Math that are offered in other schools but without the level of focus placed on them in the magnet school. Students can choose to enroll in a magnet school, based on their level of interest in the schools' theme. While no previous studies can be found on the impact of the IBDP specifically within a magnet program, other magnet themes have been studied. Regardless of the theme, a school's magnet status can have an impact on student transfers into the school and, therefore, the cultural makeup of the school and the school achievement levels (Jennings, 2010). When looking into the concept of magnet designation for a school, two areas can be explored: school choice from the perspective of the parents and school choice from the perspective of school leadership. Why do parents choose to transfer their child to a school other than their zoned school?

How do school leaders view school choice and how can these view impact school programming and enrollment (Jennings, 2010)?

The term *magnet*, first coined in 1971, was to describe a new school in Houston, Texas, that was designed around the concept of visual and performing arts (Rossell, 2005). When the school opened, it attracted students from multiple races and socioeconomic status, and it was said to act as a magnet as it pulled students in from a variety of background from all over the city. This was in the time of opposition toward the concept of desegregating public schools, so the concept of magnet was met with mixed reviews. Until the early 1970s, schools were mandated to deliberately and awkwardly desegregate (Riddle, 2004). As a result, multiple strategies were implemented, including bussing of students into schools in order to forcibly increase racial diversity or relocating teachers and administrators in order to diversify faculty as well. As time went on, federal courts came to the realization that enrichment programs could help to naturally desegregate our schools through the offering of enrichment programs that would appeal to student interests. These enrichment programs came to be known as magnet programs, and the concept of voluntary desegregation took hold (Rossell, 2015). Over the last 30 years, the concept of a magnet school has morphed and evolved, but it still traditionally refers to public schools that offer curricula that are attached to a theme or a specific content matter.

Today, magnet schools are adjusting to the new climate of school choice. Instead of using magnet themes to desegregate and attract students of different cultural and socioeconomic backgrounds, magnet schools are moving toward

using magnet themes to improve school quality and achievement and, in turn, attract student from all walks of life for the curriculum and learning environment, not the neighborhood (Fleming, 2012). As Smreker, an associate professor at Vanderbilt University, Nashville, Tennessee, who has been studying magnet schools for many years, said in Fleming's (2012) article:

> The future of magnet schools will depend upon which policy values and priorities school leaders embrace and whether the federal role will emphasize racial diversity as an educational goal or place the highest value instead on accountability and innovation exclusively, at the expense of diversity. (p. 4)

Magnet schools continue not to limit their enrollment based on zoning lines but instead accept students from multiple areas within their district. In addition, the selection of a magnet theme is now most often based on student achievement and a desire of increased student mastery, not on attracting students with the purpose of increasing racial or socioeconomic diversity. Given the very definition of a magnet school, school choice becomes a related topic when considering the implications of magnet status on a school.

Phillips, Hausman, and Larsen (2012) examined intra-district transfers within one urban school district with a focus on factors that influence the tendency of parents to request a transfer to another school within the same district. Phillips et al. (2012) discovered that while socioeconomically advantaged and disadvantaged parents both requested transfers away from their zoned school, the actual schools they selected fell into different subsets of overall student

achievement. Both sets of parents chose schools that were more affluent than the school for which they were zoned; however, while the advantaged parents chose schools that had the highest student achievement records, the more disadvantaged parents selected schools that were farther away from the least affluent schools but did not necessarily have the highest student achievement records. While the priority of both sets of parents was to provide an education for their children in a school that was located in a more affluent area, achievement records were a higher priority for the socioeconomically advantaged parents. The less advantaged parents primarily wanted their children farther away from the least affluent zoned school (Phillips et al., 2012).

The idea of school choice can have a significant impact on how school leadership drives magnet programming (Fleming, 2012). When a student is able to apply for an inter-district transfer to a school other than his zoned school, many factors can be analyzed. School choice can be considered from the parents' points of view as well as from the school leadership point of view. How might a school leader react to the idea of accepting students from out of zone? Do they wait for students to be allocated to their school or do they use specific recruitment strategies to ensure that they can positively influence the quality of students coming in to their school? Jennings (2010) conducted a study in which she examined the role of the school in school choice. Jennings (2010) interviewed the principals from three small high schools in New York to ascertain their varied views with regard to the desire to attain students that would help them in their quest for high achievement in this day and age of accountability. This study

focused on the influence of professional networking and each principal's own worldview on his philosophy of how school choice can positively influence his own school's dynamic. Jennings (2010) ultimately found that parents and community members should not be seen as the sole influencer on school choice policies and ultimate impact on school culture. Two of the three schools studied had procedures in place that directly impacted their student intake. Although the schools were not able to screen students based on academic achievement, they used other methods to influence their student admission. "Schools used multiple methods to enroll a higher achieving student population, including signaling to families during the recruitment process, using the city's data management system to their advantage, creating alliances with junior high schools, and learning the ranking preferences of the students" (Jennings, 2010, p. 244).

Through its magnet status, the focus school for this study provided opportunities for all students living within the surrounding district to attend on a magnet transfer; therefore, students living outside of the school's zone were provided with the opportunity to participate in the IB Programme. In conjunction with the four other magnet schools within the district, the focus school allows for all students to have choices when transitioning to high school. Students have the opportunity to pursue studies at a school for which they are not zoned, allowing families the flexibility to attend the high school that will best support their child's educational goals.

Magnet Schools and Student Achievement

      Many districts across the United States have opted for inter-district magnet school programs in order to promote choice-based desegregation across schools. Historically, schools with higher concentrations of minority students or students of low socioeconomic status offer fewer academically challenging courses such as AP or other challenging college-level coursework, such as the IB (Bifulco, Cobb, & Bell, 2009).

      Bifulco et al. (2009) completed an extensive quantitative study in 2009 to examine the effect that inter-district school choice can have on overall student achievement in those magnet schools in Connecticut. This study presented statistical evidence that inter-district magnet schools provide students with access to less racially and socioeconomically isolated educational environments and quantitatively measured the resulting impact on student achievement. Within the district of focus for this study, students were allowed access to their school of choice, and students were admitted to these magnet schools based on a random lottery system. By allowing all students school choice, this district hoped to reduce economic and racial isolation in its schools. The results indicated that students enrolled in magnet schools showed higher achievement and value-added growth than their non-magnet peers.

      Achievement effects were measured using a sample of magnet lottery participants and a regression formula that considered the student's 8th grade test score, and whether he was admitted to the school. Through using the regression formula, Bifulco et al. (2009) found a distinct positive effect on both the

mathematics and reading achievement for students attending an inter-district high

school and a positive effect on student reading achievement at inter-district

middle schools (Bifulco et al., 2009). It should be noted, however, that the results

by Bifulco et al. (2009) did not isolate the lack of racial and economic isolation or

curricular magnet themes as the reasons for increased achievement due to the

small sampling of schools included in the study.

This study raised the question of whether or not the cost of these magnet

schools and inter-district transfers to these schools was worth the increased

student achievement. The specific contributors to increased student achievement

were not isolated within this study, and the cost of new facilities as well as student

transportation can have significant budget implications. Due to these factors, this

study stated that magnet schools cannot be considered the sole answer for

increased student achievement due to the idea that many districts will not be able

to financially support the idea of magnet schools; however, Bifulco et al. (2009)

suggested that due to the findings in this study, districts should consider magnet

designations and magnet programming as a possible way to increase student

achievement while also decreasing racial and economic segregation within a

school district.

Also in this study report, Bifulco et al. (2009) stated that when schools

have a larger concentration of minority students and students of low

socioeconomic status, the schools have a harder time retaining high quality

teachers, which can have a directly negative impact on student achievement.

Because these students of low socioeconomic status often have more behavioral

and academic difficulties in school, teachers' expectations and instructional strategies can be negatively influenced, which can compromise student achievement. Due to these negative assumptions and behavioral issues, students in a school with high poverty levels had overall lower achievement scores than schools with low poverty levels or a more integrated and diversified educational environment. These integrated environments can help to alleviate these negative influences and provide a more cohesive and enriched learning experience for students (Bifulco et al., 2009). Providing students with options to transfer to an inter-district magnet school can help to further integrate schools to have a more socioeconomically balanced student population. In addition, because magnet schools are often centered on a common curricular theme, they can offer a stronger sense of belonging and enthusiasm toward the curriculum for students, whether the students are zoned for that school or there on a magnet transfer. This increased enthusiasm can, therefore, can lead to increased student achievement schoolwide (Gamoran, 1996).

Gamoran (1996) conducted a quantitative study on the effects of attending a magnet school, private school, or a secular private school on student achievement growth as compared to public comprehensive schools. This particular study focused on the effect of these educational structures on the achievement levels of urban students in the four core areas of study: math, reading, science, and social studies. In order to explore the distribution of achievement in city schools, Gamoran (1996) used data from the National Educational Longitudinal Survey (NELS), which surveyed 24,000 students in

their 8th grade year and followed up with those same students two years later

when they were in their 10th grade year. The urbanization of schools used in the

study was defined by school administrator responses to questions within the

NELS survey regarding the location of the school with respect to a city with a

population of 50,000+ people and whether the surrounding area to their school is

urban, suburban, or rural. A third indicator used was classifications from the

Quality Education Data, which uses census to identify central city locations.

From this data, Gamoran (1996) discovered that compared to the national

average, city students were more likely to attend a public magnet school or a

private school due to an increased number in opportunities to attend schools with

special missions or themes. In addition to analyzing school choice within a

population of city students, Gamoran (1996) analyzed student achievement

growth within those various types of schools. By analyzing achievement scores

of the students sampled in the study, Gamoran (1996) was able to conclude that

magnet schools appear to produce higher achievement for students in both reading

and social studies. Additional factors also considered in the study were types of

courses available to students, school climate, and the endearment levels students

have toward their school in general.

According to Gamoran (1996), prior to the implementation of magnet

programming, many comprehensive high schools lacked specific programming

that ties curricular strands together in order to help students see real world

connections to what they are studying in school. What resulted from this lack of

cohesiveness was that students were arbitrarily choosing courses of study instead

of truly understanding the connectivity between them. These deficiencies manifested in more obvious ways in comprehensive high schools, particularly in the inner city, as the sense of community had declined in the more urban areas of the country. This decline in social structure in the more urban areas had "undermined the development of social capital [in urban communities] and students cannot draw on that social capital in their families and neighborhoods to sustain their commitment to their education" (Gamoran, 1996, p. 2). As Gamoran (1996) stated, the social capital of a community depends on human connections within that community. When the social capital was flourishing, cognitive and emotional development of the youth within the community were supported and there was a greater understanding and appreciation for educational endeavors and academic work. When social capital suffers, so does the level of adult support for the community's youth.

When examining the effectiveness of magnet schools, it can be difficult to pinpoint student success and the factors that contribute to that success (Gamoran, 1996). The use of curricular themes, limited and competitive enrollment, and the inconsistency of community support of some students in magnet schools can impact overall student achievement; however, the actual definition of student achievement and the extraneous factors that can impact those achievement numbers can bring into question the true definition of student success. According to Ballou, Goldring, and Liu (2006), evaluations of the effectiveness and level of positive impact on student achievement can have methodological limitations. If one simply analyzes student achievement for magnet vs. non-magnet students,

one cannot account for prior educational experiences or growth. These prior

experiences can have a significant impact on student achievement, regardless of

magnet status (Ballou et al., 2006).

Despite many studies surrounding magnet schools and the subsequent

effect on student achievement, drawing direct parallels between student

achievement and magnet school status designation is a difficult process. Multiple

factors affect a student's response to instructional methods and ultimately his or

her learning. Due to multiple variables contributing to student academic success,

such as school climate, quality of teaching staff, and school location (Gamoran,

1996), it is very difficult to precisely connect student success solely to school

magnet designation. A quantitative study conducted by Ballou et al (2006)

examined the impact of attending a magnet school on student achievement within

a mid-sized school district in the state of TN. A sample of 2,747 middle school

students were monitored over a period of four years. Of the 2,747 students in the

sample, only 649 failed to secure placement in a magnet school as 5th graders.

Due to the small control sample size of students not attending a magnet middle

school, Ballou et al. (2006) stated the results were likely imprecise. In order to

measure magnet school effectiveness on student achievement, Ballou et al. (2006)

analyzed student scale scores on the Tennessee Comprehensive Assessment of

Progress state exams, which are administered to grades 3-8. While the study

found an overall positive affect of magnet school structure on reading and

mathematics achievement, Ballou et al. (2006) also stated that they are "so

imprecise that we cannot rule out that the true effects are zero or even negative"

(p. 18). The lack of connection between student achievement and the status of the school they attend was attributed by the thought that when higher-scoring students were not drawn in the lottery for attending a magnet school, they were more likely to leave the system altogether, leaving low quality schools to be overrepresented in the comparison non-magnet student group. This attrition bias can depress the mean achievement in the non-magnet comparison group and make magnet schools appear to have a larger positive impact than they actually do. Due to the lack of control over such student characteristics, Ballou et al. (2006) concluded that while there was a higher mean of achievement in magnet school students; this wide variation of student characteristics within the control group prevented a solid conclusion from being made.

International Baccalaureate Diploma Programme (IBDP)

The IBO is a non-profit educational organization that strives to provide a common rigorous international education for all IB students across the globe. Established in 1968, the IBO was developed by teachers at the International School of Geneva in Switzerland. The original goal of the IBO was to provide a rigorous education to students who were planning to study abroad after graduation from secondary school and had the intention of providing a common pre-university curriculum that would be accepted at post-secondary institutions worldwide. What began as a small non-profit organization serving Swiss students has now grown into an organization serving almost 5,000 schools in 150 countries ("About the International Baccalaureate," 2018). The specific IB program studied in this research is the Diploma Programme, which serves students aged 16-19.

The philosophy and aim of the International Baccalaureate Organization (IBO) is to create a "better and more peaceful world through intercultural understanding and respect" (IBO, 2017, p. 3). In 1997, the IB programming was expanded to include a Middle Years Programme for grades 6-10, and three years later, the Primary Years Programme for grades Kindergarten-5 was initiated. As recently as 2012, the 4th and most recent program, the Career-Related Programme was added to complete the current IB program offerings. These four IB programs were created and facilitated by the IBO. Since establishment, IB programming has gained popularity, and there are currently 6,068 programs offered in 4,655 schools ("About the IB", 2018). Currently in South America, North America and Canada, 2,833 schools implement at least one IB program, which accounts for 60.9% of all IB schools worldwide (IBO, 2018).

"A world class education is cognizant of globalization and the need for an education whose perspective extends across national frontiers" (Hill, 2012, p. 342). The IB programming aims to provide a well-rounded education to students around the world with national curricula presented with international perspectives. IB Programmes have been referred to as world class both because of the knowledge and perspectives encouraged across all IB programming and because of the development of students' attitudes and learning attributes as well as the availability and recognition of the programs worldwide (Hill, 2012). The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has been in existence since 1946 and was formed as a result of representatives from 44 countries coming together to create an organization that would create a worldwide

culture of peace. Several elements of an international education have been

defined by UNESCO, including a push toward valuing education as a catalyst for

peace, conflict resolution skills, and respect for cultural heritage and intercultural

understanding. These values were also reflected in the IB Mission Statement

(IBO, 2017, pg. 3). IB Programmes promote the educational development of the

whole child, emphasizing intellectual development as well as emotional, social,

and personal growth. (Hill, 2012). By focusing on this combination of both

knowledgeable and philosophical growth as well as the concepts of international

mindedness and understanding, the IB strives to develop responsible, educated

citizens that see the importance of both local and global action and impact. The

IB helps to instill values that encourage students to be lifelong learners, which is a

cornerstone of a world-class education.

Within the IB Diploma Programme (IBDP), students can choose to

participate in the program in two ways. First, students can pursue the full IB

diploma, which consists of enrolling and testing in seven IB courses over the 11th

and 12th grades, writing a 4,000-word extended essay, and completing

approximately 150 hours of Creativity Activity and Service (CAS) (IBO, 2017).

An IB full diploma candidate is working to obtain a diploma, which is above and

separate from the diploma they receive when they graduate from high school.

The IB diploma is awarded by the IBO to any student that successfully fulfills the

requirements designated by the IBO. In order to be awarded the IB diploma, a

student must sit for six IB exams, submit an essay as the final assessment for their

Theory of Knowledge (TOK) course, submit an extended essay, and complete his

CAS requirement (IBO, 2017). If a student fulfills all of these obligations and scores a cumulative total of 24 points on all of the diploma components, the student is awarded an IB Diploma.

Each IB exam is graded on a scale of 1-7, with a score of 7 being the highest. Students receive a grade for each IB course they attempt. A student's final diploma score is a cumulative score of all subject area exam scores. In addition to the 6 subject area exam scores, students can receive up to three additional points based on the performance on the TOK essay and the extended essay. The CAS requirement does not contribute points to a student's overall diploma score, but authenticated participation is required for the award of the diploma (IBO, 2017). If a student chooses to pursue the full diploma, he must register in a course from each of the six content area groups: Language and Literature, Language Acquisition, Individuals and Societies, Sciences, Mathematics, and the Arts. The 7th course for an IB full diploma candidate is TOK, which is a requirement for all full diploma candidates. If a student wishes to not take a course from the Arts group, he may substitute a second course from one of the remaining five groups. The acquisition of the IB full diploma is a very rigorous endeavor due to the level of rigor in each of the seven IB courses in addition to the requirement of the extended essay and the CAS component, both of which are completed over an 18-month period during the 11th and 12th grades of high school.

Most IB courses are offered at both the SL and the HL levels. A SL course is a course that may be taught over one academic year and has a minimum

requirement of 150 instructional hours. A HL course must be taught over two years and has a minimum requirement of 240 instructional hours. In order to be eligible for the full IB diploma, a student must successfully complete at least three HL courses as a part of their full diploma coursework. In addition to the full IB diploma option, students can also choose to take IB courses or participate in any of the three core elements (i.e., extended essay, CAS or TOK) individually or as a smaller curricular grouping. This option opens the IB Diploma Programme up to all students, both the students who want the rigorous challenge of a full IB course-load and the students wishing to participate in the IB to a lesser extent (IBO, 2017). IB coursework in high school can translate to college credit after graduation. The IB Diploma Programme is endorsed as a pathway program for students continuing to a post-secondary educational experience. A pathway program is a program that offers enriched curricula that can serve as a bridge for the transition from high school to a post-secondary institution. The IBO characterizes the Diploma Programme as "an academically challenging and balanced programme of education" (p. 130) that "prepares students… for success at university and life beyond" (p. 130) and has "gained recognition and respect from the world's leading universities" (Park, Caine, & Wimmer, 2014, p. 130). IB credits earned in high school can translate to college credits at institutions across the world, with each institution having its own philosophy and policy in that regard.

Impact of Post-Secondary Level Coursework in High School

Post-secondary level coursework is offered in most secondary schools across the globe. More specifically, in North America many high schools offer coursework through the AP Program and the IB Programme. In addition to AP and IB coursework, many schools offer Dual Enrollment courses. The Dual Enrollment program allows high school students, usually in grades 10-12, to enroll in college courses for credit prior to high school graduation. Those courses are taught by college faculty and can be taught either on the college campus or on the high school campus. All three of these post-secondary options can result in college credit being granted on a student's college transcript before he graduates from high school (Bailey & Karp, 2003). All three of these programs are referred to as credit-based transition programs, as they allow students to transition from high school to college with credit-bearing impact on the college transcript.

Credit-based transition programs are also categorized as either singleton or comprehensive (Bailey & Karp, 2003). Singleton programs, such as AP, are offered as an elective and are not designed to mimic the college experience; rather they aim to enrich the high school curriculum offerings by giving students the opportunity to take a course that contains college-level rigor within the curriculum. According to Bailey and Karp (2003), "…the majority of the literature reveals that students in [singleton] programs are already highly motivated and academically proficient" (p. 9). Courses within singleton programs can result in college credit being awarded on a student's transcript as long as he

achieves a certain score on the final external exam following the course (Camara & Millsap, 1998).

In contrast, comprehensive programs are meant to encompass most of a student's educational experience in the last 1-2 years of high school. Programs like the IB Diploma Programme encourage students to enroll in multiple college-level courses simultaneously to mimic a comprehensive liberal arts college-level educational experience in high school. Due to the rigor and intensity of comprehensive programs, students have more opportunity to learn the work habits and behaviors that contribute to success in college while still in high school. Bailey and Karp (2003) found that while reviewing the literature for their study, very few studies exist regarding the effects of college-transition programs on student success in college. In addition, few studies take into account student characteristics, prior student achievement, or student motivation levels. Due to the fact that many of the programs analyzed in their study had entrance requirements, they could not effectively discern that the measured outcomes resulted from the selectivity of the program entrance requirements or the programs themselves. If a college-transition program has an open-enrollment policy, it may be able to serve a more diverse set of students and measured outcomes would be more indicative of student experiences gained within the program (Bailey & Karp, 2003).

Rationale behind offering both singleton and comprehensive college-transition coursework in high school has been multi-faceted. First, college-transition programs can help to prepare students for the rigors of college

coursework. For instance, increasing students' exposure to coursework that requires students to apply previously learned knowledge to unfamiliar situations in order to solve a problem can greatly prepare them for post-secondary level coursework. By providing students with this exposure, schools can provide a more realistic picture of the skills that students will need to succeed in college (Bailey & Karp, 2003). Students who struggle in college-transition programs can get a clearer picture of the skill sets they lack for success in college before they enroll or even apply to college. Helping students to identify these skill gaps and, in turn, helping them to further develop those skills can be very beneficial to students who have had historically lower achievement levels than their peers. Often when students drop out of college, they cite non-academic reasons for their lack of success. These reasons include being overwhelmed by the course load, lacking focus, or having an unrealistic perception of what the college experience was going to be like before they arrived on campus (Bailey & Karp, 2003). Another reason for offering college-transition programs in high school is to expose traditionally non-college going or first-generation college goers to college level coursework. Many students who do not have college-educated parents do not see college as a viable option for them (Kyberg, Hertberg-Davis, & Callahan, 2007). By exposing these students to college-level work in high school can help them to better understand what college is really like and help to unshroud the mysteries of college coursework in order to increase their self-efficacy when viewing their post-secondary options.

In addition to helping students to better understand the nature and rigor of college coursework, participating in college-transition coursework in high school can help to reduce the financial burden of a college education for many students. When a student enrolls in a course through dual enrollment, that course is either free or at a low cost compared to college credit hour costs. Likewise, enrollment in AP or IB courses is free of charge. The only cost associated with AP and IB courses are the external exams that students sit for at the end of the course experience. Oftentimes, at the school, district, or state level, student test fees are covered for students needing assistance or qualifying under the free and reduced lunch program. Financial assistance is often available for students for whom an exam or exam registration fee would be a financial hardship. This ability to earn college credit, sometimes up to an entire year's worth at some post-secondary institutions, allows students to shorten the time it takes to achieve their college degree and save significantly on the overall cost of a college education (Bailey & Karp, 2003).

In a quantitative study by Saavedra (2014), the academic impact of enrollment in the IB Programme specifically in the Chicago, Illinois, Public School system was analyzed and measured based on composite ACT scores, probability of high school graduation, probability of college enrollment, and whether those estimates differ by gender. For this study, the analytic strategy was to use a propensity score approach to estimate the impact of IB enrollment on student measures of success, including academic achievement, probability of high school graduation, and probability of college enrollment. The sample group

consisted of 20,422 students attending 13 high schools within Chicago Public Schools, and the study occurred over a six-year period.

The Chicago Public School district has twice the number of IB World Schools than any other U.S. school district. IB World Schools are schools authorized by the IBO to offer IB curriculum. In addition, the average student in the Chicago Public School System is of minority status and classifies as low-income (Saavedra, 2014). The high volume of low income and minority students included in this study helps to enhance knowledge of ways to improve secondary education and increase post-secondary opportunities for disadvantaged urban youth. The primary goal when the Chicago Public Schools decided to widely implement the IB Diploma Programme across multiple schools between the years of 1997and 2004 was to "increase predominantly low-income and minority students' access to academically rigorous curricula in neighborhood high schools and, thereby, to increase their academic achievement and college preparedness" (Saavedra, 2014, p. 5).

Questions asked in this study included whether or not enrollment in the IB Diploma Programme increased the probability that students would take the ACT college entrance exam, whether enrollment would increase student academic achievement as measured by their ACT composite score, and whether enrollment in the IB Diploma Programme would increase the probability that students would enroll in a two- or four-year college after high school graduation. Another aspect of Saavedra's (2014) study was to look at probability of enrollment in IB Diploma Programme coursework based on 7th grade reading percentile based on both race

and gender of the students. The findings regarding future IB enrollment and 7th grade reading percentile revealed that given the highest reading percentile, African American males had the lowest probability of enrolling in IB coursework in the 11th grade at a 0.1 probability, followed by Latino males at 0.12, White males at 0.17, and African American females at 0.19. Asian-American females had the highest probability of IB enrollment at 0.58, followed by Asian-American males with the second highest probability of 0.4 (Saavedra, 2014). Given that the reading percentile was constant and was, therefore, not an indicator of lesser academic ability, it is clear that gender and race can currently serve as a predictor for future IB Diploma Programme enrollment.

Based on the findings of this study, the fitted probability that all White, Latino, and African-American girls will enroll in the IB Diploma Programme is greater than the probability that all White, Latino, and African-American boys will enroll (Saavedra, 2014). Regarding the impact of the IB Diploma Programme on students taking the ACT college entrance exam, in the Chicago Public School System, enrollment in the IB Diploma Programme increased the fitted probability that students would take the ACT exam. Being enrolled in the IB Diploma Programme also increased student academic achievement as measured by ACT composite scores by 0.54 standards deviations; the impact on ACT scores and on students taking the ACT exam are comparable across the student sample. Enrollment in the IB Diploma Programme also showed a resulting increase in student probability of enrolling in college during the first four semesters following high school graduation by 38% (Saavedra, 2014). This

was a large study conducted within one of the largest school districts in the United States. The results of this study were indicative of the significant impact enrolling in a comprehensive college-transition program can have on post-secondary plans for high school students, particularly for male minority students that represent the underserved and urban youth.

Kyberg et al. (2007) conducted a qualitative study that examined whether IB and AP programs provided an optimal learning environment for high-performing students, particularly from multicultural backgrounds. Qualitative data was collected through classroom observations and student, teacher, and administrator interviews across three urban high schools. Due to a significant shift in demographics of metropolitan areas, student bodies in the study area, and particularly in the three study schools, had become multiracial, multilingual, and multicultural. In addition, the number of IB and AP programs had increased significantly in the area. This study provided an examination of how students, teachers, and communities were navigating these new school environments and whether IB and AP programs provided the needed environment for academically gifted minority students. Barriers to achievement for these students include poverty and lack of education within the family, particularly immigrant families (Kyberg et al., 2007). Data were gathered through school visits by the researchers twice during the course of one academic year. Minority students comprised the majority of the student body at all three schools. The three schools had between 77%-87% minority students attending each school. Through a series of interviews and classroom observations, it was found that a complex web of

interdependent factors impacted school and classroom experiences for traditionally underserved students. These factors existed at the district level, the academic coordinator level, the building administration level, and the teacher-student interaction level and were all interwoven as a complex and impactful web that provides opportunities and support for gifted minority students. Data were triangulated across all three schools and across the sources of observations and interviews. The data provided a rich narrative of urban schools where the vast majority of the student body were in the racial, cultural, and low socioeconomic minorities.

While it was found that exposure to the AP and IB curriculum was beneficial to academically gifted minorities, two key modifications were found to allow these students to experience more success and increase college readiness. These modifications included a consistently communicated belief that all students could achieve and be successful. This was facilitated through intensive and consistent instructional support and scaffolding these supports helped to support and challenge students of all levels. Students who chose to discontinue their studies in the AP and IB programs did so because they believed the curriculum, instruction, and environments the programs provided were not appropriate for their individual academic needs, and they did not feel that they could succeed (Kyberg et al., 2007). This study concluded that when support structures are in place, academically gifted students from diverse backgrounds can overcome deficits in study skills, the English language, and background knowledge and be successful in academically rigorous coursework.

The impact of exposure to the IBDP curriculum can also provide a lasting impact for students in lessons of academic civic mindedness and model citizenship. These attributes can provide significant development in skill sets that help in post-secondary studies as well as life as a global citizen (Saavedra, 2016). In Saavedra's (2016) qualitative study, interviews and surveys were used to describe the IB Diploma Programme's impact on the development of academic civic mindedness and model citizenship at four public schools in California. This study defines academic civic mindedness as "student knowledge of the U.S. system of government public policy and effective advocacy techniques" (Saavedra, 2016, p. 2).

Due to the difficulty of determining a consensus around a singular definition of citizenship, Saavedra adopted the Westheimer and Kahne (2014) citizen typology framework for this study as a way to consider multiple definitions of model citizenship. Westheimer and Kahne (2014) suggest that engaged citizens can be personally responsible by following laws and engaging in community service. Engaged citizens should also be participatory by voting and learning about and engaging in political discussions and governmental decisions. Finally, engaged citizens are justice-oriented as when they strive to understand issued from multiple perspectives, they fight for equality and promote human rights, and they denounce prejudice (Westheimer &Kahne, 2014).

Saavedra (2016) had the Diploma Programme coordinators at each of the four schools designate teachers to participate in the study. The researcher requested the teachers collectively teach TOK, English, History of the Americas,

and Creativity, Action, and Service (CAS). TOK is a mandatory course for all full diploma candidates in which students discuss ways of knowing and reflect on the nature of knowledge and how we really know what we know about the world (IBO, 2017). CAS is another part of the Diploma Programme core curriculum and serves to engage students in community service and civic responsibility alongside their academic studies (IBO, 2017). The service component of CAS is a way in which IB purports to address civic objectives (Saavedra, 2016). These areas within the IB curriculum were chosen based on their connection to the teaching of civics and citizenships (Saavedra, 2016).

Through this qualitative study, data was collected using semi-structured interview protocols for students and teachers. Students and teachers were asked open-ended questions that prompted subjects to discuss particular social issues that are important to them personally as well as their perspectives regarding those issues. Student were asked how participation in the IB Diploma Programme had impacted their knowledge, skills, or attitudes toward that issue (Saavedra, 2016). The interview questions also asked students to compare development of civic knowledge, skills, and attitudes in IB Diploma Programme vs. non-Diploma Programme coursework.

Results from this study support the idea that the IB Diploma Programme curriculum is strengthening a civic understanding for students. According to 100% of respondents, the IB Diploma Programme's "heavy pedagogical reliance on discussions, debates, oral presentations, writing and teamwork facilitates students' development of many of the skills necessary for civic engagement"

(Saavedra, 2016, p. 9). Students and teachers reported through the interview process that the IB curriculum as well as the IB testing format further supports a stronger understanding of civic responsibilities. Student respondents frequently mentioned that the AP examination focus was not at all a civically-minded one. A few teachers also felt that IB external examinations lacked a civic focus and that both AP and IB could benefit from a more deliberate incorporation of civic outcomes in their examinations (Saavedra, 2016). Overall, this study found that the IB Diploma Programme develops students' citizenship through promoting their awareness of political and social issues as well as active engagement within the global community. The development of such civic understanding and attributes from the IB Learner Profile (IBO, 2017), such as inquiring, open-mindedness, risk-taking and being a knowledgeable and responsible citizen, can have a profound impact on student success in post-secondary studies (Hill & Saxton, 2014).

Predictors of Success in Post-Secondary Coursework in High School

Camara and Millsap (1998) conducted a quantitative study regarding predictors for success on AP exams. In particular, they looked at a correlation between a combination of Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test (PSAT/NMSQT) scores and high school course grades with a student's resulting score on several AP exams, looking at each PSAT component. The PSAT consists of both verbal and mathematical sections. The verbal section involves extended reading passages, and the mathematical section allows the use of calculators. This study evaluated both a correlation

between AP test scores and PSAT scores as well as course grades in relevant

courses and student Grade Point Average (GPA). Camara and Millsap (1998)

used data obtained for all students who took the PSAT in either 1993 or 1994 and

also took one or more AP exams in the 1993-94 and/or 1994-95 academic school

years. With this multi-year data set, the sample size for this study was 704,919

students across the United States. Additional data analyzed in this study such as

course grades, courses completed, and student GPA were gathered from the

Student Descriptive Survey that each student completes when taking the PSAT.

Since not every student completes this optional survey, the total sample size

analyzed with regard to course grades, courses taken, and student GPA was

501,469 students; therefore, two overlapping populations were analyzed in

multiple regression.

When conducting this study, each AP exam offered at the time was

analyzed in relation to the PSAT verbal and math scores. The selection index

used to determine eligibility for scholarships granted by the National Merit

Scholarship Corporation is the sum of the verbal and mathematics PSAT score x 2

(Camara & Millsap, 1998). This study then selected the best PSAT section

predictor for each AP exam based on their data analysis and created score

expectancy tables that illustrated the proportion of students within a specified

PSAT score range that scored either a three or four on the corresponding AP

exam. AP exam scores of three or four were selected for the comparative analysis

because nearly all colleges and universities require a score of three or four on an

AP exam in order to grant college credit for a course deemed to be equivalent to

the AP course completed in high school. Overall, there was a much stronger

correlation found between PSAT exam scores and AP course success than those

of high school course grades (Camara & Millsap, 1998). Specifically, regarding

AP Literature, AP Language, and both levels of AP Calculus, a strong correlation

to either the PSAT Verbal, PSAT Math score, or PSAT Verbal/Math composite

was apparent (See Table 1).

Table 1

AP Exam/PSAT Correlation Findings

Exam Name	PSAT Verbal Correlation	PSAT Math Correlation	PSAT Composite Correlation
AP Literature	.6678	Not significant	.6311
AP Language	.6537	Not significant	.6425
AP Calculus AB	Not significant	.5584	.5197
AP Calculus BC	Not significant	.5087	.4539

Based on the findings of this study, there appears to be a stronger

correlation between AP English exams and PSAT Verbal and Verbal/Math

composite scores than between AP Math exams and PSAT Math composite scores

(Camara & Millsap, 1998). This could be because the AP Calculus exams were

the only math exams analyzed, and the specificity of calculus curriculum is quite

different from the PSAT general math content. Correlation of high school math

grades to AP Calculus AB and BC exams were much weaker with a correlation of

0.057 and 0.045 respectively. Camara and Millsap (1998) found that performance

on the PSAT/NMSQT is not strongly correlated to AP grades on only four AP

exams: Studio Art/Design, Studio Art/Drawing, German Language, and Spanish

Language with correlations to the PSAT Verbal/Math composite of only .1269,

.1667, .0878, and -.0545 respectively. The relationship between PSAT/NMSQT

scores and AP scores are moderately strong in other AP courses and are consistent

across all ethnic and gender groups regardless of the time of testing. Time of

testing is an important variable to consider, as most counselors and teachers can

then use PSAT scores from the sophomore year to accurately predict AP success and place those students appropriately in AP courses in both the junior and senior years. Results from the PSAT taken in the junior year can, based on the findings in the study by Camara and Millsap (1998), very accurately predict success in AP coursework in the student's senior year.

Impact of International Baccalaureate Coursework on Post-Secondary Success

The impact that an IB education can have on post-secondary success has been explored within many facets and factors that contribute to success. The academically and emotionally enriching experiences that are accumulated by an IB diploma holder during their time as an IB full diploma candidate can have a profoundly positive affect on a student that will help to prepare him for the level of rigor and self-discipline necessary in post-secondary studies (Duevel, 1999). Skills such as abstract logical and critical thinking; literacy in reading, writing, listening, and speaking; the understanding of numerical data and its impact on all areas of study; as well as historical consciousness, an understanding of a value placed on fields of science, arts, international and multicultural experiences; and the value of in-depth study are just a few aspects that can lead to success in post-secondary studies. The IB Full Diploma Programme offers exposure and a focus on the development of all of the above attributes of a successful university degree completer. When a student completes singular IB courses for certificates and does not opt for the full IB diploma experience, he is still exposed to one or more of these important developmental aspects of a lifelong, open-minded learner. The

study conducted by Duevel (1999) was a descriptive qualitative study, using two levels of surveys to attain an understanding of the impact the IB Diploma Programme can have on success in college. Survey data from university registrars as well as survey data from U.S. citizens who had earned the IB Diploma were analyzed. The data were analyzed through content analysis and used a data reduction method. Survey responses were first prepared in a full transcript, and a set of standard topics and comments was articulated. Each comment was analyzed and separated into major topics; the totals were calculated and placed in rank order for data presentation.

In Duevel's study, 13 universities were chosen based on their representation of leading research universities in the United States at the time of the study. Through the survey, the university registrars were asked to provide only the years of attendance and date of graduation, if applicable, for all IB diploma holders who indicated that they would be attending said university after high school graduation. IB diploma holders were sent a survey consisting of seven sections, asking a multitude of questions. These questions included their view on the IB Programme as an adult; present occupation and years of practice; views on their preparation for the completion of a Bachelor's degree, both academically and socially; individual demographic information; and what their undergraduate degree studies included as well as any graduate studies they pursued/completed. Twelve of the 13 universities surveyed chose to participate. Based on the university registrar responses, 296 surveys were sent to IB diploma holding college graduates. With a 37% response rate, a total of 95 respondents

comprised the final data that were analyzed and reported. It should be noted that

within the respondent sample, not all graduated from an American high school.

Of the adults that submitted a response, 33% were international students studying

at an American university after graduating from an IB World School abroad.

Based on university registrar survey data, 92% of IB diploma holders graduated

with a bachelor's degree, with 87% of those students earning the degree in five

years or less. Based on data collected from the IB diploma holder surveys, 96%

of respondents reported that they completed a bachelor's degree, and 94% of

those completed it in five years or less. Only 4% of respondents reported not

earning a degree. From these qualitative survey results, Duevel (1999) concludes

that the survey results, in combination with the high percentage of IB diploma

holders completing a bachelor's degree in five or less years, fully supports the

idea that completing the IB Full Diploma Programme is a positive predictor of

college success.

Hill (2012) conducted a quantitative study through which college success

was measured for IB full diploma and course certificate candidates. This study

was conducted through a private international high school in Asia that sends 95%

of its graduates each year to post-secondary institutions in the United States. Data

were collected for six graduating classes, and the groups were compared based on

number of college acceptances and success after matriculation to a post-secondary

institution. Success was defined as continued enrollment in the institution and

college graduation rates. Data were collected for approximately 550 graduates

who graduated in the years 2007–2012, and this data were analyzed through *t*-

tests, Chi-squared, and Omega-squared formulas to reveal statistical reliability. Based on the statistical analysis in this study, there was not a significant difference between full diploma and course certificate graduates from the studied school and matriculation in college; however, it did show that full diploma candidates submit a higher number of college applications than their course certificate peers, but their college acceptance rate was not significantly higher than their course certificate peers. Hill (2012) mentioned the study could be further verified if more schools that offer both the full diploma and course certificate options in different countries and areas were to conduct the study. The implications of the results of this study are positive in that it reduces the pressure students may feel to enroll in the full Diploma Programme. Instead, it gives students the freedom to choose the path within the IB Diploma Programme that plays to their individual strengths

Tennessee Value-Added Assessment System (TVAAS)

The TVAAS measures a school's or teacher's impact on an individual student by analyzing student growth projections as compared to growth observed. This projection model tool called TVAAS is used to more clearly identify academic achievement trends for individual students. The TVAAS system reports student growth rather than student achievement on a state assessment (Saavedra, 2014). Individual student TVAAS data are calculated based on performance on past assessments relative to the performance of his or her peers and serves to statistically measure the value that a teacher adds to a students' learning process over one academic year (Amrein-Beardsley & Collins, 2014). These TVAAS

scores allow teachers and students alike to understand an individual student's

predicted achievement scores, set goals to surpass that predicted score, and

exhibit positive growth during an academic year. TVAAS scores are used

regularly to predict individual student achievement on state end-of-course exams.

If the student performs higher than predicted on the end-of-course exam, he or she

will have a positive TVAAS growth score (Amrein-Beardsley & Collins, 2014).

The Educational Value-Added Assessment Systems (EVAAS) is a multi-

variant model that simultaneously considers multiple data points for each student,

using multiple years of student scores across multiple subject areas in order to

predict future assessment performance (Amrein-Beardsley & Collins, 2014).

Multiple states use this assessment system to measure student growth, but the

TVAAS system is the focus of this study as the focus school is within the state of

Tennessee. Multi-variant models like EVAAS are regularly used to project

student performance on state assessments but are not used to project other

achievement scores such as ACT, AP exams, or IB exams. Instead, the ACT can

be predicted through a projection model that uses multiple data points from a

student's academic performance past to predict one future score. ACT scores can

be predicted through the projection model by using a student's 10th grade PLAN

and 9th grade EXPLORE scores. Multi-variant models, however, are not

regularly used to predict performance on college preparedness indicating

assessments such as ACT, AP, or IB exams (Amrein-Beardsley & Collins, 2014).

Value-added models like EVAAS are based on the notion that student

achievement is directly affected by external factors such as student background

and socioeconomic and cultural background as well as the school-based factors such as quality of instruction and school environment. (Amrein-Beardsley & Collins, 2014). Much of the research surrounding Value-Added Systems is focused on teacher value-added and the effects these numbers can have on teacher evaluations across the nation.

The review of the literature began by discussing the history of educational legislation in general, with a focus on equal educational opportunity and equal funding amongst schools. The creation of the ESEA and its evolution over the years through NCLB and RTTT was discussed with regard to the profound impact these legislative acts had on school accountability and educational equity for underrepresented students. Magnet schools and school choice were discussed, as the focus school for this study was designated as a magnet school for the IB Diploma Programme. Equity of, availability of, and access to educational programs were discussed as the driving force in the creation of magnet schools and oftentimes the driving force behind the big decisions school leadership makes in the management of their schools. Principal world views and values and the impact that these factors can have on magnet schools were also discussed. The correlation between magnet school status and student achievement was analyzed both in terms of the effects of decreasing racial and economic segregation and validating the use of magnet funding. The impact of magnet curricular themes and competitive school enrollment on student achievement were also discussed. Overall, the research shows that drawing a sharp parallel between student achievement and school magnet status is difficult due to a wide variety of factors

that impact student achievement, but many studies show a positive correlation between magnet schools and successful students.

Success in post-secondary coursework was discussed both through the lens of whether post-secondary level coursework in high school has a positive impact on success in college or university as well as whether there are predictors of success in that post-secondary coursework. No research was found specifically on predictors for success on IB exams, but a study about PSAT scores as predictors for success on AP exams was reviewed and discussed. Finally, the IB Programme was explained as well as its impact on student success in post-secondary studies. Research showed that exposure to IB curriculum and coursework had a positive effect on student success in college or university. With data behind the benefits of IB curriculum and its positive impact on student preparation for post-secondary coursework, seeking a predictor for success on IB exams will help to encourage more students from multiple backgrounds to take advantage of IB coursework in high school.

Chapter III: Methodology

The purpose of the quantitative, non-experimental study was twofold. The first purpose was to identify any relationships between student IB exam scores and three student data points, which were student ELA end-of-course exam achievement scores, math TNReady end-of-course exam achievement scores and student TVAAS growth data. The second purpose was to identify possible predictive measures for success in IB Diploma Programme (IBDP) coursework by seeking statistically significant predictor variables between IB exam scores and three student data points, which were student ELA end-of-course exam achievement scores, math end-of-course exam achievement scores, and student TVAAS growth data. Success on an IB exam is defined as obtaining a score of four or higher on the culminating IB exam, as this is the score required by most colleges and universities in order to equate to success in college-level coursework (Bailey & Karp, 2003). The two possible predictors have been identified as student academic achievement on ELA and math end-of-course exams in the 9th and 10th grades and TVAAS growth data for each student. In this chapter, the quantitative non-experimental research design, the population of the study, the method of data collection, the analytic statistical methods, as well as a discussion of validity and reliability and the limitations and delimitations of the study are all discussed in detail.

Research Design

In this study, the researcher was seeking statistically significant predictor variables between individual student ELA and math achievement on TN state end-of-course exams in grades 9-10, individual student TVAAS growth data in

ELA and math in grades 9-10, and achievement on IB exams in 11th and 12th

grade. For this study, the 10th grade English end-of-course exam was the AP

Language exam, as most students who took the IB English exam were enrolled in

AP Language for their 10th grade English credit. The AP Language exam differs

from the other 9th and 10th grade exams analyzed in that it is not a state end-of-

course exam but, instead, is an exam that is developed by the College Board.

Quantitative research has been defined as "explaining phenomena by collecting

numerical data that are analyzed using mathematically-based methods" (Muijs,

2004, p. 1). The researcher chose a quantitative research design in order to find a

predictor for future student success on IB English and math exams. These

predictors will hopefully serve to facilitate student recruitment into an

academically rigorous program such as the IBDP. The researcher utilized a

correlational design to explore the possible correlation between individual ELA

and math achievement on TN state end-of-course exams in grades 9-10,

individual student TVAAS growth data in ELA and math in grades 9-10, and

achievement on IB exams in 11th and 12th grades for years

2015-2018. The researcher utilized a regression design in order to ascertain if

individual ELA and math achievement scores on TN state end-of-course exams in

grades 9-10 could serve as predictors of achievement on IB exams in the 11th and

12th grades for years 2015-2018.

A correlational quantitative study allowed the researcher to explore the

relationship between variables using statistical analysis. The researcher utilized

bivariate Pearson correlation in order to analyze possible correlations between

individual student ELA and math achievement on TN state end-of-course exams

in grades 9-10, individual student TVAAS growth data in ELA and math in grades 9-10, and achievement on IB exams in 11th and 12th grades. Correlational studies do not examine statistical cause and effect but rather are observational in terms of data collection. This study was non-experimental in that it did not seek a cause and effect relationship between student academic achievement and academic growth in the 9th and 10th grades and pass rate on IB Diploma Programme assessments but instead analyzed the relationship between these data sets. Through this study, the researcher sought a statistical predictor for success through multiple regression by comparing student achievement and growth data with future achievement on IB exams in order to seek a relationship between said variables. While experimental studies can result in higher internal validity through repetition and result tracking, observational studies can provide evidence of association between two variables.

Population of the Study

The population used for this study included students at one high school that has been an established and authorized IB World School since August 2011. The school is located in Southeastern United states and had approximately 1,400 students enrolled in grades 9-12. The school was established in 1951, with the first class graduating in May 1952, and is a well-established school within a Tennessee county school district. Each graduating cohort is comprised of approximately 350 students, but that number varies slightly from year to year. The percentage of 11th and 12th grade students taking IB courses or exams had increased since the designation as an IB World School from ~17% of all juniors and seniors enrolled in one or more IB course to 58% of all juniors and seniors enrolled in one or more

IB course during the 2017-2018 school year. The high school was a designated magnet school for the IB Diploma Programme. Students not living in the school zone could apply for a magnet transfer to attend the school in order to have access to the IB Diploma Programme. This high school is the only school in the school district authorized to offer IB diploma curriculum.

The sample was comprised of 305 students who have taken 656 IB English exam or IB math exams between May 2015 and May 2018. The school administers the IB exams in May of each academic year, and total of four student cohorts have been tested. Of those 656 exams, 368 were English and 288 were math. Of the 305 students that took one or more English or math IB exams between 2015 and 2018, 179 were female and 126 were male. Table 2 presents the gender ratio for each testing cohort that was analyzed in this study.

Table 2

Student Gender Percentage and Number of Exams Administered per Year

Year Tested	Number of Students Tested	Number of Exams Administered	Percentage of Female Testers	Percentage of Male Testers
2015	55	85	69	31
2016	87	140	46	54
2017	55	94	67	33
2018	108	177	59	41

In addition, when analyzing the sample most students who had taken an IB exam since 2015 do not fall into underrepresented demographics. Across all testing cohorts, less than 8% of students in each cohort were either of a minority race or received financial assistance for exam costs. Students who were either white or did not request financial assistance on the IB exams comprised 92% of the tested cohorts.

Data Collection

In order to obtain the data sets needed for this non-experimental study, data were obtained from two sources: the IB World School that the tested student sample attended and the school district in which the school was housed. In order to obtain student achievement data, growth data, and IB exam score data from the school district, the researcher first obtained permission to conduct the research. In order to obtain permission, the researcher submitted information to the school district's central office. This written request included all information pertaining to the principal researcher, such as name, telephone number, title of the proposed research report, a brief research description, and copies of any documents needed

for the study. After all required documentation was submitted, the Research

Committee reviewed the request in its entirety.

Analytical Methods

In order to answer research question 1 and research question 3, the

researcher used the statistical method of bivariate Pearson correlation. Individual

ELA and math achievement on TN state end-of-course exams and achievement on

IB exams are both continuous variables. The method used to analyze the

relationship between two continuous variables was the correlation coefficient. A

correlation coefficient was used to measure how strong the relationship is

between two variables or data sets. The formulas returned a value between -1 and

+1, where +1 represents a strong positive relationship and -1 represents a strong

negative relationship. The Pearson correlation formula is a type of correlation

coefficient that shows a linear relationship between two sets of data (Muijs,

2004).

To answer research question 2 and question 4, the statistical method of

multiple regression was used. Multiple regression is an extension of a simple

linear regression and "employs a linear function of two or more independent

variables to explain the variation in a dependent variable" (Allen, 1997, p. 76).

Multiple regression analysis is a statistical technique used for predicting an

unknown value of a variable from the known value of two or more variables. For

this study, the IB exam scores functioned as the dependent variable and were the

value the study aimed to predict. For research question 2, the ELA and math end-

of-course exam achievement were the independent variables. For research

question 4, student TVAAS growth data served as the independent variable.

Reliability and Validity

Data points used in this study were 9th and 10th grade ELA and math end-of-course exam achievement scores for every student taking an IB Diploma Programme exam in the years 2013-2018, the growth scores calculated in ELA and math areas for every student taking an IB Diploma Programme exam in the years 2013-2018, and each student's corresponding IB exams scores taken in the 11th and 12th grades. Reliability and validity of these data sets are essential to the outcome of this study.

The ELA and math end-of-course exams are graded in a common location at the state level. All exams are mailed to this common location, and they are scanned and scored and a report is sent back to the school with individual student data. The Tennessee state end-of-course exams are designed, graded, and benchmarked at the state level and are considered indications of the level of mastery a student has attained with regard to the state common curricular standards. The confidence interval of the end-of-course exams is still being analyzed, as the current exam model is relatively new to the school district.

The Value-Added estimates are provided by the Statistical Analysis System (SAS), which is a software system for data analysis. All Tennessee Value-Added Assessment Scores (TVAAS) are tabulated by SAS. When analyzing assessment scores, reliability can be viewed in two ways. The first reliability factor is the idea that a student would receive the same score if he or she were to take the assessment multiple times. Secondly, reliability can refer to the assessments' scales over the years. Both of these reliability factors are

essential when assigning a number to a child's academic growth through standardized tests.

The validity and reliability of all IB exams are ensured by the Department of Assessment Research within the IBO (IBO, 2018). This department provides and analyzes meaningful data to effectively support assessment practices and the IB curriculum review process. If there are any changes in the assessment or marking processes, the Department of Assessment Research ensures that the IB does not risk the integrity of assessment results by ensuring that any changes are well grounded in the current understanding of best practices in teaching and learning. This department is held responsible for ensuring that all marks and grades awarded to candidates are reliable and fair through an extensive moderation process of all internal and external assessments. IB assessments have been demonstrated as strong predictors of post-secondary performance (IBO, 2018).

Limitations and Delimitations

Limitations in any study are the shortcomings or conditions that the researcher has no control over that may impact the methodology or conclusions of the study. One limitation in this study was the sample being from only one school in a metropolitan school district. Due to the fact that the school included in this study was the only IB World School in the district, the student sample set was relatively small, at a total of 496 exam results and 305 students tested. The student sample was limited based on accessibility to student end-of-course exam achievement data. If a student who tested in either IB English or IB math did not have English or math end-of-course test data from 9th or 10th grade, they could not

be included in the study. Reasons for students not having end-of-course data attached to them include that they moved to Tennessee from another state or another country after their 10th grade year or attended private school or were homeschooled through the 10th grade. In these cases, students would not have taken the Tennessee state end-of-course exams and would not have achievement or growth data in the district data archives. Another limitation for this study was that the school from which IB data points were obtained was a magnet school and, therefore, did not have complete open enrollment. The district of which the school was a part had a zoned school attendance policy, which meant that only students living within the designated school zone could attend. If a student living outside of the designated school zone wanted to attend the school, he was required to complete an academic screening and obtain a certain score in order to qualify for a transfer.

Delimitations are factors within a study that can be controlled and are chosen by the researcher as boundaries that have been set for the study. In this study, delimitations include that only 9th and 10th grade ELA and math state End-of Course exam results and student growth measures were used in the study due to the differences in test models between elementary/middle school exams and high school exams. This study only used IB Diploma Programme exam results of 11th and 12th graders due to the IB Diploma Programme coursework being exclusive to this age group. No IB diploma course credit can appear on a student's transcript before the 11th grade year. Only data from four cohorts of IB testers were analyzed, as these were the only cohorts that tested in both IB coursework

and took the same English and math end-of-course exams in the 9th and 10th grade.

Assumptions of the Study

This study was approached through the lenses of some assumptions that must be true regarding the characteristics of the data being analyzed. In order to effectively analyze the correlation between two data sets, some assumptions must have been in place that validated these data. The first assumption was that each student that had taken an IB assessment in their 11th or 12th grade years at the study site had both growth (on the TVAAS) and literacy/numeracy achievement data for each year that TVAAS was calculated prior to their graduation from high school; therefore, in order to specifically analyze the correlation between individual growth and achievement data and achievement on IB exams, there must have been complete data sets on both sides of the correlation. The second assumption made by the researcher was that all IB exams were administered properly with no irregularities and that the data obtained regarding student achievement from the International Baccalaureate Information System (IBIS) were reliable and valid. This assumption must be true in order for this study to yield accurate findings. In addition, it was assumed that state exams were administered correctly and without irregularities in order to assume that all student data were accurate as they were reported from the state of Tennessee. In addition, all TVAAS data was assumed to be accurately calculated based on the data sets provided for each student that were included in this study. The third assumption was the absence of outliers in either variable data set. The researcher sought to find a positive correlation between individual Value-Added growth

data, subject area achievement data, and IB exam achievement in the correlating

subject. If outliers existed, the corresponding data sets would skew the results by

deviating the line of best fit.

Chapter IV: Analyses and Results

The purpose of this quantitative, non-experimental study was to seek a correlation between student achievement on IB English and math exams and individual student growth as well as 9th and 10th grade math and English state exam achievement data, ultimately to examine these student data as predictors for IB exam achievement. This chapter presented the analysis and results of the statistical analysis of the correlation between scores obtained on TN state end-of-course exams taken in the 9th and 10th grades and scores on IB English and/or math exams as well as whether exam scores from the 9th and 10th grade can effectively predict performance on the IB exams. The findings presented in this chapter used the Pearson correlation model to analyze correlation and linear regression to analyze the predictive measures.

Data Analysis

Research question 1 asked whether or not there was a correlational relationship between individual student ELA and math achievement scores on TN state end-of-course exams in the 9th and 10th grades and achievement on IB exams in 11th and 12th grades for years 2015-2018. Four separate correlations were run in order to establish if a liner relationship existed between ELA and math achievement scores and IB English and math exam scores. The first correlation analysis included 9th grade state ELA end-of-course exam achievement scores and IB English scores as the statistical variables. The second correlation analyzed 10th grade state ELA end-of-course exam scores and IB English scores as the statistical variables. The third correlation analysis included 9th grade state end-of-course math exam scores and IB math scores as the

statistical variables. The final correlation included 10th grade state end-of-course math exam scores and IB math scores as the statistical variables. Each correlational data set was reported separately in order to seek separate correlational values between each subject at each grade level.

The second research question in this study asked whether individual student ELA and math achievement scores on TN state end-of-course exams in 9th and 10th grades could predict achievement on IB exams in 11th and 12th grades for students taking IB exams in the years 2015-2018 and, if predictor values were found, which of those values were statistically significant. Again, four separate linear regression operations were run in order to assess the linear relationship between the two variables in each operation in order predict the dependent variable based on the independent variable. Through these linear regression operations, the researcher was seeking a statistically significant predictor value for any of the four data sets. The first regression operation included 9th grade state end-of-course ELA exam achievement scores and IB English scores as the statistical variables. The second regression operation included 10th grade state end-of-course ELA exam scores and IB English scores as the statistical variables. The third regression operation included 9th grade state end-of-course math exam scores and IB math scores as the statistical variables. The final regression analysis included 10th grade state end-of-course math exam scores and IB math scores as the statistical variables. Each linear regression data set was reported separately in order to seek separate correlational values between each subject at each grade level.

The third research question in this study asked whether or not there was a relationship between individual student growth values on TN state ELA and math end-of-course exams in 9th and 10th grades and achievement on IB exams in 11th and 12th grades for years 2016-2018. In order to answer this research question, only three separate correlations were run in order to establish if a liner relationship existed between ELA and math achievement scores and IB English and math exam scores. The reason only three correlations could be run was that there were no score predictions made for the AP Language exam, which was the English course taken by 76% of the student sample set. Ninth grade ELA state end-of-course exam achievement scores and IB English scores were the statistical variables for one correlation analysis. Ninth grade State math end-of-course exam scores and IB math scores were the statistical variables for the second correlation analysis. The final variables included 10th grade state math end-of-course scores and IB math scores. Each set of correlational variables was reported separately in order to seek separate correlational values between each subject at each grade level.

The fourth and final research question in this study asked whether or not individual student growth values on TN state ELA and math end-of-course exams in grades 9-10 could predict achievement on IB exams in 11th and 12th grades for students taking IB exams in the years 2016-2018 and, if predictor values were found, which of those values were statistically significant. As for the third research question, separate linear regression operations were run in order to assess the linear relationship between the two variables in each operation in order predict the dependent variable based on the independent variable. Through these linear

regression operations, the researcher was seeking a statistically significant predictor value for any of the three data sets. The first set of variables included 9th grade state end-of-course ELA exam achievement scores and IB English scores. The second set of variables included 9th grade state end-of-course math exam scores and IB math scores. The final statistical variables included 10th grade state end-of-course math exam scores and IB math scores. Each linear regression operation was reported separately in order to seek separate correlational values between each subject at each grade level.

Research Questions

    Research question 1. What relationship, if any, exists between individual English Language Arts and math achievement on Tennessee state end-of-course exams in grades 9-10 and achievement on International Baccalaureate exams in 11th and 12th grades for years 2015-2018 at one high school?

    To answer research question 1, the researcher used a Pearson's product-moment correlation to analyze the relationship between ELA and math achievement on TN state end-of-course and AP exams in grades 9-10 and achievement on IB English and IB math exams in the 11th and 12th grades. Regarding the 9th grade English end-of-course exam correlation analysis, there was a statistically significant correlation. The correlation was small and positive between the English I end-of-course exam scores and the IB English exam scores (r (242) $= .28, p < .001$). The 10th grade exam correlation analysis found that there was a statistically significant, moderate positive correlation between achievement on the AP Language exam and the IB English exam (r (166) $= .524, p < .001$).

With regard to the correlational data between math end-of-course achievement and IB math exam scores, no statistical relationship existed between achievement on the 9th grade math end-of-course exam and the IB math exam (r (150) = .80, p = .798). Finally, there was a significantly correlation between achievement on the 10th grade math end-of –course exam and the IB math exam (r (189) = -.19, p = .009) (see Table 3).

Table 3

Pearson Correlation Among ELA/Math End-of-Course (EOC) Exams and IB Exams

Exam Name	Pearson Correlation Values		
	r	p	n
English 1 EOC Exam	.279	.000	244
AP Language Exam	.524	.000	168
9th Grade Math EOC Exam	.021	.798	152
10th Grade Math EOC Exam	-.188	.009	191

Research question 2. Do individual English Language Arts and math achievement scores on TN state end-of-course exams in grades 9-10 predict achievement on International Baccalaureate exams in the 11th and 12th grades for testing cohorts in the years 2015-2018 at one high school, and if so, what predictor variables are statistically significant?

Linear regression analysis was used to predict IB English or IB math exam scores based on ELA and math achievement on state end-of-course and AP exams in the 9th and 10th grades. Scatterplots were examined in order to determine that

the assumptions were met, and no outliers existed. For the 9th grade ELA end-of-course exam analysis the sample size was 244 exam scores. Grade 9 ELA achievement scores accounted for 7.8% of variation in IB English exam scores (R^2 = .078); therefore, 92.2% of the variation remained unaccounted for in the model. The researcher concluded that this model can significantly predict IB English exam scores (F = 20.36, p < .001). This regression model of 9th grade English end-of-course exam scores significantly predicts IB English exam scores. The researcher concluded that an approximate IB score can be predicted based on a student's 9th grade ELA achievement score on the end-of-course exam. The resulting prediction equation from this analysis was IB exam score = -3.89 + (.011* English I EOC Score). Based on the regression analysis performed by the researcher, .011 is the value that represents the change in the outcome associated with a unit change in the predictor. In other words, for every one point increase to the English I EOC score, the predicted IB English test score will increase by .011 (Field, 2018).

For the AP Language exam regression analysis, the sample size was 168 exams. AP Language exam scores account for 27% of variation in IB English exam scores (R^2 = .270). Therefore, 73% of the variation remains unaccounted for in the model. The researcher concluded that this model can significantly predict IB English exam scores than the mean value of IB exam scores *(F =* 64.72, p <.001). This regression model of AP Language exam scores significantly predicts IB English exam scores. From this model, the researcher can conclude that IB English exam scores can be predicted from AP Language exam scores. The prediction equation was IB English exam score = 3.68 + (.351*

AP Language Exam Score), indicating that for every one point increase to the AP Language exam score, a student's predicted IB English exam score increases by .351 points, which is a significant prediction correlation.

For the 9th grade math state end-of-course exam analysis, the sample size was 152 exams. Grade 9th end-of-course exam achievement scores account for -.6% of variation in the model; therefore, 99.4% of the variation remained unaccounted for in the model. The researcher concluded that this model does not significantly predict IB math exam scores ($F = .066$, $p = .798$). This regression model of 9th grade math end-of-course exam scores does not significantly predict IB math exam scores. Based on this model, it was clear that achievement scores on 9th grade math exams cannot effectively predict IB math exam scores.

For the 10th grade state math end-of-course exam analysis the sample size was 191 exams. Grade 10 end-of-course exam achievement scores accounted for 3.0% of variation in the model; therefore, 97% of the variation remained unaccounted for in the model. The researcher concluded that this regression model of 10th grade math end-of-course exam scores does significantly predict IB math exam scores ($F = 6.89$, $p = .009$). This regression model of 10th grade math end-of-course exam scores did significantly predict IB math exam scores. The prediction equation was IB math exam score = 3.71 + (-.001* 10th grade math end-of-course exam score), indicating that for every one point increase to the 10th grade end-of-course exam score, a student's predicted IB math exam score decreases by .001 points, which is a significant prediction correlation. See Table 4 for a summary of these findings.

Table 4

Exam Achievement and IB Exams: Linear Regression Findings Summary Table

Exam	Regression Model Summary					
	R	R^2	F	p	β	% variance
9th Grade ELA	.279	.078	20.36	.000	-3.89	7.8
AP Language	.524	.270	62.74	.000	3.68	27
9th Grade Math	.021	-.006	.066	.798	2.45	-.60
10th Grade Math	.188	.030	6.89	.009	3.71	3

Research question 3. What relationship, if any, exists between individual student Tennessee Value Added Assessment System growth data in English Language Arts and math in grades 9-10 and achievement on International Baccalaureate exams in 11th and 12th grades for years 2015-2018 at one high school?

Regarding the 9th grade English individual student growth correlation analysis, there was a statistically significant correlation. The correlation was small and positive between the individual student TVAAS growth value and the IB English exam scores (r (140) = .30, $p < .001$). The 168 ELA exams taken in the 10th grade were AP Language exams. The district providing data for this study did not predict AP exam scores as it did state end-of-course exam scores. For this reason, no TVAAS growth data was calculated by the district for the 10th grade ELA exam and no growth correlation could be performed by the researcher.

Regarding the 9th grade math individual student growth correlation analysis, there was a small positive statistical relationship found between the individual student growth value and the IB math exam score (r (18) = .45, p = .049). Due to lack of prediction data for 9th grade math scores in the school district archives, the student sample set for the 9th grade math correlation to student growth was extremely small. The 9th grade math course in this district was Algebra I. Due to an advanced math placement track, the vast majority of the students that had scores for an IB math exam took Algebra I in 8th grade. When a student tested in the 9th grade math level in 8th grade, no predicted end-of-course exam scores were calculated by the district. Without those predicted scores, TVAAS student growth values could not be calculated. Regarding the 10th grade math individual student growth correlation analysis, there was no statistical relationship found between the individual student growth value and the student IB math exam score, (r (112) = .11, p = .268) (see Table 5).

Table 5

Pearson Correlation Among Student Growth Values and IB Exams

Course Student Growth	Pearson Correlation Values		
	r	p	n
9th Grade English	.303	.000	142
9th Grade Math	.445	.049	20
10th Grade Math	.105	.268	114

Research Question 4. Do individual student Tennessee Value Added Assessment System growth data in grades 9-10 predict achievement on International Baccalaureate exams in the 11th and 12th grades for testing cohorts in the years 2015-2018 at one high school, and if so, what predictor variables were statistically significant?

Linear regression analysis was used to predict IB English and math exam scores based on individual student growth values in 9th grade math courses as well as 9th and 10th grade ELA courses. The ELA exam in 10th grade was the AP Language exam, and since there were no predicted scores for AP exams, 10th grade English growth scores were not available from the district. For the 9th grade ELA end-of-course exam analysis the sample size was 142 exam scores. Student TVAAS growth data for 9th grade ELA accounted for 8.6% of variation in IB English exam scores ($R^2 = .086$); therefore, 91.4% of the variation remained unaccounted for in the model. The researcher concluded that this model can significantly predict IB English exam scores ($F = 14.19, p < .001$). This regression model of student growth values during 9th grade ELA coursework significantly predicts IB English exam scores. The resulting prediction equation from this analysis was IB exam score = 4.93 + (.014* 9th grade ELA student growth value). From this predictor equation, the researcher was able to determine that for every one point increase in a student's 9th grade ELA TVAAS growth value, the IB English exam score would increase by .014 points.

For the 9th grade math end-of-course exam analysis, the sample size was significantly smaller at 20 exam scores. The reason for such a low sample size was that most students take Algebra I in 8th grade and, therefore, take Geometry

in the 9th grade which has no state exam. For this reason, the district did not archive 9th grade math end-of-course data for students taking Geometry in the 9th grade. Student TVAAS growth values in 9th grade math accounted for 19.8% of variation in IB math exam scores (R^2 = .198); therefore, 80.2% of the variation remained unaccounted for in the model. The researcher concluded that this model can significantly predict IB math exam scores (F = 4.44, p = .049). This regression model of student growth values during 9th grade math coursework significantly predicts IB math exam scores. The resulting prediction equation from this analysis was IB exam score = 2.95 + (.023* 9th grade math student growth value). From this prediction equation, the researcher was able to determine that for every one point a student's 9th grade math TVAAS growth score increased, that student's IB math exam score would increase by .023 points. Due to the lack of TVAAS growth data for AP Language exams, which serve as the 10th grade ELA end-of-course exam, the researcher could not complete a regression analysis.

For the 10th grade math end-of-course exam analysis, the sample size was 114 exam scores. Student TVAAS growth in 10th grade math accounted for 1.1% of variation in IB math exam scores (R^2 = .011); therefore, 98.9% of the variation remained unaccounted for in the model. The researcher concluded that this model can significantly predict IB math exam scores (F = 1.24, p < .001), and, therefore, student growth values during 10th grade math coursework can significantly predict IB exam scores. The resulting prediction equation from this analysis was IB exam score = 2.93 + (.005* 10th grade math student growth value). From this prediction equation, the researcher was able to determine that for every one point

a student's 10th grade TVAAS growth score value increased, that student's IB math exam score would increase by .005 points. See Table 6 for a summary of research question 4 findings.

Table 6

Student Growth and IB Exams: Linear Regression Findings Summary Table

Exam	Regression Model Summary					
	R	R^2	F	p	β	% variance
9th Grade ELA	.303	.092	14.19	.000	.014	9.2
9th Grade Math	.445	.198	4.44	.049	.023	19.8
10th Grade Math	.105	.011	1.24	.000	2.93	1.1

Summary of Results

The researcher determined that scores on AP Language exams have the strongest correlation with IB English exams, and 9th grade English exam scores have the second strongest correlation. The correlation was statistically significant between AP Language and IB English and moderately significant between 9th grade ELA end-of-course exam and IB English. The correlation between 9th and 10th grade math state end-of-course exams, however, were very different. There was no statistically significant correlation between 9th grade state math end-of-course exam achievement and IB math exam scores. There was, however, a statistically significant correlation between 10th grade state end-of-course math exam achievement and IB math exam scores.

The statistical study of whether state end-of-course ELA and math exams as well as the AP Language exam can predict IB English and math exam scores yielded mixed results. The prediction effect was existent yet small between 9th grade ELA end-of-course exams and IB English exam scores. The prediction effect was statistically moderate, however, between the AP Language exam scores and IB English exam scores. When statistically analyzing prediction effect between state math exams and IB math exams, there was no prediction effect found between 9th grade state math end-of-course exams and IB math exams, but there was a small prediction effect between 10th grade state end-of-course math exams and IB math exams.

The researcher found a small statistical correlation between student growth during the 9th grade coursework and the IB English exam. While there were statistically significant relationship correlations between student TVAAS growth in both the 9th grade ELA and the 9th grade math courses, there was no statistical correlation between student TVAAS growth during the 10th grade math course. Due to no TVAAS predicted scores for AP Language exams since they are not Tennessee state end-of-course exams but are rather developed and written by the College Board, no correlation operation could be performed to seek statistical correlation.

The linear regression study performed to determine whether individual student TVAAS growth scores could predict achievement on IB English or IB math exams revealed that student growth scores in both 9th grade ELA and 9th grade math courses can predict achievement on the IB English and IB math exams, respectively. Similarly, individual student TVAAS growth scores during the 10th

grade math course can significantly predict achievement on IB math exams in the

12th grade.

Chapter V: Conclusions and Recommendations

The purpose of this quantitative, non-experimental study was to seek a correlation between student achievement on IB English and math exams and individual student growth as well as 9th and 10th grade math and English state exam achievement scores, ultimately to examine these student data points as predictors for IB exam achievement. This chapter includes a discussion of the statistical conclusions derived from the study, the significance of those findings, implications that this research has for educational practices, as well as recommendations for future research extensions.

Conclusions of the Study

When analyzing the statistical correlation of achievement and student growth in the 9th and 10th grades with achievement on IB English and math exams, the researcher was seeking a statistical indicator that teachers and administrators could utilize to help students to make course enrollment decisions that can lead to academic success in post-secondary work during the final two years of high school. As discussed in the theoretical framework of this study, the concepts of improved self-efficacy, academic self-concept, and, ultimately, self-belief can have positive impacts on student success in courses with a more rigorous curriculum. Improved student self-efficacy beliefs can have profound impacts on students' academic performance (Bandura, 1997) and can, thereby, give students the confidence to enroll and experience success in rigorous coursework.

After the correlational analysis, the researcher concluded that there is a statistical relationship between 9th and 10th grade ELA end-of-course exam scores and IB English exam scores. The researcher also concluded that while there is a

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statistical relationship between 10th grade math scores and IB math scores, there is no relationship between 9th grade math scores and IB math exam scores. These findings mirror the findings in the study by Camara and Millsap (1998), where the correlation between high school math grades and AP Calculus exam grades were also much weaker than the correlations between AP English exams and high school English grades. Furthermore, the researcher concluded that 9th and 10th grade ELA exam scores and 10th grade math scores can effectively predict IB English and math exams. Conversely, the researcher concluded that 9th grade math exam scores cannot effectively predict IB math exam success.

According to Parker et al. (2014), a student's lack of belief in his or her own academic abilities can have a negative impact on academic achievement. This lack of belief can also result in students placing academic limits on themselves due to fear of failure and a repeat of past academic achievement patterns (Lopez & Lent, 1992). Furthermore, a student's past academic achievement is not always directly correlated to his or her academic growth during the course. Armed with the statistical correlation of 9th and 10th grade end-of-course exams to IB exams, educators can identify and recruit students into HL coursework while, at the same time, increasing the student's self-concept and self-belief that his achievement/growth scores have statistically set him up for success in rigorous IB coursework. After the correlational and regression analyses of student growth during 9th grade ELA and 9th and 10th grade math coursework, the researcher concluded that there is a statistical relationship between both 9th grade ELA and math courses and IB English and math exams, respectively; however, the

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researcher also concluded that there is no statistical relationship between 10th grade math end-of-course exams and IB math exam scores.

With regard to student growth in coursework, the researcher concluded that IB English exam grades can be predicted from TVAAS student growth values during 9th grade ELA coursework. The researcher also concluded that IB math exam scores can be predicted from TVAAS student growth values during both 9th and 10th grade math coursework. Student growth values are most often not shared with the students or parents after the course is completed, and the end-of-course exam grades are released to the school by the state. Student achievement data and student growth data are not always positively correlated. If a student focuses solely on achievement scores, he may not be aware of a positive growth value, meaning he scored better on the end-of-course exam than the data had predicted. By increasing educator and student awareness of these growth scores which can, based on the researcher's findings, predict IB English and math exams, it is possible that students' self-concept and self-belief can be positively impacted by extending the focus to also include student growth, not just achievement.

Implications for Practice

The results of this study contributed new quantitative support regarding the linkage between both student academic achievement and growth to success in post-secondary coursework. Based on a study by Bifulco et al. (2009), schools with a higher concentration of minority students or students of low socioeconomic status offer few post-secondary level academic options. By offering the IBDP as a magnet program at the school from which the student score data were collected, this rigorous coursework is accessible to all students and can prepare them for

post-secondary coursework as well as culminate in credits on a college transcript. When the student population in a school has high racial and economic diversity, it will best serve the school to be very intentionally clear with all stakeholders regarding student qualifications and readiness indicators for this curriculum and that all student data are analyzed to identify students that can experience success. Having specific quantitative student data points such as state end-of-course test scores and knowing that it is possible to predict IB exam scores based on those end-of-course exam scores, will help any school to identify students with the statistically-supported potential for success in post-secondary level coursework in high school.

The researcher recommends that districts provide not only student achievement scores to schools but also student growth score values in all courses with state or district level accountability. By providing these data points to schools, both student achievement and growth data could be analyzed to predict success on IB English and math exams. Based on this analysis, schools could then communicate this predicted success to both students and parents as a way to recruit students with potential for success into advanced academic coursework. This level of individual student data analysis can not only assist in ensuring proper academic placement for all students, but also communicating these data points to students and parents can help to increase student self-efficacy (Nicolsen et al., 2013) as well as student self-concept (Marsh, 1993), which can, in turn, further increase student achievement and growth.

Camara and Millsaps (1998) reported that success on certain AP exams could be predicted by PSAT scores. In the research conducted in this study, the

link was made between Tennessee end-of-course exams for 9th grade math and 9th and 10th grade English and IB English and math exam scores. The researcher recommends that schools or districts offering any advanced academic programming explore any possible connections between student achievement and/or growth data and future success in post-secondary level coursework. In addition, as was reported by Duevel (1999) and Hill (2012), a high percentage of students graduating from high school with either the IB full diploma or having completed individual IB courses were not only accepted into a college but completed at least a Bachelor's degree in 5 years or less. Having the ability to predict success in advanced academic coursework during a student's first two years of high school, schools can have a significant impact on student enrollment in advanced coursework in high school which can, in turn, have a positive impact on students' success in college. As was cited by Hill (2012), there was not a significant difference between IB full diploma graduates and course certificate graduates regarding the matriculation rates into college. By encouraging and increasing advanced academic course enrollment, schools can increase the probability of students not only attending a post-secondary institution but successfully completing a college degree.

Recommendations for Future Research

Firstly, the researcher believed that future scholars interested in the same topic may expand the study to include multiple schools within the same state. By doing this, a future study could possibly discover a stronger link between end-of-course state exam data and IB exam scores. For instance, the lack of a statistical relationship between 9th grade math end-of-course exam scores and IB math

exams may be a result of the small sample size of only 20 exam scores. This small sample size resulted from the fact that most students who took the IB math exam did not take the traditional 9th grade math course but instead enrolled in a higher level of math. With such a small sample size, the researcher believes that further research with a larger sample would help to solidify the statistical relationship. By replicating this study in a larger district with more than one school offering the IBDP, a future scholar could attempt to find the same or a stronger statistical relationship with a much larger sample size. In addition, by seeking separate correlations for each mathematical subject offered to 9th graders, a researcher could better understand any possible impacts that different fields of mathematical study can have on IB math exam achievement scores.

In addition, the researcher recommends that an interested scholar expand this study to include IBDP schools across multiple states in order to test a relationship between IB exam scores and state-level end-of-course exams in general. This study could be replicated across multiple states using different end-of-course assessments in order to investigate statistical relationships between IB exams and North American state standardized exams. Furthermore, replicating this study on a global scale could reveal more international connections between student achievement in lower grades and achievement on IB exams.

By further researching a statistical connection between student state standardized test scores and various advanced academic program exam scores, educators and parents alike can have a deeper understanding of a child's predicted success on advanced academic exams culminating from challenging and rigorous coursework such as AP and IB. Armed with this information, schools can

encourage students to enroll in advanced academic coursework knowing a

predicted score outcome and that past student achievement and/or growth has

actually contributed to this statistical prediction. Student self-perception can result

from multiple factors including past academic performance (Marsh & Martin,

2011). By arming students with the knowledge that they are predicted to succeed

on an advanced academic exam based on past performance or their hard work

resulting in positive growth data, they can enroll in HL coursework with

confidence and an increased self-belief. Pushing students into advanced academic

coursework when they are struggling to believe that they are capable of success

can negatively impact a range of key outcomes related to their achievement and

learning (Nicholson et al., 2013). Students with higher efficacy levels and self-

belief are more likely to take risks and accept challenges that will help them to

attain a deeper level of curriculum mastery.

References

Allen, M.P., (1997). *Understanding Regression Analysis*. New York, NY.:

Plenum Press.

Amrein-Beardsley, A., & Collins, C. (2014). *Putting growth and value-added*

models on the map: A national overview. Retrieved from

http://www.nysed.gov/common/nysed/files/beardsleyputtinggrowthandval

ueaddedmodel.pdf

Bailey, T., & Karp, M. M. (2003). *Promoting college access and success: A*

review of credit-based transition programs. New York, NY.: Columbia

University, Community College Research Center.

Ballou, D., Goldring, E., & Liu, K. (2006). *Magnet schools and student*

achievement. New York, NY: Columbia University.

Bandura, A. (1997). *Self-efficacy*. New York, NY: John Wiley & Sons, Inc.

Baumeister, R. F. (1999). *The self in social psychology*. Philadelphia, PA:

Psychology Press.

Bergeron, L. (2015*). Diploma Programme students' enrollment and outcomes at*

US postsecondary institutions 2008–2014. Bethesda, MD: International

Baccalaureate Organization.

Bifulco, R., Cobb, C. D., & Bell, C. (2009). Can interdistrict choice boost student

achievement? The case of Connecticut's interdistrict magnet school

Program. *Educational Evaluation and Policy Analysis*, *31*(4), 323–345.

Retrieved from http://www.jstor.org/stable/25621589

Boufford-Bouchard, T., Parent, S., & Larivee, S. (1991). Influence of self-efficacy on self-regulation and performance among junior and senior high-school age students. *International Journal of Behavioral Development, 14*(2), 153-164.

Camara, W. J., & Millsap, R. (1998). Using the PSAT/NMSQT and course grades in predicting success in the advanced placement program. *The College Board Report*, *98*(4),1-24.

Caspary, K. (2011). *Postsecondary enrollment patterns of IB certificate and diploma candidates from U.S. high schools.* Menlo Park, CA, SRI International.

Cascio, E. U., & Reber, S. (2013). The poverty gap in school spending following the introduction of Title I. *American Economic Review, 103*(3), 423-427.

Duevel, L. M. (1999). *The International Baccalaureate experience: University perseverance, attainment, and perspectives on the process* (Doctoral Dissertation). Retrieved from: ProQuest Theses & Dissertations database, 9951943.

Field, A. (2018). *Discovering statistics using IBM SPSS statistics*. Thousand Oaks, CA: Sage Publications.

Fleming, N. (2012, May 9). Magnets adjust to new climate of school choice. *Education Week*. Retrieved from http://www.edweek.org/ew/articles/2012/05/09/30magnet_ep-2.h31.html

Gamoran, A. (1996). Student achievement in public magnet, public comprehensive, and private city high schools. *Educational Evaluation and Policy Analysis*, *18*(1), 1–18.

Ghazvini, S. D. (2011). Relationships between academic self-concept and

    academic performance in high school students. *Procedia: Social and*

    Behavioral Sciences, *15,* 1034-1039.

Hill, I. (2012). An international model of world-class education: The International

    Baccalaureate. *Prospects, 42,* 341-359.

Hill, I. & Saxton, S. (2014). The International Baccalaureate (IB) Programme: An

    international gateway to higher education and beyond. *Higher Learning*

    Research Communications, 4(3), 42-52.

International Baccalaureate Organization. (2017). *Handbook of procedures for the*

    Diploma Programme 2017. Geneva, Switzerland: International

    Baccalaureate Publishing, Ltd.

International Baccalaureate Organization. (2018). *About the IB*. Retrieved from

    www.ibo.org.

Jennings, J. L. (2010). School choice or schools' choice? Managing in an era of

    accountability. *Sociology of Education*, *83*(3), 227–247. Retrieved from

    http://www.jstor.org/stable/25746199

Klein, A. (2015, March 31). The Nation's main K-12 law: A timeline of the

    ESEA. *Education Week, 34*(26), 18-20. Retrieved from

    http://www.edweek.org/ew/section/multimedia/the-nations-main-k-12-

    law-a-timeline.html

Kyberg, R. M., Hertberg-Davis, H., & Callahan, C. M. (2007). Advanced

    Placement and International Baccalaureate programs: Optimal learning

    environments for talented minorities? *Journal of Advanced Academics,*

    18(2), 172-215.

Lopez, F. G., & Lent, R. W. (1992). Sources of mathematics self-efficacy in high

    school students. *Career Development Quarterly*, *41*(1), 3.

Marsh, H. W. (1993). Academic self-concept: Theory, measurement, and

    research. *Psychological Perspectives on the Self, 4,* 59–98.

Marsh, H. W., & Martin, A. J. (2011). Academic self-concept and academic

    achievement: Relations and causal ordering. *British Journal of*

    Educational Psychology, 81, 59-77.

Morales, E. E. (2016). Prospective teachers from urban environments examine

    causes of the achievement gap in the United States. *International Journal*

    of Higher Education, 5(2). 101-112.

Muijs, D. (2004). *Doing quantitative research in education with SSPS.* London,

    England: SAGE Publications.

Nicholson, L., Putwain, D., Connors, L., & Hornby-Atkinson, P. (2013). The key

    to successful achievement as an undergraduate student: Confidence and

    realistic expectations? *Studies in Higher Education*, *38*(2), 285–298.

Page, G. L., Martín, E. S., Orellana, J., & González, J. (2017). Exploring

    complete school effectiveness via quantile value added. *Journal of the*

    Royal Statistical Society: Series A (Statistics in Society), *180*(1), 315–340.

Papay, J. P. (2011). Different tests, different answers: The stability of teacher

    value-added estimates across outcome measures. *American Educational*

    Research Journal, *48*(1), 163–193. Retrieved from

    https://doi.org/10.3102/0002831210362589

Park K., Caine V., & Wimmer, R. (2014). The experiences of Advanced

    Placement and International Baccalaureate diploma program participants:

A systematic review of qualitative research. *Journal of Advanced Academics, 25*(2), 129-153.

Parker, P. D., Marsh, H. W., Ciarrochi, J., Marshall, S., & Abduljabbar, A. S. (2014). Juxtaposing math self-efficacy and self-concept as predictors of long-term achievement outcomes. *Educational Psychology*, *34*(1):29.

Phillips, K. J. R., Hausman, C., & Larsen, E. S. (2012). Students who choose and the schools they leave: Examining participation in intradistrict transfers. *Sociological Quarterly*, *53*(2), 264–294.

Riddle, W. (2004). Education for the disadvantaged: Overview of ESEA Title I-A amendments under the No Child Left Behind Act. Washington, DC: Library of Congress.

Rossell, C. H. (2005). No longer famous but still intact: Magnet. *Education Next*, *5*(2), 44-49.

Saavedra, A. R. (2014). The academic impact of enrollment in International Baccalaureate programs: A case study in Chicago Public Schools. *Teachers College Record, 116*(4), 1-40.

Saavedra, A. R. (2016). Academic civic mindedness and model citizenship in the International Baccalaureate Diploma Programme. *Social Studies*, *107*(1), 1–13.

Showers, C. J., Ditzfeld, C. P., & Zeigler-Hill, V. (2015). Self-concept structure and the quality of self-knowledge. *Journal of Personality*, *83*(5), 535–551.

United States Department of Education. (2004). *Title I: Improving the academic achievement of the disadvantaged*. Washington, DC: Author. Retrieved from https://www2.ed.gov

United States Congress. (2011). *ESEA reauthorization: The importance of a world-class K-12 education for our economic success (Senate Hearing 111-885).* Washington, DC: U.S. Government Printing Office.

Westheimer, J., & Kahne, J. (2004). What kind of citizen? The politics of educating for democracy. *American Educational Research Journal, 41(2)*, 237-269.