

DIFFERENCES IN ADVANCED COURSE PERFORMANCE OF TEXAS  
STUDENTS AS A FUNCTION OF THEIR ETHNICITY/RACE  
AND ECONOMIC STATUS: A MULTIYEAR, STATEWIDE INVESTIGATION

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Doctor of Education

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by

Brian R. Flores

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## **DEDICATION**

I dedicate this dissertation to my wonderful parents, Ray and Emma, who without their love and support, I could not have earned this doctoral degree. They have been the bedrock of my grit and determination throughout my life. Although neither one of them has a college degree, they both understand the value and importance of education. I will always remember Dad saying “Son, I don’t want you to have to work outside in the heat or cold like me, I want you to get an education and have a better life”. Likewise, growing up, I will always remember Mom saying “Son, there are many things in life that may be taken away from you, but no one can take away your education”. I thank my Dad and Mom for those very simplistic, yet wise words of wisdom.

I also dedicate this dissertation to my late husband, who passed away unexpectedly during the second year of my doctoral journey. He was a brilliant, loving man who always supported my dream of earning a doctorate degree. How I wish he was with me today to see the joy and happiness on my face as I complete and publish this dissertation. I thank him with all my love, I know he will always be with me in spirit.

I would be remiss if I did not also dedicate this dissertation to my two beautiful girls, Kelsey and Britany. I am so blessed to have each of them in my life. I thank them for their complete encouragement and faith in me that I could accomplish this lifetime dream and for giving me the space and time I needed to finish this degree. Now they have a role model for them to continue their education.

Finally, I would like to dedicate this dissertation to all the first-generation students and underrepresented students who are thinking about getting an education, but perhaps think they are not smart enough. Once upon a time, I too felt that I was never

good enough or smart enough to get a college education. I am living testament that a person does not have to be brilliant or smart, just have to be determined, possess grit and perseverance. Don't let anyone stand in your way of getting an education, because knowledge is power. Education and perseverance is the key to breaking the cycle of poverty and improvement as individuals and as a society. I encourage everyone to surround themselves by others who value education and to support one another, as a strong support system is necessary for your success. Nothing in life comes easy; after all, if getting a college degree was easy, everyone would have one.

## **ABSTRACT**

Flores, Brian R., *Differences in advanced course performance of Texas students as a function of their ethnicity/race and economic status: A multiyear, statewide investigation*. Doctor of Education (Educational Leadership), May 2019, Sam Houston State University, Huntsville, Texas

### **Purpose**

The purpose of this journal-ready dissertation was to examine the extent to which ethnic/racial and economic status differences were present in the advanced course performance of Texas students. In the first article, the extent to which ethnic/racial (i.e., Asian, White, Hispanic, Black) differences existed in advanced course performance of Texas students was examined. In the second article, a descriptive analysis of mathematics and science advanced course taking was conducted, with an emphasis on student ethnicity/race (i.e., Asian, White, Hispanic, Black). In the third study, the advanced course taking performance of Texas students in poverty was determined. Lastly, the final purpose of this study was to ascertain the extent to which trends were present in each of the three articles.

### **Method**

A quantitative, causal comparative, non-experimental research design (Creswell, 2013) was present in this study in which four years of Texas statewide data were analyzed. Archival data from the 2012-2013 to the 2015-2016 school year were obtained from the Texas Academic Performance Reports to determine the extent to which differences were present in the AP/IB performance of Texas high school students as a function of their ethnicity/race and their economic status (i.e., students in poverty and students not in poverty). Moreover, trends were determined in the percentages of high

school students who had taken and who had scored at or above the criterion on an AP/IB exam.

## **Findings**

Results were remarkably congruent with results of previous research regarding the presence of large gaps in AP/IB exam course-taking and AP/IB exam performance among Asian, White, Hispanic, and Black students. Very low percentages of the four groups of students had completed an AP/IB exam. Statistically significant differences were present between students in poverty and students not in poverty who had taken and who had scored at or above the criterion on AP exams from the 2012-2013 through the 2015-2016 school year. Students in poverty had the lowest percentage, on average, of all students who had taken and who had scored at or above the criterion on an AP/IB exam. Implications and recommendations for future research were discussed.

**KEYWORDS:** Advanced Placement, International Baccalaureate, Percent scoring at or above criterion, Texas Academic Performance Reports, Student ethnicity/race, Asian, White, Hispanic, Black, Economically disadvantaged, Mathematics, Science

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After an intensive period of three years I encountered on this scholarly journey, today is the day I wish to give thanks as the finale of this passage. The entire dissertation process has been challenging professionally, personally, and spiritually. I would like to take this opportunity to reflect on the people who have supported and helped me throughout this journey.

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## **CHAPTER I**

### **INTRODUCTION**

With the rising cost of higher education and the competitive nature of being admitted to top ranked postsecondary institutions, public high schools are highly committed to offering students a rigorous high school curriculum. Many programs expose students to rigorous college-level coursework. One such educational program that serves to facilitate the transition from high school to college while offering a rigorous curriculum is the Advanced Placement (AP) Program. Since 1955, the AP Program has allowed high school students the opportunity to take college-level coursework and earn college credit while still in high school (Mattern, Marini, & Shaw, 2013). At the end of the AP course, students can take a criterion referenced AP exam scored on a scale of 1 to 5. If a score of 3 or above is obtained on the exam, many higher education institutions in the United States will award college credit or course exemption (Mattern et al., 2013).

With over 3 million students participating in AP courses each year, much discussion has centered about whether student participation in AP exams is a good predictor of student success in college. Some researchers (e.g., Mattern et al., 2013; Warne, 2017) suggested high school students who participate in AP courses and AP exams outperform their high school peers who do not participate in AP courses and AP exams in postsecondary education courses. However, Warne (2017) stated “Researchers have become increasingly interested in issues of equity and fairness in relationship to the AP program” (p. 10). Therefore, conducting the three investigations in this journal-ready dissertation regarding successful Advanced Placement course performance by ethnicity/race, performance, and economic status in Texas may provide more information

that could be useful to present and future policymakers and high school and postsecondary administrators with respect to issues of equity and fairness.

### **History of Advanced Placement**

The history of AP performance dates to as early as 1936, when Henry Ford, the founder of the Ford Motor Company established the Ford Foundation. After World War II, to help close the widening gap between secondary and higher education, members of the Ford Foundation suggested all foundation resources be used to improve public welfare through scientific and educational charitable contributions (Ford Foundation, 2018). During this time, members of the Ford Foundation created the Fund for the Advancement of Education, which was designed to support new programs at all levels of formal education (Rockefeller Archive Center, 2018). The administrators of the Fund for the Advancement of Education focused resources in five areas of education, one of which was educational opportunity (Rockefeller Archive Center, 2018). Several studies emerged from the Fund for the Advancement of Education. Members of the Ford Foundation recommended that secondary schools and colleges work as a team to avoid coursework repetition between the two institutions and allow highly motivated students to work at their capabilities and advance as quickly as their potential allowed (College Board, 2003).

In another study from The Fund for the Advancement of Education, recommendations were for secondary school administrators to encourage high school seniors to engage in college-level work taught by highly creative teachers and allow students to take achievement exams which would permit the students to enter college with an advanced standing (College Board, 2003). Later, in the mid-twentieth century,



the Committee on Admission with Advanced Standing created a plan that would allow high school seniors to engage in college-level curricula and standards (College Board, 2003). With the help of higher education leaders in all disciplines, the Committee on Admission with Advanced Standing developed high school courses and assessments with college rigor that would be the basis for granting college credit (College Board, 2003). “In 1952, a pilot program was launched introducing advanced courses in 11 initial subjects” (College Board, 2003, p. 1). The College Board was invited in the 1955-1956 academic school year to administer the college level curricula and standards program to all high school students. In 1955, the AP movement became official and the College Board named the program, the College Board Advanced Placement Program (College Board, 2003).

The history of the College Board began in 1900 as a not-for-profit organization to connect and expand students’ access to and success in higher education (College Board, 2018a). Each year, the College Board (2018a) assists over seven million students in their transition from high school to college by offering college readiness and college success programs and services (e.g., AP, International Baccalaureate [IB]) at over 6,000 educational institutions worldwide. The College Board has a well-defined AP equity and access policy that encourages all educators to give all academically prepared students the opportunity to participate in academically challenging AP coursework regardless of ethnic/racial status (College Board, 2018a).

The College Board (2014) provides a report to educators and policymakers on each individual state’s AP exam results for public schools in the United States. Tracked in this annual report are AP exams that high school graduates take throughout their high

school experience. The College Board (2014) provides clear guidelines for high school administrators and teachers on curricular and resource requirements for AP courses. Each school participating in the AP program designates an AP coordinator who takes the primary responsibility of managing all policies and procedures, including the administration of all AP exams, adhering to all exam schedules, and preserving exam security, required by the College Board (College Board, 2014).

In 1993, the 73rd Texas Legislature enacted the Texas Advanced Placement/International Baccalaureate Incentive Program to emphasize Texas' commitment to high academic performance (Texas Education Agency, 2017b). The purpose of the Texas AP/IB Incentive Program was to subsidize the cost of exams for low-income students taking the AP or IB exams and to recognize schools that demonstrated success in achieving state goals. This new initiative was introduced to Local Education Agencies to ensure student participation from low-income students (Texas Education Agency, 2017b). In the 2017-2018 academic school year, school administrators were notified the subsidy was decreased from \$30 dollars to \$24 dollars per AP/IB exam taken by eligible students (Texas Education Agency, 2017b). The United States Department of Education's AP Test Fee Grant Program, allotted additional money for qualified students taking the AP/IB exams until the federal Every Student Succeeds Act was initiated (Texas Education Agency, 2017b). With the passage and changes to the Every Student Succeeds Act, the AP Test Fee Grant Program was discontinued, which required the Texas Education Agency to use Title I and Title IV state-level funds to compensate for the gap in funding to support low-income student exam participation (Texas Education Agency, 2017b). Currently, in the United States,

the College Board offers 38 AP courses at a cost of \$94 per exam and local schools are allowed a per-exam rebate of \$9 to offset the total cost of the exam (College Board, 2018a). Any AP exams administered at schools outside of the United States (e.g., U.S. territories, U.S. commonwealths, and Canada) cost \$124 per exam. The College Board (2014) does not charge students who take AP exams for an online score report or to send scores to a postsecondary institution designated on the registration answer sheet.

In 1965, the United States federal government committed to providing students with equal opportunities in K-12 education with the authorization of the Elementary and Secondary Education Act (Malin, Bragg, & Hackman, 2017). In 2015, this 50-year-old Elementary and Secondary Act was re-authorized by then-President Obama (U.S. Department of Education, 2018) by signing into law the Every Student Succeeds Act. The Every Student Succeeds Act was designed to uphold protections for students who were disadvantaged and required that all students have equal access to a rigorous curriculum to assist in their postsecondary success (U.S. Department of Education, 2018). Educational leaders agree that the single best predictor of success in postsecondary settings is the rigor of student's high school curriculum (College Board, 2018b). The National Association for College Admission Counseling encourages enrollment in college preparatory classes, such as AP courses, for students to succeed in credit-bearing, entry-level course work at postsecondary institutions (College Board, 2018b). Although a plethora of research studies has been published on college readiness (e.g., Barnett, Maclutsky, & Wagonlander, 2015; Combs et al., 2010; Conley & McGaughy, 2012; Harvey, Slate, Moore, Barnes, & Martinez-Garcia, 2013) and the level of preparation required for students to succeed in general education course work at a postsecondary

institution, limited studies are available on the connections between ethnicity/race and economic status on the advanced course performance of Texas students. Therefore, the focus of this journal-ready dissertation was on the advanced course performance of Texas high school students to ascertain the degree to which ethnic/racial and economic status differences might be present.

### **AP Course-Taking**

High school students take AP courses to prepare themselves for success in a postsecondary institution (College Board, 2014). Students in high school have the option of taking an AP class without taking the AP exam and have the option of taking an AP exam without taking the AP course. If students opt to take the AP exam, they are required to score a minimum of a 3 out of a 5-point scale to receive college level credit if the college has chosen to award credit for the exam (College Board, 2014). Many high school students choose to take AP courses and exams to enhance their college readiness skills and to challenge themselves in preparation for postsecondary education. The AP exams enable students to challenge themselves by applying their knowledge and critical thinking skills. Both the AP and IB exam results are used by postsecondary institutions for initial course placement and to award college credit to incoming students who meet eligibility standards (Texas Education Agency, 2017a). Students who score a minimum of 3 on an AP exam typically earn higher grade point averages in college and have higher graduation rates than students who score less than a 3 on an AP exam (College Board, 2014).

## College Readiness

For a person to be considered eligible for application by a postsecondary institution, a college entrance exam is required. In the United States, a college entrance exam is a standardized test, which may include the SAT or the ACT test. The ACT is a multiple-choice entrance exam used by many colleges and universities to make decisions regarding student admissions. In 2017, 60% or more than 2 million, of U.S. high school graduates took the ACT exam (ACT, 2017). Although 60% of U.S. high school graduates took the ACT exam in 2017, the percentage of high school graduates who were college ready in three or four subject areas was only 39% (ACT, 2017). In addition, the ACT (2017) stated the national average composite score on the ACT exam in 2017 was 21.0, slightly higher than the national average composite score in 2016. In addition, in the last 4 years the percentage of ACT-tested graduates who met or exceeded the ACT College Readiness Benchmarks increased in reading, stayed relatively steady in science, and declined in English and mathematics (ACT, 2017). Although the number and percentage of Hispanic students taking ACT exams increased in 2017, the average scores and college readiness levels of Hispanic students only improved slightly (ACT, 2017). In comparison, the percentage of Hispanic students taking ACT exams increased in 2017 and the percentage of Black student taking ACT exams decreased in 2017.

From a national perspective, during 2014-2017, the percentage of White students who took the ACT exam decreased 6 percentage points from 58% to 52%, the percentage of Hispanic students who took the ACT exam increased 3 percentage points from 14% to 17%, the percentage of Asian students who took the ACT exam increased 1 percentage point from 4% to 5%, and the percentage of Black students who took the ACT exam

decreased less than 0.5% percentage points (ACT, 2017). Of the six described ethnic/racial groups (e.g., African American, American Indian, Asian American, Hispanic, Pacific Islander, and White) who met three or more benchmarks on the ACT, Asian Americans outperformed African Americans by 50 percentage points, American Indians by 46 percentage points, Hispanics by 38 percentage points, Pacific Islanders by 39 percentage points, and Whites by 12 percentage points (ACT, 2017). Therefore, according to the ACT (2017), a national trend might be present of Asian high school graduates outperforming White, Hispanic, and Black high school graduates by meeting three or more benchmarks on the ACT exam in four consecutive years, from 2014-2017.

Furthermore, 76% of Asian students met the ACT College Readiness Benchmarks in English compared to 74% of White students, 46% of Hispanic students, and 33% of Black students (ACT, 2017). In mathematics, 70% of Asian students met the ACT College Readiness Benchmarks compared to 51% of White students, 26% of Hispanic students, and 13% of Black students (ACT, 2017). In reading, 62% of Asian students met the ACT College Readiness Benchmarks compared to 58% of White students, 33% of Hispanic students, and 20% of Black students (ACT, 2017). In Science, 58% of Asian students met the ACT College Readiness Benchmarks compared to 47% of White students, 22% of Hispanic students, and 11% of Black students (ACT, 2017). According to ACT (2017), the organization has consistent evidence to support that students who take the recommended core curriculum of four years of English, three years of mathematics, three years of science, and three years of social studies are more likely to be college-ready than students who do not take these courses.

Further evidence of the disparity in the 2017 graduating class in ACT performance among ethnic/racial groups of students in Texas exists. For example, in the 2017 Texas graduating class, the ACT composite average was 20.7, whereas the ACT composite average of Hispanic students was 18.6 and the ACT composite average of Black students was 17.8 (ACT, 2017). In Texas, 2017 high school graduates who took the ACT two or more times had an average Composite score of 22.7 compared to 19.5 for high school graduates who took the ACT test only one time (ACT, 2017). White high school graduates were more likely than their Hispanic and Black peers to take the ACT exam more than once and therefore, outperformed their Hispanic and Black peers who took the ACT exam only once. To recognize and act upon the achievement gaps by ethnicity/race, a bipartisan effort by the United States government recommitted to a national education law in 2015 to ensure equal opportunity for all students (U. S. Department of Education, 2018).

### **Every Student Succeeds Act**

The Every Student Succeeds Act (U. S. Department of Education, 2018) followed the No Child Left Behind Act, which mandated the same rigorous curriculum, but had debilitating accountability measures and became increasingly unworkable for schools. The Every Student Succeeds Act includes provisions to help guarantee success for students by upholding protections for traditionally underserved students by requiring that all students in America be taught to high academic standards (U. S. Department of Education, 2018). The Every Student Succeeds Act was designed to uphold protections for students who were disadvantaged and required that all students have equal access to a rigorous curriculum to assist in their postsecondary success (U.S. Department of

Education, 2018). For example, in the graduating class of 2017, more White, Hispanic, and Black students took an AP exam than did their Asian peers, yet underperformed their Asian peers (Jaschik, 2018). Asian students outperformed their peers on an AP exam by scoring a 3 or greater. In the graduating class of 2017, 6% of all Asian students who took an AP exam scored at or above the minimum criterion of a 3. Asian students had the largest percentage gain of their peers scoring a 3 or greater on an AP exam. Furthermore, in the graduating class of 2017, the total number of all Hispanic students who took an AP exam scoring a 3 or greater, outperformed their Black peers who took an AP exam by more than 18 percentage points (Jaschik, 2018).

Student diversity and enrollment in AP courses in Texas high schools have been topics of discussion for years. During the last 10 years, an increase in the diversity of students taking rigorous AP courses has occurred (College Board, 2014). For example, from 2003-2013, American Indian/Alaska Native students and Asian/Asian American/Pacific Islander students taking rigorous AP courses has more than doubled. Over the same period, the number of Hispanic students and Black students taking rigorous AP courses has more than tripled; however, Hispanic student and Black student performance has not improved (College Board, 2014).

### **Purpose of the Study**

The purpose of this journal-ready dissertation was to examine the extent to which ethnic/racial and economic status differences were present in the advanced course performance of Texas students. In the first article, the extent to which ethnic/racial (i.e., Asian, White, Hispanic, or Black) differences existed in advanced course performance of Texas students was examined. In the second article, a descriptive analysis of



mathematics and science advanced course taking was conducted, with an emphasis on student ethnicity/race (i.e., Asian, White, Hispanic, or Black). In the third study, the advanced course taking performance of Texas students in poverty was determined. Lastly, the final purpose of this study was to ascertain the extent to which trends were present in each of the three articles.

### **Significance of the Study**

A substantial body of research has been generated in which statistically significant relationships have been established between poverty, ethnicity/race, and college readiness. However, few researchers have recently analyzed the differences between ethnic/racial (i.e., Asian, White, Hispanic, Black) differences in advanced course placement of Texas students who scored at or above the criterion and students of poverty who scored at or above the criterion. Although some researchers (e.g., Davis, Joyner, & Slate, 2011; Koch, 2012; Moore, Slate, & Martinez-Garcia, 2009) have explored national trends in college readiness as measured by AP exam performance and the achievement gaps between Asian, White, Hispanic, and Black peers, limited studies are present in which researchers have analyzed recent trends in AP performance by ethnicity/race and economic status of Texas students. The findings of this investigation may be used to add to the existing research regarding AP performance by ethnicity/race and economic status for high school students in the State of Texas. Administrators, teachers, policymakers, and legislators might use findings in this study when making critical decisions regarding improving access and equity to AP examinations in the State of Texas.

Research exists (i.e., National Center for Education Statistics, 2014; United States Government Accountability Office, 2018) on AP/IB exam performance as a function of

student economic status. Although the AP/IB exam performance of Texas students by their economic status has been examined in existing literature, much of the research is not recent. Findings obtained in this study will contribute to the research literature through bringing up-to-date information. Policymakers, legislators, and high school administrators might use the findings in this study when faced with important decisions regarding improving AP curriculum and improving equity in AP exam performance among students in poverty and students not in poverty. Educators might use the findings in this study to understand the unique challenges of students in poverty and their peers who took AP courses, those students who scored at or above the criterion, and to set meaningful goals to increase AP exam performance for all students.

### **Review of the Literature on Advanced Course Performance and Ethnicity/Race**

The United States faces a challenge of creating new work opportunities, better career paths, and higher postsecondary degree attainment to remain globally competitive in the 21st century (Council of Foreign Relations, 2018). Higher levels of educational attainment improve the prospects of employment and the earning potential of individuals in the 21st century. For example, in 2016 the employment rate for young adults with a bachelor's degree or higher was 88%, compared to an employment rate of only 69% for young adults who had completed high school (National Center for Education Statistics, 2017). The National Center for Education Statistics (2018a) documented the median annual earnings for 25 to 34-year olds who completed high school as the highest level of education attained was \$31,800 compared to \$54,800 for the same age group who attained a bachelor's degree or higher.

Although documented that higher levels of educational attainment improve earning potential, the rate at which 25 to 34 year olds graduate from postsecondary institutions within four years is lower than the rate at which they graduated from high school within four years. For example, in Texas, 360,606 students graduated from high school in the class of 2017 and 89.7% of those students graduated within four years (Texas Education Agency, 2018c). In contrast, at the postsecondary level only 60% of students who began a bachelor's degree at a 4-year institution in 2010 completed their degree within four years (National Center for Education Statistics, 2018b). Though Texas has one of the nation's largest enrollment in community colleges, it ranks 44th out of all U.S. states in Associate degree attainment (Collins, 2014). In Texas, out of every 100 certificate or degree-seeking community college students, only 20 students complete a postsecondary credential in three years (Collins, 2014). Elapsed time to degree attainment is critical because each additional semester of enrollment costs students' additional tuition expenses and future earning potential (Shapiro et al., 2016).

Because postsecondary graduation rates and work opportunities have changed over time, educational programs have changed to improve postsecondary entrance, retention, and graduation rates (National Center of Education Statistics, 2018b). Several different types of educational programs and models exist to facilitate the academic transition from high school to college and help improve postsecondary entrance, retention, and graduation rates. Some of these college preparatory programs include AP courses, IB courses, and dual enrollment courses. According to Adelman (1999), one of the best predictors of earning a bachelor's degree was the degree of curriculum rigor, which students attained in high school. The AP program and the IB programs are

advanced and rigorous academic programs that are available to secondary school students (Texas Education Agency, 2016b).

Over the past few decades, tremendous growth has occurred in the AP participation of high school students. Judson and Hobson (2015) documented between 1997 and 2012, the number of students in Grades 9-12 who took AP exams increased by 4,952% in ninth-grade, 844% in tenth-grade, 353% in eleventh-grade, and 211% in the twelfth-grade. Although AP participation and AP test taking in the United States have increased over the last 20 years, Judson and Hobson (2015) have questioned whether the increase in AP course taking has generated equitable access. Judson and Hobson (2015) documented that White and Asian students are far more likely to enroll in AP courses than are Hispanic and Black students even when levels of college readiness are equivalent. In 2012, 68.4% of Asian students and 64.7% of White students scored a 3, 4, or 5 on their AP exams, whereas 29.1% of Black students and 42.8% of Hispanic students scored a 3, 4, or 5 on their AP exams (Judson & Hobson, 2015).

Although more than 1 million students in the United States took at least one AP course in 2017, large gaps remain in exam performance among ethnic/racial groups (e.g., Barnes & Slate, 2014; Holmes, Slate, Moore, & Barnes, 2013; Jaschik, 2018). Barnes and Slate (2014) investigated the college readiness rates of Black, Hispanic, and White students across a 3-year period in Texas. Barnes and Slate (2014) established that for the 3 years of data, college readiness rates of White students were statistically significantly higher than the college readiness rates of Black and Hispanic students in reading, mathematics, and in both subjects. In 2008-2009, White students averaged 14.03% and 17.41% higher in their college readiness rates in reading than Hispanic and Black

students, respectively (Barnes & Slate, 2014). Regarding 2008-2009, a statistically significant difference in college readiness rates in mathematics was present between White, Hispanic, and Black students. White students averaged 14.4% and 29.57% higher in their college readiness rates in mathematics than their Hispanic and Black peers, respectively. In 2008-2009, White students averaged 16.05% and 21.55% higher in college readiness rates in reading and mathematics than their Hispanic and Black peers, respectively (Barnes & Slate, 2014).

For the past 20 years, persistent ethnic/racial academic achievement gaps have been documented on AP exam performance. In particular, access and equity of AP exam performance was examined by investigating the cost effectiveness ratios for AP exam performance as a function of ethnicity/race. In their study, Holmes et al. (2013) analyzed whether increased spending on AP exam course-taking by ethnically/racially diverse students resulted in higher AP exam performance. A positive ratio was indicative that more students achieved passing scores and earned AP college credit and a negative ratio indicated more students failed to achieve a passing score and failed to earn AP college credit. Increases in AP course-taking did not result in increases in student success rates. Black and Hispanic students had a negative cost effectiveness ratio, which escalated over 16 years of data (Holmes et al., 2013).

In addition, Holmes, et al. (2013) investigated ethnic/racial disparities in overall AP exam performance over 16 years and documented the percentage of Black and Hispanic students earning passing scores on their AP exams declined each year. Also established was that the percentage of White students who had passing scores on AP exams decreased slightly over the 16 years of data, whereas, the percentage of Asian

students who had passing scores on AP exams consistently increased. Although numerous external factors might exist in overall AP exam performance by ethnicity/race, Holmes et al. (2013) contended that low performance on AP exams by students who were disadvantaged and ethnically/racially diverse is often related to the lack of high quality schools and economic status as compared to their White and Asian peers. Specifically, White and Asian students attending high performing suburban high schools outperformed Black and Hispanic students on AP exam performance.

In a separate investigation, Koch et al. (2013) provided evidence to support the presence of ethnic/racial achievement gaps on AP exam performance. Koch et al. (2013) compared the performance of Hispanic students from three states (i.e., California, Texas, and Arizona) from 1997 through the 2012 school years on two AP English exams (i.e., English Language and Composition, and English Literature and Composition). For the 16 years of data examined on AP exam performance of Hispanic students in these three states, statistically significant differences were revealed (Koch et al., 2013). In this investigation, California had the highest percentage (63.54%) of Hispanic students earn a score of 3 or higher on all AP exams and Texas had the lowest percentage (48.06%) of Hispanic students earn a score of 3 or higher on all AP exams (Koch et al., 2013). California had the highest percentage of Hispanic students earn a 3 or higher on all AP exams for 11 of the 16 years of comparisons (Koch et al., 2013).

Whereas Koch et al. (2013) addressed the achievement gaps on AP exam performance for Hispanic students in three states, Wilson, Slate, Moore, and Barnes (2014) analyzed the AP exam performance of Black students in five states. Specifically, Wilson et al. (2014) investigated the performance of Black males in Connecticut, Florida,

Maryland, Massachusetts, and Texas on the AP English Language and Composition, Calculus AB, Biology, and U.S. History exams over a 12-year period from the 2001 through the 2012 exam years. Of the five states in this study, 90% of Black male students in three of the five states did not receive college credit (Wilson et al., 2014). Furthermore, of all five states investigated, Black male students in Texas had the highest percentage (90%) who did not receive college credit based on their AP exam scores (Wilson et al., 2014). In addition, Texas had the highest percentage of Black male students who did not receive an AP score of 4 or 5 (Wilson et al., 2014). At least 65% of Black males in this study did not achieve an AP score that would allow them to receive college credit for AP exams based upon their AP exam scores (Wilson et al., 2014). Accordingly, the ethnic/racial differences in recent AP performance of Texas students warrants further investigation.

### **Review of the Literature on Advanced Course Performance in Mathematics and Science**

Mathematics and science are critical areas of educational focus in preparing high school graduates for postsecondary education and for preparation in a globally competitive economy. As a result, policymakers in the United States have focused on science, technology, engineering, and mathematics, otherwise known as STEM courses (National Center for Education Statistics, 2018c). Researchers for The High School Transcript Study program collected and analyzed transcripts from America's public and private high school graduates to explore the relationships between course-taking patterns and student achievement. They established that students who take advanced mathematics and science courses in high school have higher assessment scores and are more likely to

enroll in, persist, and graduate from a postsecondary institution than their peers who do not take advanced mathematics and science courses (National Center for Education Statistics, 2018c).

In Grade 9, 58% of students took Algebra I, or a similar level course; however, as students progressed through high school, they were increasingly less likely to take a mathematics course. For example, only 46% of students in Grade 10 took Geometry, 39% of students in Grade 11 took Algebra II, and 16% of students in Grade 12 took other advanced mathematics courses (National Center for Education Statistics, 2018c). In Grade 9, 76% of students took one of two science courses (i.e., Biology or Survey of Science); however, as students progressed through high school, their pattern of science course-taking decreased. In Grade 10, 51% of students took Biology; in Grade 11, 38% of students took Chemistry; and in Grade 12, 15% of students took Physics, 14% of students took Biology, and 13% of students took an advanced science course (National Center for Education Statistics, 2018c). Although researchers from this investigation suggested students who take advanced mathematics and science courses in high school have higher college assessment scores and are more college-ready than students who do not take advanced mathematics and science courses, they established that students are not taking more advanced mathematics and science courses as they progress through high school.

To promote college readiness in the fields of science and mathematics, educators and researchers have advocated for students to take more Advanced Placement courses. For the past few decades, developing rigorous curriculum in American high schools has been a priority and has led to the growth of AP and IB course-taking in high schools.



Over the last 11 years, the number of public high schools offering AP courses has increased from 16,464 schools to 22,169 schools (College Board, 2017). In public high schools nationwide, more than 1.17 million students took 3.98 million AP exams (College Board, 2017).

Moreover, the number of United States public high school graduates who have taken an AP exam and the number who have scored a 3 or higher on at least one AP exam have increased by 70%. Nationally, the top 10 states with the highest percentage of 2017 public high school graduates scoring a 3 or higher on AP exams are: Massachusetts (32.1%), Maryland (31.2%), Connecticut (31.0%), Florida (30.8%), California (30.3%), Virginia (28.5%), New Jersey (28.0%), New York (27.8%), Colorado (27.4%), and Illinois (26.3%) (College Board, 2017). Notably missing in the top 10 states with the highest percentage of public high school graduates scoring a 3 or higher on AP exams is the State of Texas.

In Texas, mathematics participation in AP or IB exams by students in Grades 11 or 12 has only increased 0.3 percentage points from the 2013-2014 to the 2014-2015 school year. The percentage of Texas students who took at least one AP or IB mathematics exam in Grades 11 and 12 for the 2014-2015 school year was only 6.8%. Among the Grade 11 and 12 students who participated in at least one AP or IB mathematics exam, 27.1% were Asian, 8.6% were White, 4.7% were Hispanic, and 3.0% were Black (Texas Education Agency, 2017a). Mathematics performance in AP or IB exams by students in Grades 11 or 12 decreased 1.9 percentage points from the 2013-2014 to the 2014-2015 school year (Texas Education Agency, 2017a).

The percentage of all students in Texas who scored at or above the criterion on a least one AP or IB mathematics exam in Grade 11 and 12 for the 2014-2015 school year was 51.7%. Among Grade 11 and 12 students who scored at or above the criterion on at least one AP or IB mathematics exam, 71.7% were Asian, 62.6% were White, 31.9% were Black, and 31.2% were Hispanic (Texas Education Agency, 2017a). Of the ethnic/racial groups examined in Texas, Asian students had the highest percentage who took at least one AP or IB mathematics exam and outperformed their White, Hispanic, and Black peers by scoring at or above the criterion on at least one AP or IB mathematics exam by 9.1, 39.8, and 40.5 percentage points, respectively (Texas Education Agency, 2017a).

In Texas, science participation in AP or IB exams by students in Grade 11 or 12 has increased 3.3 percentage points from the 2013-2014 to the 2014-2015 school years. The percentage of students who took at least one AP or IB science exam in Grade 11 and 12 for the 2014-2015 school year was 10.2%. Among the Grade 11 and 12 students who took at least one AP or IB science exam, 35.0% were Asian, 11.9% were White, 8.1% were Hispanic, and 5.6% were Black (Texas Education Agency, 2017a).

The percentage of all students in Texas scoring at or above the criterion on a least one AP or IB science exam in Grade 11 and 12 for the 2014-2015 school year was 35.4%. This was a decrease of 10.3 percentage points from the previous year. Among Grade 11 and 12 students scoring at or above the criterion on at least one AP or IB science exam, 56.6% were Asian, 48.1% were White, 17.7% were Hispanic, and 17.0% were Black (Texas Education Agency, 2017a). Of the ethnic/racial groups examined in Texas, Asian students had the highest percentage who took at least one AP or IB science

exam and outperformed their White, Hispanic, and Black peers by scoring at or above the criterion on at least one AP or IB science exam by 8.5, 38.9, and 39.6, percentage points, respectively (Texas Education Agency, 2017a).

### **Review of the Literature on Advanced Course Performance and Economic Status**

With the passage of the Every Student Succeeds Act (2015), public school administrators have focused on growth and achievement. This approach offers a better way for school administrators to measure school effectiveness and to generate high levels of learning for all students, including students in poverty. This Every Student Succeeds Act (2015) was the reauthorization of the No Child Left Behind Act (U.S. Department of Education, 2004) in which a commitment was made to pursuing higher standards and more equitable outcomes for children across all social groups. Schools were required by the No Child Left Behind Act to set challenging standards by ensuring that all students reach academic proficiency within 12 years (U.S. Department of Education, 2004).

Today the economy of the United States demands a global knowledge-based citizen who has some postsecondary education. To be globally competitive, all students have the opportunity to develop high-level literacy skills, quantitative reasoning skills, problem-solving skills, and communication skills. Because of this need for students to acquire the necessary skills to be globally competitive, college-and career-ready standards have been implemented in all states (Achieve, 2015). College readiness has been defined by Conley (2007) as “the level of preparation a student needs in order to enroll and succeed-without remediation-in a credit-bearing general education course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program” (p. 5).

A decade ago, only Arkansas and Texas had adopted statewide college-and career-ready standards. In 2014, 14 states had not adopted college-and career-ready standards. In addition to the states who have adopted college-and career-readiness standards, many states have adopted different types of educational programs which serve to facilitate the academic transition from high school to college and to assist with improving postsecondary entrance, retention, progression, and graduation rates. Of particular interest for this article are AP courses and IB courses. The AP program and the IB program are advanced and rigorous academic programs that are available to all secondary school students (Texas Education Agency, 2016b).

In addition to Judson and Hobson (2015) questioning the equitable access among all students (e.g. ethnicity/race and students in poverty) to AP course-taking and performance, researchers (e.g., Harwell et al., 2017; Hegedus, 2018) over the last few decades established a link between poor academic achievement and poverty. According to the National Center for Education Statistics (2017), in the United States 44.7% of public school, students were eligible for free or reduced lunch and attended either a low-poverty or high-poverty school. In the United States, high school students who were eligible for free and reduced lunch performed 44 percentage points lower on student achievement than students enrolled in schools considered high income and high achieving public schools (National Center for Education Statistics, 2017). Researchers at The Education Trust (2013) reported that over half a million students of low-income status are not participating in AP/IB courses, thus contributing to the educational attainment gap between students in poverty and students not in poverty.

Whereas almost all public high schools in America offer courses such as Algebra and Biology, disparities in access have been associated with AP courses with respect to school poverty levels. An example of disparities in AP course offerings is that only 60% of schools considered as schools of high-poverty offer at least one AP course compared to 80% of schools considered as schools of low-poverty (U.S. Government Accountability Office, 2018). Schools considered to be wealthy offer more AP courses than schools considered to be poor. Of note is that about 70% of schools considered as wealthy offered more than 10 different AP courses compared to only 30% of schools considered as poor.

Poverty adversely affects academic outcomes. For instance, The Texas Education Agency (2018c) reported that for the class of 2017, only 86.9% of Texas students in poverty graduated from high school in contrast to 92.6% of students who were not in poverty. In addition, students in poverty in the class of 2017 dropped out of high school at a rate almost twice that of their peers who were not in poverty (Texas Education Agency, 2018c). The National Center for Education Statistics (2014) reported that students from low-income families often earn bachelor's degrees at rates that are statistically significantly lower than their more affluent peers.

Revealed in a report by the Texas Education Agency (2017a) were gaps in access and equity among students in poverty and students not in poverty who participated in AP/IB courses. The percentage of students in poverty who took at least one AP or IB English Language Arts exam in Grade 11 and 12 for the 2014-2015 school year was 11.0% compared to 19.1% of students who were not in poverty. Among Grade 11 and 12 students, 57.0% of students who were not economically disadvantaged who took an

English Language Arts examine scored at or above the criterion compared to only 20.7% of students who were economically disadvantaged (Texas Education Agency, 2017a).

In Texas, Grade 11 and 12 students in poverty were less likely to participate in AP/IB mathematics exams than their peers who were not in poverty. Students in poverty were also less likely to outperform their peers not in poverty on the mathematics AP/IB exam. The percentage of students who were economically disadvantaged took at least one AP/IB mathematics exam in Grade 11 and 12 for the 2014-2015 school year was only 4.0% compared to 9.5% of students who were not economically disadvantaged. Among Grade 11 and 12 students, 61.1% of students who were not economically disadvantaged who took a mathematics exam scored at or above the criterion compared to 29.3% of students who were economically disadvantaged (Texas Education Agency, 2017a).

Science AP/IB participation and performance by student poverty status revealed even more inequity by student poverty status. Between Grade 11 and 12 students in Texas, a higher percentage of students who were not economically disadvantaged (13.3%) took at least one AP/IB science exam than students who were economically disadvantaged (7.0%). According to the Texas Education Agency (2017a), almost three times as many students who were not poor (45.7%) in Grade 11 and 12 scored at or above the criterion on at least one AP/IB science examination than students who were economically disadvantaged (16.0%).

With respect to Grade 11 and 12 Social Studies, a higher percentage of students who were not economically disadvantaged (18.2%) took at least one AP/IB exam than their peers in poverty (10.5%). More than half, 52.3%, of students who were not poor

scored at or above the criterion on at least one AP/IB Social Studies examination than their peers who were poor (19.0%). In Texas, of all four AP/IB subjects analyzed (i.e., English Language Arts, Mathematics, Science, and Social Studies), the achievement gaps between all students (e.g., students in poverty and students not in poverty) on their performance of AP/IB mathematics exams, English Language Arts exams, social studies exams, and science exams was, 39.8%, 36.3%, 33.3%, and 29.7%, respectively (Texas Education Agency, 2017a).

### **Statement of the Problem**

An abundance of research exists on college readiness (e.g., Barnett, Maclutsky, & Wagonlander, 2015; Combs et al., 2010; Conley, & McGaughy, 2012; Harvey, Slate, Moore, Barnes, & Martinez-Garcia, 2013) and the level of academic preparation required for students to succeed in general education coursework in a postsecondary institution. In addition, research exists regarding ethnic/racial achievement gaps on AP exam performance (e.g., Barnes & Slate, 2014; Holmes et al., 2013; Jaschik, 2018). However, much of the research regarding ethnic/racial achievement gaps on AP exam performance is national in scope and researchers have focused on states other than Texas. In addition, much of the current research is at least 5 years old. Therefore, current findings regarding ethnic/racial achievement gaps on the AP exam performance of students in Texas and current trends, if any, warrants further investigation.

Many researchers who have examined AP performance in mathematics and science have focused on STEM areas, college matriculation, and the relationship between AP course-taking and AP performance (i.e., Judson, 2017, Judson & Hobson, 2015, National Center for Education Statistics, 2018c). Furthermore, much of the research

regarding AP exam performance in mathematics and science is national in scope and researchers have focused on states other than Texas. In addition, much of the current research on high school students' AP mathematics and science exam performance is at least 5 years old. Therefore, current findings regarding AP exam performance in mathematics and science of high school students in Texas and current trends, if any, warrants further investigation.

Many of the researchers and educational leaders who have examined the issue of poverty as related to AP/IB course-taking and exam performance have mainly been national in scope (i.e., National Center for Education Statistics, 2014; United States Government Accountability Office, 2018) or on states other than Texas. The research investigations conducted in this area are also dated, with the majority of them at least five years old. Therefore, current findings regarding AP exam performance and economic status of high school students in Texas and current trends, if any, warrants further investigation.

### **Definition of Terms**

The terms that are essential to understanding the three research studies in this proposed journal-ready dissertation are defined next for the reader.

#### **ACT College Readiness Benchmark**

The ACT college readiness benchmark is the minimum ACT college readiness assessment score required for students to have approximately a 50% chance of earning a B or better in a college credit-bearing course (ACT, 2013).



**Advanced Course-taking**

Advanced course-taking refers to secondary school students who engage in Advanced Placement Program and International Baccalaureate Diploma courses designed with rigorous and college-level academic content (Texas Education Agency, 2017a).

**Advanced Placement**

Advanced Placement refers to a program administered by the College Board in which students are offered opportunities to take one or more advanced level courses and examinations from six academic areas: English, history and social sciences, mathematics, computer sciences, sciences, and world languages (Texas Education Agency, 2018b).

**Asian**

A person defined as Asian is a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including: Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam (Texas Education Agency Appendix F, 2018a).

**Black**

A person defined as Black or African American is a person having origins in Africa or a person having origins in any of the black racial groups of Africa (Texas Education Agency Appendix F, 2018a).

**Economically Disadvantaged**

An economically disadvantaged student is defined as a person who is eligible for free or reduced price meals under the National School Lunch and Child Nutrition Program (Texas Education Agency, 2016a).

**Ethnicity/race**

The United States Department of Commerce (2017) defines race as a person's self-identification with one or more social groups (i.e., White, Black or African American, Asian, American Indian and Alaskan Native, Native Hawaiian and Other Pacific Islander, or some other race). Ethnicity determines whether a person is of Hispanic origin or not.

**Hispanic**

A person defined as Hispanic is a person having origins of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race (Texas Education Agency Appendix F, 2018a).

**International Baccalaureate**

International Baccalaureate refers to a nonprofit educational foundation that offers elementary, middle, and high school educational programs for students aged 3 to 19 to assist in developing intellectual, personal, emotional, and social skills (Texas Education Agency, 2018b).

**Percent Scoring Above Criterion**

The percent scoring above criterion refers to secondary students who take Advanced Placement and International Baccalaureate courses who have valid Advanced Placement scores in the range of 1 to 5 or valid International

Baccalaureate scores in the range of 1 to 7 for at least one examination taken in the current academic school year (Texas Education Agency, 2017a).

### **Texas Academic Performance Reports**

The Texas Academic Performance Reports replaced the Academic Excellence Indicator System report in the 2012-2013 school year and is an annual statistical report that contains information about student performance, school and district staffing, programs, and student demographics (Texas Education Agency, 2018b).

### **Texas Education Agency**

The Texas Education Agency refers to an administrative unit in the State of Texas for elementary and secondary public education which provides leadership, guidance, and resources to assist in meeting the needs of all students. This agency manages the textbook adoption process, oversees development of statewide curriculum, administers the statewide assessment program, collects data on public schools, rates school districts using an accountability system, and monitors compliance with federal guidelines (Texas Education Agency, 2018b).

### **White**

A person defined as White is a person having origins in any of the original peoples of Europe, the Middle East, or North Africa (Texas Education Agency Appendix F, 2018a).

### **Literature Review Search Procedures**

For this journal-ready dissertation, the literature regarding the academic performance of students and its relationship to ethnicity/race, and economic status was

examined. To search for relevant literature, the phrases economically disadvantaged, advanced course performance, mathematics, science, race, ethnicity, student, and Texas were used. The searches for this journal-ready dissertation were conducted through the EBSCO host database for academic journals, which is an acronym for the Elton B. Scott Company. The criteria were defined as scholarly peer reviewed articles with a publication date within the last five to 10 years.

### **Delimitations**

The three studies in this journal-ready dissertation were delimited to students (i.e., Asian, White, Hispanic, and Black) who participated in AP examinations. Only data from Texas students who took AP/IB courses and the percentage of students who scored above the criterion on AP/IB examinations in four school years beginning with the 2012 school year and ending with the 2016 school year, and trends, if any, were analyzed herein. For the third study in this journal-ready dissertation, only data from Texas students of poverty who took AP/IB exams and students of poverty who scored at or above the criterion, and trends, if any, were analyzed.

The data that were analyzed for the three studies involved four different school years. Data for other students were not included nor analyzed. In this journal-ready dissertation, the data for the three studies were downloaded from the Texas Education Agency Texas Academic Performance Reports (Texas Education Agency, 2018d).

### **Limitations**

Several limitations were present in this journal-ready dissertation. The main limitation was relying on empirical archival data acquired from a single source (i.e.,

Texas Academic Performance Reports). Another limitation in this journal-ready dissertation was that the data for the independent variables and the dependent variables were merged in each school years. As a result, only specific inferential statistical procedures (i.e., paired samples *t*-tests) were used to analyze the data. The data that the Texas Education Agency provided were the only data that were analyzed. This journal-ready dissertation also had another limitation regarding how key terms were defined (i.e., advanced course-taking, ethnicity/race, and economically disadvantaged). The definitions of these key terms were defined according to the Texas Education Agency (2016a, 2017a, 2018a).

### **Procedures**

In this journal-ready dissertation, initial approval was requested from the researcher's dissertation committee. Once approval was received from the dissertation committee, additional approval was requested from Sam Houston State University's Institutional Review Board. Once approval from both sources had been received, data for Grades 9-12 students in Texas who participated in AP/IB examinations in the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years from the Texas Academic Performance Reports were downloaded and analyzed.

### **Organization of the Study**

In this journal-ready dissertation, three research investigations were conducted. In the first journal-ready dissertation article, the research questions that were addressed were on the effect of ethnicity/race on the percentage of students who took an Advanced Placement/International Baccalaureate course and on the percentage of students who scored at or above the criterion on these exams for the 2012-2013 through the 2015-2016

school years. Also included in the first investigation was a determination of trends that were present on the percentage of students who took an Advanced Placement/International Baccalaureate course and on the percentage of students who scored at or above the criterion on these exams. In the second journal-ready dissertation article, the research questions addressed were on the percentages of students by their ethnicity/race (i.e., Asian, White, Hispanic, or Black) who had taken an Advanced Placement/International Baccalaureate exam in Mathematics and Science for the 2012-2013 through the 2015-2016 school years and on the percentage of these students who scored at or above the criterion on these exams. Also addressed was the presence of trends regarding the percentage of students by their ethnicity/race who had taken an AP/IB course and who had scored at or above the criterion on these exams. In the third study, the focus was on comparing the percentages of students in poverty to the percentages of all students who had taken an AP/IB exam and who had scored at or above the criterion on these exams was determined. Also addressed in this study was the presence of trends.

Five chapters constitute this journal-ready dissertation. Chapter I includes the background of the study, statement of the problem, purpose of the study, significance of the study, theoretical framework, definition of terms, assumptions, delimitations, and limitations of the three research investigations. In Chapter II, the framework for the first journal-ready article on ethnic/racial differences in the AP/IB performance of Texas students was discussed. In Chapter III, readers are provided with a descriptive analysis of AP/IB Mathematics and Science course taking and performance of Texas students. In Chapter IV, economic status differences in Advanced Placement performance of Texas

students were discussed. Finally, Chapter V entails a discussion of research results of all three studies, implications for policy and practice, and recommendations for research in the future.

## CHAPTER II

### ETHNIC/RACIAL DIFFERENCES IN THE ADVANCED PLACEMENT PERFORMANCE OF TEXAS STUDENTS: A MULTIYEAR, STATEWIDE INVESTIGATION

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This dissertation follows the style and format of *Research in the Schools (RITS)*.



### **Abstract**

In this investigation, the degree to which differences were present in the advanced course performance of Texas students as a function of their ethnicity/race (i.e., Asian, White, Hispanic, Black) was addressed. Archival data were obtained and analyzed from the Texas Academic Performance Reports for the 2012-2013 through the 2015-2016 school years. Trends on the percentages of students by ethnicity/race who had taken and who had scored at or above the criterion on an AP/IB exam were also addressed. For the four school years analyzed, the percentages of Hispanic students (i.e., 13.27% to 27.00%) and Black students (i.e., 11.70% to 22.22%) who completed an AP/IB exam were very low, as were the percentages of White and Asian students. Percentages of completion for students who had taken an AP/IB exam ranged from 45.19% to 55.48% for Asian students, from 18.11% to 37.03% for White students, from 13.27% to 27.00% for Hispanic students, and from 11.70% to 22.22% for Black students, respectively. In all four school years, Asian students had the highest percentages of students who had taken and who had scored at or above the criterion on AP/IB exams, followed by White students, Hispanic students, and Black students, respectively. Recommendations for future research, along with suggestions for policy and practice, were provided.

**Keywords:** Advanced Course-Taking, Percent Scoring at or Above Criterion, Ethnicity/Race

ETHNIC/RACIAL DIFFERENCES IN THE ADVANCED PLACEMENT  
PERFORMANCE OF TEXAS STUDENTS: A MULTIYEAR, STATEWIDE  
INVESTIGATION

The United States faces a challenge of creating new work opportunities, better career paths, and higher postsecondary degree attainment to remain globally competitive in the 21st century (Council of Foreign Relations, 2018). Higher levels of educational attainment improve the prospects of employment and the earning potential of individuals in the 21st century. For example, in 2016 the employment rate for young adults with a bachelor's degree or higher was 88%, compared to an employment rate of only 69% for young adults who had completed high school (National Center for Education Statistics, 2017). The National Center for Education Statistics (2018a) documented the median annual earnings for 25 to 34-year olds who completed high school as the highest level of education attained was \$31,800 compared to \$54,800 for the same age group who attained a bachelor's degree or higher.

Although documented that higher levels of educational attainment improve earning potential, the rate at which 25- to 34-year-olds graduate from postsecondary institutions within four years is lower than the rate at which they graduated from high school within four years. For example, in Texas, 360,606 students graduated from high school in the class of 2017 and 89.7% of those students graduated within four years (Texas Education Agency, 2018a). In contrast, at the postsecondary level only 60% of students who began a bachelor's degree at a 4-year institution in 2010 completed their degree within four years (National Center for Education Statistics, 2018b). Though Texas has one of the nation's largest enrollments in community colleges, it ranks 44th out

of all U.S. states in Associate degree attainment (Collins, 2014). In Texas, out of every 100 certificate or degree-seeking community college students, only 20 students complete a postsecondary credential in three years (Collins, 2014). Elapsed time to degree attainment is critical because each additional semester of enrollment costs students' additional tuition expenses and future earning potential (Shapiro et al., 2016).

Because postsecondary graduation rates and work opportunities have changed over time, educational programs have changed to improve postsecondary entrance, retention, and graduation rates (National Center of Education Statistics, 2018b). Several different types of educational programs and models exist to facilitate the academic transition from high school to college and help improve postsecondary entrance, retention, and graduation rates. Some of these college preparatory programs include Advanced Placement courses, International Baccalaureate courses, and dual enrollment courses. According to Adelman (1999), one of the best predictors of earning a bachelor's degree was the degree of curriculum rigor, which students attained in high school. The Advanced Placement (AP) program and the International Baccalaureate (IB) programs are advanced and rigorous academic programs that are available to secondary school students (Texas Education Agency, 2016).

Over the past few decades, tremendous growth has occurred in the AP participation of high school students. Judson and Hobson (2015) documented between 1997 and 2012, the number of students in Grades 9-12 who took AP exams increased by 6,360.2%. Although AP participation and AP test-taking in the United States has increased over the last 20 years, Judson and Hobson (2015) have questioned whether the increase in AP course-taking has generated equitable access. Judson and Hobson (2015)

documented that White and Asian students are far more likely to be enrolled in AP courses than are Hispanic and Black students even when levels of college readiness are equivalent. In 2012, 68.4% of Asian students and 64.7% of White students scored a 3, 4, or 5 on their AP exams, whereas 29.1% of Black students and 42.8% of Hispanic students scored a 3, 4, or 5 on their AP exams (Judson & Hobson, 2015).

Although more than 1 million students in the United States took at least one AP course in 2017, large gaps remain in exam performance among ethnic/racial groups (e.g., Barnes & Slate, 2014; Holmes, Slate, Moore, & Barnes, 2013; Jaschik, 2018). Barnes and Slate (2014) investigated the college readiness rates of Black, Hispanic, and White students across a 3-year period in Texas. Barnes and Slate (2014) established that for the 3 years of data, college readiness rates of White students were statistically significantly higher than the college readiness rates of Black and Hispanic students in reading, mathematics, and in both subjects. In 2008-2009, White students averaged 14.03% and 17.41% higher in their college readiness rates in reading than Hispanic and Black students, respectively (Barnes & Slate, 2014). Regarding 2008-2009, a statistically significant difference in college readiness rates in mathematics was present between White, Hispanic and Black students. White students averaged 14.4% and 29.57% higher in their college readiness rates in mathematics than their Hispanic and Black peers, respectively. In 2008-2009, White students averaged 16.05% and 21.55% higher in their college readiness rates in reading and mathematics than their Hispanic and Black peers, respectively (Barnes & Slate, 2014).

For the last 20 years, persistent ethnic/racial academic achievement gaps have been documented on AP exam performance. In particular, access and equity of AP exam

performance was examined by investigating the cost effectiveness ratios for AP exam performance as a function of ethnicity/race. In their study, Holmes et al. (2013) analyzed whether increased spending on AP exam course-taking by ethnically/racially diverse students resulted in higher AP exam performance. A positive ratio was indicative that more students achieved passing scores and earned AP college credit and a negative ratio indicated more students failed to achieve a passing score and failed to earn AP college credit. Increases in AP course-taking did not result in increases in student success rates. Black and Hispanic students had a negative cost effectiveness ratio which escalated over 16 years of data (Holmes et al., 2013).

In addition, Holmes, et al. (2013) investigated ethnic/racial disparities in overall AP exam performance over 16 years and documented the percentage of Black and Hispanic students earning passing scores on their AP exams declined each year. Also established was that the percentage of White students who had passing scores on AP exams decreased slightly over the 16 years of data whereas the percentage of Asian students who had passing scores on AP exams consistently increased. Although numerous external factors might exist in AP exam performance by ethnicity/race, Holmes et al. (2013) contended that low performance on AP exams by disadvantaged and ethnically/racially diverse students is often related to the lack of high quality schools and economic status as compared to their White and Asian peers. Specifically, White and Asian students attending high performing suburban high schools outperformed Black and Hispanic students on AP exam performance.

In a separate investigation, Koch et al. (2013) provided evidence to support the presence of ethnic/racial achievement gaps on AP exam performance. Koch et al. (2013)

compared the performance of Hispanic students from three states (i.e., California, Texas, and Arizona) from 1997 through the 2012 school years on two AP English exams (i.e., English Language and Composition, and English Literature and Composition). For the 16 years of data examined on the overall AP exam performance of Hispanic students in these three states, statistically significant differences were revealed (Koch et al., 2013). In this investigation, California had the highest percentage (63.54%) of Hispanic students earn a score of 3 or higher on all AP exams and Texas had the lowest percentage (48.06%) of Hispanic students earn a score of 3 or higher on all AP exams (Koch et al., 2013). California had the highest percentage of Hispanic students earn a 3 or higher on all AP exams for 11 out of the 16 years of comparisons (Koch et al., 2013).

Whereas Koch et al. (2013) addressed the achievement gaps on AP exam performance for Hispanic students in three states, Wilson, Slate, Moore, and Barnes (2014) analyzed the AP exam performance of Black students in five states. Specifically, Wilson et al. (2014) investigated the performance of Black males in Connecticut, Florida, Maryland, Massachusetts, and Texas on the AP English Language and Composition, Calculus AB, Biology, and U.S. History exams over a 12-year period from the 2001 through the 2012 exam years. Of the five states in this study, 90% of Black male students in three of the five states did not receive college credit (Wilson et al., 2014). Furthermore, of all five states investigated, Black male students in Texas had the highest percentage (90%) who did not receive college credit based on their AP exam scores (Wilson et al., 2014). In addition, Texas had the highest percentage of Black male students who did not receive an AP score of 4 or 5 (Wilson et al., 2014). At least 65% of the Black males in this study did not achieve an AP score that would allow them to

receive college credit based upon their AP exam scores (Wilson et al., 2014).

Accordingly, the ethnic/racial differences in recent AP performance of Texas students warrants further investigation.

### **Statement of the Problem**

An abundance of research exists on college readiness (e.g., Barnett, Maclutsky, & Wagonlander, 2015; Combs et al., 2010; Conley, & McGaughy, 2012; Harvey, Slate, Moore, Barnes, & Martinez-Garcia, 2013) and the level of academic preparation required for students to succeed in general education coursework in a postsecondary institution. In addition, research exists regarding ethnic/racial achievement gaps on AP exam performance (e.g., Barnes & Slate, 2014; Holmes et al., 2013; Jaschik, 2018). However, much of the research regarding ethnic/racial achievement gaps on AP exam performance is national in scope and researchers have focused on states other than Texas. In addition, much of the current research is at least 5 years old. Therefore, current findings regarding ethnic/racial achievement gaps on the AP exam performance of students in Texas and current trends, if any, warrants further investigation.

### **Purpose of the Study**

The purpose of this study was to examine the degree to which differences were present in the AP/IB performance of Texas students as a function of their ethnicity/race (i.e., Asian, White, Hispanic, Black). In addition, the results of this investigation were on the percentage of students who had taken AP/IB courses and the percentage of students who had scored at or above the criterion on AP/IB examinations in four school years beginning with the 2012-2013 school year and ending with the 2015-2016 school year. A final purpose of this study was to determine the degree to which trends, if any, were

present in the percentage of students by their ethnicity/race who had taken AP/IB courses and who had scored at or above the criterion on the AP/IB examinations involving all four school years of data.

### **Significance of the Study**

Research exists (e.g., Clark, Moore, & Slate, 2012; Koch et al., 2013; Moore & Slate, 2008; Richardson, Gonzalez, Leal, Castillo, & Carman, 2016) on AP exam performance and ethnic/racial differences. Although AP/IB exam performance and achievement gaps among ethnic/racial groups of Texas students are discussed in the existing literature, much of the research literature is not recent. Findings obtained in this study will contribute to the existing research by adding current data and trends, if any, on the AP/IB performance of Asian, White, Hispanic, and Black students in Texas over multiple years beginning with the 2012 school year. Policymakers and legislators might use the findings in this study when faced with critical decisions regarding improving access and equity to AP exams in Texas. Educators might use the findings in this study to set meaningful goals to understand the unique challenges of students and to set meaningful goals to increase opportunity for all students who might choose to take AP exams.

### **Research Questions**

In this proposed study, the following overarching research question was addressed: What is the difference in the advanced course performance of Texas students as a function of their ethnicity/race (i.e., Asian, White, Hispanic, Black)? Specific subquestions under this overarching research question were: (a) What is the effect of ethnicity/race on the percentage of students who had taken AP/IB courses?; (b) What is



the effect of ethnicity/race on the percentage of students who had scored at or above the criterion on AP/IB exams?; (c) What trend is present, if any, in the percentage of students by their ethnicity/race who had taken AP/IB courses?; and (d) What trend is present, if any, in the percentage of students by their ethnicity/race who had scored at or above the criterion on AP/IB exams? The first two research questions were repeated for the 2013, 2014, 2015, and 2016 school years whereas the last two research questions involved all four school years of data. Thus, 10 research questions was present in this investigation.

## **Method**

### **Research Design**

A non-experimental causal-comparative research design was used for this study (Creswell, 2013). Archival data were obtained from the Texas Academic Performance Reports. Because the archival data collected for this study had occurred in the past, the dependent variable and the independent variable could not be manipulated nor changed (Johnson & Christensen, 2012). The ethnicity/race of high school students in Texas constituted the independent variables and the AP/IB exam performance of high school students in Texas was the dependent variable. The archival data that were obtained for this study were assumed to be accurate and free of errors. This assumption is believed to be appropriate because the Texas Education Agency audits the data that are provided by each high school (Texas Education Agency, 2018c).

### **Participants**

Participants for this study were students (i.e., Asian, White, Hispanic, and Black) enrolled in Texas public high schools who had taken an AP/IB exam and students who

had scored at or above the criterion on AP/IB exams in the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years. The data were obtained from the Texas Education Agency, which is responsible for tracking performance and providing AP/IB data through the Texas Academic Performance Reports (Texas Education Agency, 2018b). To date, these data constituted 100% of the available data at the Texas Education Agency, Texas Academic Performance Reports website. This database is publicly available and accessible to users who want to locate data for Texas high school students (Texas Education Agency, 2018b).

The two key terms that need to be defined in this article are advanced course-taking and percent scoring at or above criterion. Advanced course-taking refers to secondary school students who completed Advanced Placement Program and International Baccalaureate Diploma courses (Texas Education Agency, 2017). The percent scoring at or above criterion refers to secondary students who take Advanced Placement and International Baccalaureate courses who have valid Advanced Placement scores in the range of 1 to 5 or valid International Baccalaureate scores in the range of 1 to 7 for at least one examination taken in the current academic school year (Texas Education Agency, 2016).

## **Procedures**

Archival data from the Texas Education Agency Texas Academic Performance Reports website were analyzed herein. Data on the ethnicity/race (i.e., Asian, White, Hispanic, Black) of students who had taken AP/IB exams and of the students who scored at or above the criterion on AP/IB exams for the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years were downloaded and analyzed. Because these data were

reported to the Texas Education Agency by individual school districts, errors were assumed to be minimal. The downloaded data were then transformed from an Excel datafile into the Statistical Package for Social Sciences (SPSS) format to conduct statistical analyses. Before conducting inferential statistics to answer the research questions in this investigation, checks were performed to determine whether or not the data were normally distributed.

## **Results**

To address the first two research questions, inferential statistical procedures were calculated. Because of the manner in which the Texas Education Agency reported student performance, paired samples *t*-tests were conducted. Performance on AP/IB exams was reported in the following manner by the Texas Education Agency: White AP/IB performance for a specific school year; Hispanic AP/IB performance for a specific school year; Black AP/IB performance for a specific school year; and Asian AP/IB performance for a specific school year. As such, the student demographic characteristic, the dependent variable, and the school year were all merged into the same variable. This situation limited the type of statistical analysis that could be conducted. Prior to performing parametric paired samples *t*-tests, its underlying assumptions, particularly of normality, were checked. Although all of the data were not normally distributed, a decision was made to use the more powerful, parametric paired samples *t*-test.

### **Results of Analyses for Research Question One for White and Hispanic Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between White and Hispanic students in their percentages who had taken an AP/IB exam,  $t(1107) = 16.23, p < .001$ . This difference represented a moderate effect

size (Cohen's  $d$ ) of 0.69 (Cohen, 1988). The percentage of White students, on average, who had taken an AP/IB exam was almost a third higher than the percentage of Hispanic students who had taken an AP/IB exam. Table 2.1 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between White and Hispanic students in their percentages who had taken an AP/IB exam,  $t(1115) = 17.60, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.75 (Cohen, 1988). The percentage of White students, on average, who had taken an AP/IB exam was almost a third higher than the percentage of Hispanic students who had taken an AP/IB exam. Delineated in Table 2.1 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between White and Hispanic students in their percentages who had taken an AP/IB exam,  $t(423) = 12.43, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 0.85 (Cohen, 1988). The percentage of White students, who had taken an AP/IB exam was almost a third higher, on average, than the percentage of Hispanic students who had taken an AP/IB exam. Revealed in Table 2.1 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between White and Hispanic students in their percentages who had taken an AP/IB exam,

$t(443) = 10.45, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.70 (Cohen, 1988). As delineated in Table 2.1, the percentage of White students, on average, who had taken an AP/IB exam was almost a third higher than the percentage of Hispanic students who had taken an AP/IB exam.

### **Results of Analyses for Research Question One for White and Black Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between White and Black students in their percentages who had taken an AP/IB exam,  $t(757) = 22.26, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.14 (Cohen, 1988). The percentage of White students, on average, who had taken an AP/IB exam was almost twice as much as the percentage of Black students who had taken an AP/IB exam. Table 2.2 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between White and Black students in their percentages who had taken an AP/IB exam,  $t(770) = 21.98, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.12 (Cohen, 1988). The percentage of White students, on average, who had taken an AP/IB exam was almost twice as much as the percentage of Black students who had taken an AP/IB exam. Delineated in Table 2.2 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between White and Black students in their percentages who had taken an AP/IB exam,  $t(309) = 14.78, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.19 (Cohen, 1988). The percentage of White students, on average, who had taken an AP/IB exam was more than one third higher than the percentage of Black students who had taken an AP/IB exam. Revealed in Table 2.2 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between White and Black students in their percentages who had taken an AP/IB exam,  $t(325) = 15.15, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.19 (Cohen, 1988). The percentage of White students, on average, who had taken an AP/IB exam was more than one third higher than the percentage of Black students who had taken an AP/IB exam. As presented in Table 2.2 contains the descriptive statistics for this school year.

### **Results of Analyses for Research Question One for White and Asian Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between White and Asian students in their percentages who had taken an AP/IB exam,  $t(408) = -20.23, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.42 (Cohen, 1988). The percentage of White students, on average, who had taken an AP/IB exam was almost a third lower than the percentage of Asian students who had taken an AP/IB exam. Table 2.3 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between White and Asian students in their percentages who had taken an AP/IB exam,  $t(427) = -21.19, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.45 (Cohen, 1988). The percentage of White students, on average, who had taken an AP/IB exam was almost a third lower than the percentage of Asian students who had taken an AP/IB exam. Delineated in Table 2.3 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between White and Asian students in their percentages who had taken an AP/IB exam,  $t(185) = -15.66, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.62 (Cohen, 1988). The percentage of White students, on average, who had taken an AP/IB exam was almost a third lower than the percentage of Asian students who had taken an AP/IB exam. Revealed in Table 2.3 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between White and Asian students in their percentages who had taken an AP/IB exam,  $t(182) = -14.31, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.50 (Cohen, 1988). As presented in Table 2.3, the percentage of White students, on average, who had taken an AP/IB exam was almost a third lower than the percentage of Asian students who had taken an AP/IB exam.

### **Results of Analyses for Research Question One for Hispanic and Black Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between Hispanic and Black students in their percentages who had taken an AP/IB exam,  $t(778) = 12.47, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.63 (Cohen, 1988). The percentage of Hispanic students, on average, who had taken an AP/IB exam was almost a third higher than the percentage of Black students who had taken an AP/IB exam. Table 2.4 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between Hispanic and Black students in their percentages who had taken an AP/IB exam,  $t(793) = 12.77, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.64 (Cohen, 1988). The percentage of Hispanic students, on average, who had taken an AP/IB exam was almost a third higher than the percentage of Black students who had taken an AP/IB exam. Delineated in Table 2.4 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between Hispanic and Black students in their percentages who had taken an AP/IB exam,  $t(330) = 6.89, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.54 (Cohen, 1988). The percentage of Hispanic students, on average, who had taken an AP/IB exam was almost one fourth higher than the percentage of Black



students who had taken an AP/IB exam. Revealed in Table 2.4 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between Hispanic and Black students in their percentages who had taken an AP/IB exam,  $t(341) = 8.21, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.63 (Cohen, 1988). As presented in Table 2.4, the percentage of Hispanic students, on average, who had taken an AP/IB exam was almost one fourth higher than the percentage of Black students who had taken an AP/IB exam.

### **Results of Analyses for Research Question One for Hispanic and Asian Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between Hispanic and Black students in their percentages who had taken an AP/IB exam,  $t(414) = -26.87, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.87 (Cohen, 1988). The percentage of Hispanic students, who had taken an AP/IB exam was more than twice as low, on average, as the percentage of Asian students who had taken an AP/IB exam. Table 2.5 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between Hispanic and Asian students in their percentages who had taken an AP/IB exam,  $t(434) = -29.35, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.99 (Cohen, 1988). The percentage of Hispanic students, who had taken

an AP/IB exam was more than twice as low, on average, as the percentage of Asian students who had taken an AP/IB exam. Revealed in Table 2.5 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between Hispanic and Asian students in their percentages who had taken an AP/IB exam,  $t(185) = -22.80, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 2.36 (Cohen, 1988). The percentage of Hispanic students, who had taken an AP/IB exam was more than twice as low, on average, as the percentage of Asian students who had taken an AP/IB exam. Delineated in Table 2.5 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between Hispanic and Asian students in their percentages who had taken an AP/IB exam,  $t(182) = -20.26, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 2.12 (Cohen, 1988). As presented in Table 2.5, the percentage of Hispanic students, who had taken an AP/IB exam was more than twice as low, on average, as the percentage of Asian students who had taken an AP/IB exam.

### **Results of Analyses for Research Question One for Black and Asian Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between Black and Asian students in their percentages who had taken an AP/IB exam,  $t(393) = -30.20, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 2.15 (Cohen, 1988). The percentage of Black students, who had taken an AP/IB exam was almost three times lower, on average, than the percentage of Asian

students who had taken an AP/IB exam. Table 2.6 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between Black and Asian students in their percentages who had taken an AP/IB exam,  $t(409) = -31.15, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 2.18 (Cohen, 1988). As delineated in Table 2.6, the percentage of Black students, who had taken an AP/IB exam was almost three times lower, on average, than the percentage of Asian students who had taken an AP/IB exam.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between Black and Asian students in their percentages who had taken an AP/IB exam,  $t(176) = -23.81, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 2.53 (Cohen, 1988). The percentage of Black students, who had taken an AP/IB exam was almost three times lower, on average, than the percentage of Asian students who had taken an AP/IB exam. Revealed in Table 2.6 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between Black and Asian students in their percentages who had taken an AP/IB exam,  $t(179) = -21.68, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 2.29 (Cohen, 1988). The percentage of Black students, who had taken an AP/IB exam was almost three times lower, on average, than the percentage of Asian students who had

taken an AP/IB exam. Presented in Table 2.6 are the descriptive statistics for this school year.

### **Results of Analyses for Research Question Two for White and Hispanic Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between White and Hispanic students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(548) = 11.72, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.71 (Cohen, 1988). The percentage of White students, on average, who had scored at or above the criterion on an AP/IB exam was almost one fourth higher than the percentage of Hispanic students who had scored at or above the criterion on an AP/IB exam. Table 2.7 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between White and Hispanic students in their percentages who scored at or above the criterion on an AP/IB exam,  $t(562) = 11.43, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.68 (Cohen, 1988). The percentage of White students, on average, who had scored at or above the criterion on an AP/IB exam was almost one fourth higher than the percentage of Hispanic students who had scored at or above the criterion on an AP/IB exam. Delineated in Table 2.7 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between White and Hispanic students in their percentages who scored at or above the criterion on an AP/IB exam,  $t(239) = 9.18, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 0.84 (Cohen, 1988). The percentage of White students, who had scored at or above the criterion on an AP/IB exam was almost twice as much, on average, than the percentage of Hispanic students. Revealed in Table 2.7 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between White and Hispanic students in their percentages who scored at or above the criterion on an AP/IB exam,  $t(250) = 9.51, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 0.85 (Cohen, 1988). As presented in Table 2.7, the percentage of White students, on average, who had scored at or above the criterion on an AP/IB exam was almost one fourth higher than the percentage of Hispanic students.

### **Results of Analyses for Research Question Two for White and Black Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between White and Black students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(336) = 25.45, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.96 (Cohen, 1988). The percentage of White students, on average, who had scored at or above the criterion on an AP/IB exam was almost twice as much as the percentage of Black students. Table 2.8 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between White and Black students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(344) = 24.91, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.90 (Cohen, 1988). The percentage of White students, on average, who had scored at or above the criterion on an AP/IB exam was almost twice as much as the percentage of Black students. Delineated in Table 2.8 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between White and Black students in their percentages who scored at or above the criterion on an AP/IB exam,  $t(159) = 18.28, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 2.04 (Cohen, 1988). The percentage of White students, on average, who had scored at or above the criterion on an AP/IB exam was almost twice the percentage of Black students. Revealed in Table 2.8 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between White and Black students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(250) = 9.51, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 2.16 (Cohen, 1988). The percentage of White students, on average, who had scored at or above the criterion on an AP/IB exam was almost twice the

percentage of Black students. Presented in Table 2.8 are the descriptive statistics for this school year.

### **Results of Analyses for Research Question Two for White and Asian Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between White and Asian students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(229) = -3.26, p < .001$ . This difference represented a small effect size (Cohen's  $d$ ) of 0.27 (Cohen, 1988). The percentage of White students, on average, who had scored at or above the criterion on an AP/IB exam was less than one fourth than the percentage of Asian students who had scored at or above the criterion on an AP/IB exam. Table 2.9 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between White and Asian students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(307) = -2.56, p = .011$ . This difference represented a small effect size (Cohen's  $d$ ) of 0.21 (Cohen, 1988). The percentage of White students, on average, who had scored at or above the criterion on an AP/IB exam was less than one fourth than the percentage of Asian students who had scored at or above the criterion on an AP/IB exam. Delineated in Table 2.9 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was not yielded between White and Asian students in their percentages who scored at or above the criterion on an AP/IB exam,  $t(145) = -1.23, p = .22$ . Similar percentages of White students and Asian students scored at or above the criterion on an AP/IB exam in this school year. Table 2.9 contains the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was not revealed between White and Asian students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(144) = -0.36, p = .72$ . Similar percentages of White students and Asian students scored at or above the criterion on an AP/IB exam in this school year. Presented in Table 2.9 are the descriptive statistics for this school year.

### **Results of Analyses for Research Question Two for Hispanic and Black Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between Hispanic and Black students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(389) = 18.20, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.30 (Cohen, 1988). The percentage of Hispanic students, on average, who had scored at or above the criterion on an AP/IB exam was more than one fourth than the percentage of Black students who had scored at or above the criterion on an AP/IB exam. Table 2.10 contains the descriptive statistics for this school year.

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Regarding the 2013-2014 school year, a statistically significant difference was revealed between Hispanic and Black students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(400) = -16.80, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.19 (Cohen, 1988). The percentage of Hispanic students, on average, who had scored at or above the criterion on an AP/IB exam was more than one fourth than the percentage of Black students who had scored at or above the criterion on an AP/IB exam. Delineated in Table 2.10 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between Hispanic and Black students in their percentages who scored at or above the criterion on an AP/IB exam,  $t(187) = 12.10, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.25 (Cohen, 1988). The percentage of Hispanic students, on average, who had scored at or above the criterion on an AP/IB exam was more than one fourth than the percentage of Black students. Revealed in Table 2.10 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between Hispanic and Black students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(189) = 11.10, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.14 (Cohen, 1988). The percentage of Hispanic students, on average, who had scored at or above the criterion on an AP/IB exam was slightly less than one fourth than the percentage of Black students who had scored at or above the criterion on an AP/IB exam. Presented in Table 2.10 are the descriptive statistics for this school year.

### **Results of Analyses for Research Question Two for Hispanic and Asian Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between Hispanic and Asian students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(303) = -11.96, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 0.97 (Cohen, 1988). The percentage of Hispanic students, on average, who had scored at or above the criterion on an AP/IB exam was almost one fourth less than the percentage of Asian students who had scored at or above the criterion on an AP/IB exam. Table 2.11 contains the descriptive statistics for this school year.

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 Insert Table 2.11 about here  
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Regarding the 2013-2014 school year, a statistically significant difference was revealed between Hispanic and Asian students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(317) = -11.75, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 0.93 (Cohen, 1988). The percentage of Hispanic students, on average, who had scored at or above the criterion on an AP/IB exam was almost one fourth less than the percentage of Asian students who had scored at or above the criterion on an AP/IB exam. Delineated in Table 2.11 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between Hispanic and Asian students in their percentages who scored at or above the criterion on an AP/IB exam,  $t(146) = -8.58, p < .001$ . This difference

represented a large effect size (Cohen's  $d$ ) of 1.00 (Cohen, 1988). The percentage of Hispanic students, on average, who had scored at or above the criterion on an AP/IB exam was almost one fourth less than the percentage of Asian students who had scored at or above the criterion on an AP/IB exam. Revealed in Table 2.11 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between Hispanic and Asian students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(145) = -9.08, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.06 (Cohen, 1988). The percentage of Hispanic students, on average, who had scored at or above the criterion on an AP/IB exam was almost one fourth less than the percentage of Asian students who had scored at or above the criterion on an AP/IB exam. Presented in Table 2.11 are the descriptive statistics for this school year.

### **Results of Analyses for Research Question Two for Black and Asian Students**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between Black and Asian students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(265) = -20.83, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.81 (Cohen, 1988). The percentage of Black students, on average, who had scored at or above the criterion on an AP/IB exam was more than one third less than the percentage of Asian students who had scored at or above the criterion on an AP/IB exam. Table 2.12 contains the descriptive statistics for this school year.

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Insert Table 2.12 about here  
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Regarding the 2013-2014 school year, a statistically significant difference was revealed between Black and Asian students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(276) = -20.24, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.72 (Cohen, 1988). The percentage of Black students, on average, who had scored at or above the criterion on an AP/IB exam was more than one third less than the percentage of Asian students. Delineated in Table 2.12 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between Black and Asian students in their percentages who scored at or above the criterion on an AP/IB exam,  $t(131) = -13.27, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.63 (Cohen, 1988). The percentage of Black students, on average, who had scored at or above the criterion on an AP/IB exam was more than one third less than the percentage of Asian students. Revealed in Table 2.12 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between Black and Asian students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(131) = -13.66, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 1.68 (Cohen, 1988). The percentage of Black students, on average, who had scored at or above the criterion on an AP/IB exam was more almost

more than one third less than the percentage of Asian students. Presented in Table 2.12 are the descriptive statistics for this school year.

### **Discussion**

In this investigation, the extent to which differences were present in the advanced course performance of Texas students as a function of their ethnicity/race (i.e., Asian, White, Hispanic, and Black) in the 2012-2013 school year through the 2015-2016 school year was addressed. Also examined in this multiyear, statewide investigation was the presence of trends on the percentages of students by ethnicity/race who had taken and who had scored at or above the criterion on an AP/IB course incorporating all four years of data. Four years of statewide archival data were obtained from the Texas Academic Performance Reports and analyzed.

### **Connections with Existing Literature**

Results from this multiyear Texas statewide investigation were congruent with results of previous researchers (e.g., Barnes & Slate, 2014; Holmes et al., 2013; Jaschik, 2018) regarding the presence of large gaps in AP/IB exam course-taking and AP/IB exam performance among Asian, White, Hispanic, and Black students. In this empirical statewide Texas investigation of four school years of data, low percentages of all four groups of students had completed an AP/IB exam. Percentages of completion ranged from 45.19% to 55.48% for Asian students, from 18.11% to 37.03% for White students, from 13.27% to 27.00% for Hispanic students, and from 11.70% to 22.22% for Black students, respectively. Furthermore, large gaps existed among Asian, White, Hispanic, and Black students regarding their performance on scoring at or above the criterion on AP/IB exams.

In a previous investigation by Judson and Hobson (2015), White and Asian students were far more likely to be enrolled in AP courses than were Hispanic and Black students even when levels of college readiness were equivalent. In addition, Judson and Hobson (2015) revealed in their investigation that Asian and White students were far more likely to score a 3, 4, or 5 on their AP exams than Hispanic and Black students. Results of this investigation were congruent with their results. As such, more information is now available on students who had taken and who had scored at or above the criterion on AP/IB exams, particularly related to their ethnicity/race.

### **Implications for Policy and Practice**

Based upon the results of this multiyear, Texas statewide investigation, several implications for policy and practice can be made. First, educational leaders and school administrators need to analyze the data concerning all students who take and who score at or above the criterion on AP/IB exams. After analyzing the data on AP/IB exam course-taking and performance among Asian, White, Hispanic and Black students, educational leaders and school administrators need measures that decrease the large achievement gap among students. Educational leaders and administrators could use this information to determine what action should be taken to provide better access and equity to students taking AP/IB exams. Another implication is to examine the data on students who did not score at or above the criterion and provide them with more in-school support to help increase their likelihood of scoring at or above the criterion on AP/IB exams. The issue of equity among students who score at or above the criterion on AP/IB exams should be addressed by providing students (e.g., Hispanic and Black) who traditionally do not perform well on AP/IB exams with intensive intervention and support. Such

interventions could include support from AP/IB instructors on campus who could offer additional tutorials, test-taking strategies, and provide additional formative assessment, including diagnostic testing, to improve student attainment and success on AP/IB exams.

### **Recommendations for Future Research**

Several recommendations can be made for future research based upon the results of this Texas, multiyear investigation. Because this study was limited to high school students in Texas, researchers are encouraged to extend this study by analyzing data on other students of other ethnic/racial groups. Another suggestion for future research would be for researchers to analyze AP/IB data on Texas students who might be considered at-risk. Qualitative studies are also recommended to obtain information directly from students, teachers, and school administrators. Such information would provide a more nuanced approach to understanding the equity, access, and performance issues of students who take and score at or above the criterion on AP/IB exams. Finally, only four school years of data were used in this study. As such, future researchers are encouraged to analyze data from more years and more recent years to determine the extent to which results obtained herein would be generalizable.

### **Conclusion**

In this article, the percentages of Texas high school students who had taken, who had scored at or above the criterion, and the presence of trends, on AP/IB exams from the 2012-2013 school year through the 2015-2016 school year were determined. Findings from this multiyear, Texas statewide investigation were congruent with results of previous researchers (e.g., Barnes & Slate, 2014; Holmes et al., 2013; Jaschik, 2018) regarding the presence of large gaps in AP/IB exam course-taking and AP/IB exam

performance among Asian, White, Hispanic, and Black students. The percentages of Hispanic and Black students who had completed an AP/IB exam across all four school years was very low. The percentages of White and Asian students who had completed an AP/IB exam across all four school years was low. Of the four years of data analyzed and of the four ethnic/racial groups analyzed, Asian students had the highest percentage, on average, of students who had taken and who had scored above the criterion on an AP/IB exam followed by White, Hispanic, and Black students, respectively.



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Table 2.1

*Descriptive Statistics for White and Hispanic Students Who Had Taken an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
White	1,108	18.11	18.70
Hispanic	1,108	13.27	14.66
2013-2014			
White	1,116	19.29	19.61
Hispanic	1,116	14.11	15.94
2014-2015			
White	424	23.50	21.59
Hispanic	424	17.34	18.63
2015-2016			
White	444	23.80	22.84
Hispanic	444	18.43	19.63

Table 2.2

*Descriptive Statistics for White and Black Students Who Had Taken an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
White	758	21.44	18.82
Black	758	11.70	14.63
2013-2014			
White	771	22.33	19.50
Black	771	12.85	15.97
2014-2015			
White	310	26.86	21.12
Black	310	16.34	18.84
2015-2016			
White	326	27.92	22.59
Black	326	17.40	20.26

Table 2.3

*Descriptive Statistics for White and Asian Students Who Had Taken an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
White	409	29.00	17.06
Asian	409	45.50	23.06
2013-2014			
White	428	31.89	18.43
Asian	428	49.95	23.23
2014-2015			
White	186	36.63	19.26
Asian	186	55.45	22.35
2015-2016			
White	183	37.03	19.32
Asian	183	54.50	23.63

Table 2.4

*Descriptive Statistics for Hispanic and Black Students Who Had Taken an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Hispanic	779	16.45	15.59
Black	779	12.59	15.74
2013-2014			
Hispanic	794	17.41	16.72
Black	794	13.83	16.93
2014-2015			
Hispanic	331	20.74	19.69
Black	331	17.77	20.70
2015-2016			
Hispanic	342	21.99	19.73
Black	342	18.18	20.81



Table 2.5

*Descriptive Statistics for Hispanic and Asian Students Who Had Taken an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Hispanic	415	21.15	14.22
Asian	415	45.47	23.45
2013-2014			
Hispanic	435	22.76	15.87
Asian	435	49.58	23.48
2014-2015			
Hispanic	186	26.52	18.44
Asian	186	55.48	22.30
2015-2016			
Hispanic	183	27.00	16.92
Asian	183	54.50	23.63

Table 2.6

*Descriptive Statistics for Black and Asian Students Who Had Taken an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Black	394	16.08	13.83
Asian	394	45.19	22.60
2013-2014			
Black	410	18.39	16.04
Asian	410	49.37	22.41
2014-2015			
Black	177	21.49	19.20
Asian	177	54.92	21.82
2015-2016			
Black	180	22.22	18.41
Asian	180	54.34	23.05

Table 2.7

*Descriptive Statistics for White and Hispanic Students Who Had Scored at or Above the Criterion on an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
White	549	50.55	23.62
Hispanic	549	43.28	23.36
2013-2014			
White	563	50.95	23.86
Hispanic	563	43.66	23.62
2014-2015			
White	240	51.68	23.35
Hispanic	240	42.51	23.15
2015-2016			
White	251	51.74	23.18
Hispanic	251	43.47	22.40

Table 2.8

*Descriptive Statistics for White and Black Students Who Had Scored at or Above the Criterion on an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
White	337	55.68	21.92
Black	337	35.55	24.34
2013-2014			
White	345	56.50	22.70
Black	345	36.19	24.23
2014-2015			
White	160	55.81	21.86
Black	160	34.00	23.14
2015-2016			
White	167	55.81	21.37
Black	167	36.37	22.71

Table 2.9

*Descriptive Statistics for White and Asian Students Who Had Scored at or Above the Criterion on an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
White	290	61.58	19.16
<i>Asian</i>	290	64.26	19.91
2013-2014			
White	308	61.60	20.09
<i>Asian</i>	308	64.01	21.33
2014-2015			
White	146	61.02	19.77
<i>Asian</i>	146	62.54	23.94
2015-2016			
White	145	61.83	18.76
<i>Asian</i>	145	62.22	22.25

Table 2.10

*Descriptive Statistics for Hispanic and Black Students Who Had Scored at or Above the Criterion on an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Hispanic	390	43.94	23.24
Black	390	31.61	24.91
2013-2014			
Hispanic	401	44.51	23.50
Black	401	32.39	24.99
2014-2015			
Hispanic	188	42.65	22.74
Black	188	30.77	23.32
2015-2016			
Hispanic	190	43.71	21.95
Black	190	33.46	23.32

Table 2.11

*Descriptive Statistics for Hispanic and Asian Students Who Had Scored at or Above the Criterion on an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Hispanic	304	51.72	21.47
Asian	304	62.73	21.45
2013-2014			
Hispanic	318	51.83	21.60
Asian	318	62.65	22.33
2014-2015			
Hispanic	147	50.09	21.48
Asian	147	61.90	24.55
2015-2016			
Hispanic	146	51.63	20.05
Asian	146	61.73	22.67

Table 2.12

*Descriptive Statistics for Black and Asian Students Who Had Scored at or Above the Criterion on an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Black	266	40.50	24.00
Asian	266	62.79	21.82
2013-2014			
Black	277	40.36	23.58
Asian	277	62.92	22.16
2014-2015			
Black	132	38.07	22.71
Asian	132	60.60	24.34
2015-2016			
Black	132	41.74	21.49
Asian	132	60.49	22.68



### CHAPTER III

#### A DESCRIPTIVE ANALYSIS OF MATHEMATICS AND SCIENCE ADVANCED PLACEMENT COURSE TAKING AND PERFORMANCE: A TEXAS, MULTIYEAR INVESTIGATION

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This dissertation follows the style and format of *Research in the Schools (RITS)*.

### **Abstract**

In this investigation, the AP/IB Mathematics and AP/IB Science exam course-taking and AP/IB exam performance of Asian, White, Hispanic, and Black students were addressed. Archival data were obtained from the Texas Academic Performance Reports and analyzed for the 2012-2013 through the 2015-2016 school years. Across all four school years, the percentages of students who completed an AP/IB Mathematics or an AP/IB Science exam were very low. Percentages of completion on an AP/IB Mathematics exam ranged from 19.56% to 23.43% for Asian students, from 4.77% to 6.83% for White students, from 2.95% to 4.28% for Hispanic students, and from 2.91% to 3.97% for Black students, respectively. Percentages of completion on an AP/IB Science exam ranged from 21.43% to 32.27% for Asian students, from 4.94% to 10.21% for White students, from 3.23% to 6.78% for Hispanic students, and from 3.01% to 8.08% for Black students, respectively. Implications of these results, along with recommendations for future research, were discussed.

**Keywords:** Mathematics, Science, AP/IB Course-Taking, AP/IB Scored at or Above Criterion, Student Ethnicity/Race, Texas High School Students

A DESCRIPTIVE ANALYSIS OF MATHEMATICS AND SCIENCE ADVANCED  
PLACEMENT COURSE TAKING AND PERFORMANCE: A TEXAS,  
MULTIYEAR INVESTIGATION

Mathematics and science are critical areas of educational focus in preparing high school graduates for postsecondary education and for preparation in a globally competitive economy. As a result, policymakers in the United States have focused on science, technology, engineering, and mathematics, otherwise known as STEM courses (National Center for Education Statistics, 2018). Researchers for The High School Transcript Study program collected and analyzed transcripts from America's public and private high school graduates to explore the relationships between course-taking patterns and student achievement. They established that students who take advanced mathematics and science courses in high school have higher assessment scores and are more likely to enroll in, persist, and graduate from a postsecondary institution than their peers who do not take advanced mathematics and science courses (National Center for Education Statistics, 2018).

In Grade 9, 58% of students took Algebra I, or a similar level course; however, as students progressed through high school, they were increasingly less likely to take a mathematics course. For example, only 46% of students in Grade 10 took Geometry, 39% of students in Grade 11 took Algebra II, and 16% of students in Grade 12 took other advanced mathematics courses (National Center for Education Statistics, 2018). In Grade 9, 76% of students took one of two science courses (i.e., Biology or Survey of Science); however, as students progressed through high school, their pattern of science course-taking decreased. In Grade 10, 51% of students took Biology, in Grade 11, 38% of

students took Chemistry, and in Grade 12, 15% of students took Physics, 14% of students took Biology, and 13% of students took an advanced science course (National Center for Education Statistics, 2018). Although these researchers suggested students who take advanced mathematics and science courses in high school have higher college assessment scores and are more college-ready than students who do not take advanced mathematics and science courses, they established that students are not taking more advanced mathematics and science courses as they progress through high school.

To promote college readiness in the fields of science and mathematics, educators have advocated for students to take more Advanced Placement courses. For the past few decades, developing rigorous curriculum in American high schools has been a priority and has led to the growth of Advanced Placement (AP) and International Baccalaureate (IB) course-taking in high schools. Over the last 11 years, the number of public high schools offering AP courses has increased from 16,464 schools to 22,169 schools (College Board, 2017). In public high schools nationwide, more than 1.17 million students took 3.98 million AP exams (College Board, 2017).

Moreover, the number of United States public high school graduates who have taken an AP exam and the number who have scored a 3 or higher on at least one AP exam have increased by 70%. Nationally, the top 10 states with the highest percentage of 2017 public high school graduates scoring a 3 or higher on AP exams are: Massachusetts (32.1%), Maryland (31.2%), Connecticut (31.0%), Florida (30.8%), California (30.3%), Virginia (28.5%), New Jersey (28.0%), New York (27.8%), Colorado (27.4%), and Illinois (26.3%) (College Board, 2018). Notably missing in the top 10 states with the

highest percentage of public high school graduates scoring a 3 or higher on AP exams is the State of Texas.

In Texas, mathematics participation in AP or IB exams by students in Grades 11 or 12 has only increased 0.3 percentage points from the 2013-2014 to the 2014-2015 school year. The percentage of Texas students who took at least one AP or IB mathematics exam in Grades 11 and 12 for the 2014-2015 school year was only 6.8%. Among the Grade 11 and 12 students who participated in at least one AP or IB mathematics exam, 27.1% were Asian, 8.6% were White, 4.7% were Hispanic, and 3.0% were Black (Texas Education Agency, 2017). Mathematics performance in AP or IB exams by students in Grades 11 or 12 decreased 1.9 percentage points from the 2013-2014 to the 2014-2015 school year (Texas Education Agency, 2017).

The percentage of all students who scored at or above the criterion on a least one AP or IB mathematics exam in Grade 11 and 12 for the 2014-2015 school year was 51.7%. Among Grade 11 and 12 students who scored at or above the criterion on at least one AP or IB mathematics exam, 71.7% were Asian, 62.6% were White, 31.9% were Black, and 31.2% were Hispanic (Texas Education Agency, 2017). Of the ethnic/racial groups examined in Texas, Asian students had the highest percentage who took at least one AP or IB mathematics exam and outperformed their White, Hispanic, and Black peers by scoring at or above the criterion on at least one AP or IB mathematics exam by 9.1, 39.8, and 40.5 percentage points, respectively (Texas Education Agency, 2017).

In Texas, science participation in AP or IB exams by students in Grade 11 or 12 has increased 3.3 percentage points from the 2013-2014 to the 2014-2015 school year. The percentage of students who took at least one AP or IB science exam in Grade 11 and

12 for the 2014-2015 school year was 10.2%. Among the Grade 11 and 12 students who took at least one AP or IB science exam, 35.0% were Asian, 11.9% were White, 8.1% were Hispanic, and 5.6% were Black (Texas Education Agency, 2017).

The percentage of all students scoring at or above the criterion on a least one AP or IB science exam in Grade 11 and 12 for the 2014-2015 school year was 35.4%. This was a decrease of 10.3 percentage points from the previous year. Among Grade 11 and 12 students scoring at or above the criterion on at least one AP or IB science exam, 56.6% were Asian, 48.1% were White, 17.7% were Hispanic, and 17.0% were Black (Texas Education Agency, 2017). Of the ethnic/racial groups examined in Texas, Asian students had the highest percentage who took at least one AP or IB science exam and outperformed their White, Hispanic, and Black peers by scoring at or above the criterion on at least one AP or IB science exam by 8.5, 38.9, and 39.6, percentage points, respectively (Texas Education Agency, 2017).

### **Statement of the Problem**

Many researchers who have examined AP performance and AP performance in mathematics and science have focused on STEM areas, college matriculation, and the relationship between AP course-taking and AP performance (Judson, 2017; Judson & Hobson, 2015; Moore & Slate, 2008, National Center for Education Statistics, 2018). Furthermore, much of the research regarding AP exam performance in mathematics and science is national in scope and researchers have focused on states other than Texas. Also, much of the current research on high school students' AP mathematics and science exam performance is at least 5 years old. Therefore, current findings regarding AP exam

performance in mathematics and science of high school students in Texas and current trends, if any, warrants further investigation.

### **Purpose of the Study**

The purpose of this article was to determine the percentages and the performance of Texas students who had taken AP/IB Mathematics and Science courses beginning with the 2013-2014 school year and ending with the 2016-2017 school year. In addition, the focus of this investigation was on the percentage of students who had taken AP/IB Mathematics and/or Science courses. A third purpose of this study was to examine the percentage of students who had scored at or above the criterion in AP/IB Mathematics and Science courses. A final purpose of this study was to determine the degree to which trends, if any, were present in the percentage of students who took AP/IB Mathematics and Science advanced courses, and who scored had at or above the criterion on the advanced course examinations involving four years of data.

### **Significance of the Study**

Research exists (e.g., Judson, 2017; Judson & Hobson, 2015; National Center for Education Statistics, 2018) on AP/IB exam performance in mathematics and science. Although AP/IB Mathematics and Science exam performance of Texas students has been discussed in existing literature, much of the research is not recent. Findings obtained in this study will contribute to the existing research by adding current data and trends, if any on AP/IB Mathematics and Science exam performance of high school students in Texas over multiple years from the 2012-2013 to the 2016-2017 school years. Policymakers, legislators, and high school administrators might use the findings in this study when faced with important decisions regarding improving AP/IB Mathematics and Science

curriculum and improving equity in AP exam performance. Educators might use the findings in this study to understand the unique challenges of students who took AP/IB Mathematics and Science courses, those students who scored at or above the criterion, and to set meaningful goals to increase AP Mathematics and Science exam performance for all students.

### **Research Questions**

In this study, the following research questions were addressed: What are the numbers, percentages, and performance of Texas students who have taken AP/IB Mathematics and Science courses? Specifically, the following sub-research questions were addressed: (a) What percentage of students took an AP/IB Mathematics advanced course?; (b) What percentage of students took an AP/IB Science advanced course?; (c) What percentage of students who had scored at or above the criterion on an AP/IB Mathematics advanced course?; (d) What percentage of students who had scored at or above the criterion on an AP/IB Science advanced course?; (e) What trends are present, if any, in the percentage of students who took an AP/IB Mathematics advanced course from the 2012-2013 school year through the 2015-2016 school year?; (f) What trends are present, if any, in the percentage of students who took an AP/IB Science advanced course from the 2012-2013 school year through the 2015-2016 school year?; (g) What trends are present, if any, in the percentage of students who had scored at or above the criterion on an AP/IB Mathematics advanced course from the 2012-2013 school year through the 2015-2016 school year?; and (h) What trends are present, if any, in the percentage of students who had scored at or above the criterion on an AP/IB Science advanced course from the 2012-2013 school year through the 2015-2016 school year?



The first four research questions were repeated for the four school years, whereas the last four research questions incorporated all four years of data.

## **Method**

### **Research Design**

A non-experimental causal-comparative research design was used for this study (Creswell, 2013). Archival data were obtained from the Texas Academic Performance Reports and were analyzed in this study. Because archival data collected for this study had occurred in the past, the dependent variable and the independent variable could not be manipulated or changed (Johnson & Christensen, 2012). The AP/IB Mathematics and Science exam scores of high school students in Texas were the independent variables and the Advanced Course Performance (i.e., percentage who had taken and the percentage who had scored at or above criterion) of high school students in Texas were the dependent variables. The archival data that were obtained for this study were assumed to be free and accurate of errors. This assumption is believed to be appropriate because the Texas Education Agency audits the data that are provided by each high school (Texas Education Agency, 2018).

### **Instrumentation and Procedures**

The data that were used in this study were archival data from the Texas Academic Performance Reports website. Data on the mathematics and science performance of students who had taken AP/IB exams and of the students who had scored at or above the criterion on AP/IB exams for the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years were downloaded and analyzed. Errors were assumed minimal because these data were reported to the Texas Education Agency by individual school districts.

The downloaded data were transformed from an Excel datafile into the Statistical Package for Social Sciences (SPSS) format so that statistical analyses can be conducted.

## **Results**

For the first four research questions of this study, descriptive statistics were calculated on the percentages of high school students who had taken and who had scored at or above the criterion on an AP/IB Mathematics course in the 2012-2013, 2013-2014, 2014-2015, 2015-2016 school years. For the second four research questions of this study, descriptive statistics were calculated on the presence of trends, on the percentages of students who had taken and who had scored at or above the criterion on an AP Mathematics and/or an AP/IB Science exam incorporating all four years of data.

### **Results of All Students Who Took an AP/IB Mathematics Exam in the 2012-2013 Through the 2015-2016 School Year**

Descriptive statistics were calculated on Texas statewide data on all students who had taken an AP/IB Mathematics exam in the 2012-2013 through the 2015-2016 school years. As revealed in Table 3.1, the total number of Texas high school campuses that provided data on all students who had taken an AP/IB Mathematics exam ranged from a low of 502 campuses in the 2014-2015 school year to a high of 1,318 campuses in the 2013-2014 school year. The percentages of students who had taken an AP/IB Mathematics exam ranged from a low of 3.68% in the 2012-2013 school year to a high of 5.30% in the 2014-2015 school year. Readers should note the low percentage of students who completed an AP/IB Mathematics exam in all four school years.

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Insert Table 3.1 about here

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**Results by the Ethnicity/Race of Students Who Took an AP/IB Mathematics Exam  
in the 2012-2013 Through the 2015-2016 School Year**

Descriptive statistics were calculated on Texas statewide data on students by their ethnicity/race, who had taken an AP/IB Mathematics exam in the 2012-2013 through the 2015-2016 school year. As revealed in Table 3.2, the total number of Texas high school campuses that provided data on Asian students who had taken an AP/IB Mathematics exam ranged from a low of 183 campuses in the 2015-2016 school year to a high of 436 campuses in the 2013-2014 school year. The percentages of Asian students who had taken an AP/IB Mathematics exam ranged from a low of 19.56% in the 2012-2013 school year to a high of 23.43% in the 2014-2015 school year. In all four school years, less than three fourths of Texas Asian students had completed an AP/IB Mathematics exam.

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Insert Table 3.2 about here

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The total number of Texas high school campuses that provided data on White students who had taken an AP/IB Mathematics exam ranged from a low of 452 campuses in the 2014-2015 school year to a high of 1,178 campuses in the 2013-2014 school year. The percentages of White students who had taken an AP/IB Mathematics exam ranged from a low of 4.77% for students in the 2012-2013 school year to a high of 6.83% for students in the 2015-2016 school year. In all four school years, more than 90% of White

students had not completed an AP/IB Mathematics exam. Table 3.2 contains the descriptive statistics for White students.

With respect to Hispanic students, the total number of Texas high school campuses that provided data on Hispanic students who had taken an AP/IB Mathematics exam ranged from a low of 471 campuses in the 2014-2015 school year to a high of 1,243 campuses in the 2013-2014 school year. The percentages of Hispanic students who had taken an AP/IB Mathematics exam ranged from a low of 2.95% in the 2012-2013 school year to a high of 4.28% in the 2014-2015 school year. As such, less than 95% of Hispanic students had completed an AP/IB Mathematics exam in the four school years of data analyzed herein. Delineated in Table 3.2 are the descriptive statistics for Hispanic students.

Regarding Black students, the total number of Texas high school campuses that provided data on Black students who had taken an AP/IB Mathematics exam ranged from a low of 332 campuses in the 2014-2015 school year to a high of 817 campuses in the 2013-2014 school year. The percentages of Black students who had taken an AP/IB Mathematics exam ranged from a low of 2.91% in the 2012-2013 school year to a high of 3.97% in the 2015-2016 school year. Readers should note that less than 95% of Black students had completed an AP/IB Mathematics exam in these four school years. Presented in Table 3.2 are the descriptive statistics for Black students.

### **Results of All Students Who Scored at or Above the Criterion on an AP/IB Mathematics Exam in the 2012-2013 Through the 2015-2016 School Year**

Descriptive statistics were calculated on Texas statewide data on all students who had scored at or above the criterion on an AP/IB Mathematics exam in the 2012-2013

school year through the 2015-2016 school year. As revealed in Table 3.3, the total number of Texas high school campuses that provided data on all students who had scored at or above the criterion on an AP/IB Mathematics exam ranged from a low of 295 campuses in the 2014-2015 school year to a high of 670 campuses in the 2013-2014 school year. The percentages of students who had scored at or above the criterion on an AP/IB Mathematics exam ranged from a low of 37.99% in the 2014-2015 school year to a high of 40.88% in the 2015-2016 school year. In all four school years, more than half of all students who had taken an AP/IB Mathematics exam failed to score at or above the criterion.

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Insert Table 3.3 about here

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### **Results by the Ethnicity/Race of Students Who Scored at or Above the Criterion on an AP/IB Mathematics Exam in the 2012-2013 Through the 2015-2016 School Year**

Descriptive statistics were calculated on Texas statewide data on students by their ethnicity/race, who had scored at or above the criterion on an AP/IB Mathematics exam in the 2012-2013 school year through the 2015-2016 school year. The total number of Texas high school campuses that provided data on Asian students who had scored at or above the criterion on an AP/IB Mathematics exam ranged from a low of 106 campuses in the 2014-2015 school year to a high of 207 campuses in the 2013-2014 school year. The percentages of Asian students who had scored at or above the criterion on an AP/IB Mathematics exam ranged from a low of 56.93% in the 2014-2015 school year to a high of 62.19% in the 2013-2014 school year. Of the Asian students who had taken an AP/IB

Mathematics exam, more than a third of them failed to score at or above the criterion.

Readers are directed to Table 3.4 for these descriptive statistics.

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Insert Table 3.4 about here

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Regarding White students, the total number of Texas high school campuses that provided data on White students who had scored at or above the criterion on an AP/IB Mathematics exam ranged from a low of 194 campuses in the 2015-2016 school year to a high of 437 campuses in the 2013-2014 school year. The percentages of White students who had scored at or above the criterion on an AP/IB Mathematics exam ranged from a low of 52.05% in the 2012-2013 school year to a high of 55.72% in the 2015-2016 school year. Almost half of all White students who had taken an AP/IB Mathematics exam failed to score at or above the criterion. Table 3.4 contains the descriptive statistics for White students.

With respect to Hispanic students, the total number of Texas high school campuses that provided data on Hispanic students who had taken an AP/IB Mathematics exam ranged from a low of 471 campuses in the 2014-2015 school year to a high of 1,243 campuses in the 2013-2014 school year. The percentages of Hispanic students who had scored at or above the criterion on an AP/IB Mathematics exam ranged from a low of 33.15% in the 2014-2015 school year to a high of 35.56% in the 2013-2014 school year. Across the four school years, almost two thirds of all Hispanic students who had completed an AP/IB Mathematics exam failed to score at or above the criterion. Delineated in Table 3.4 are the descriptive statistics for Hispanic students.

Concerning Black students, the total number of Texas high school campuses that provided data on Black students who had scored at or above the criterion on an AP/IB Mathematics exam ranged from a low of 82 campuses in the 2014-2015 school year to a high of 158 campuses in the 2013-2014 school year. The percentages of Black students who had scored at or above the criterion on an AP/IB Mathematics exam ranged from a low of 27.85% in the 2012-2013 school year to a high of 34.73% in the 2015-2016 school year. Almost two thirds of all Black students who had taken an AP/IB Mathematics exam failed to score at or above the criterion. Delineated in Table 3.4 are the descriptive statistics for Black students.

### **Results of All Students Who Took an AP/IB Science Exam in the 2012-2013 Through the 2015-2016 School Year**

Descriptive statistics were calculated on Texas statewide data on all students who had taken an AP/IB Science exam in the 2012-2013 through the 2015-2016 school years. As revealed in Table 3.5, the total number of Texas high school campuses that provided data on all students who had taken an AP/IB Science exam ranged from a low of 502 campuses in the 2014-2015 school year to a high of 1,318 campuses in the 2013-2014 school year. The percentages of students who had taken an AP/IB Science exam ranged from a low of 3.98% in the 2012-2013 school year to a high of 8.08% in the 2015-2016 school year. Readers should note the very low percentage of students who had completed an AP/IB Science exam across all four school years.

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Insert Table 3.5 about here

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### **Results by the Ethnicity/Race of Students Who Took an AP/IB Science Exam in the 2012-2013 Through the 2015-2016 School Year**

Descriptive statistics were calculated on Texas statewide data on students by their ethnicity/race, who took an AP/IB Science exam in the 2012-2013 through the 2015-2016 school year. As presented in Table 3.6, the total number of Texas high school campuses that provided data on Asian students who had taken an AP/IB Science exam ranged from a low of 183 campuses in the 2015-2016 school year to a high of 436 campuses in the 2013-2014 school year. The percentages of Asian students who had taken an AP/IB Science exam ranged from a low of 21.43% in the 2012-2013 school year to a high of 32.27% in the 2014-2015 school year. In all four school years, more than two thirds of Texas Asian students had not taken an AP/IB Science exam.

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Insert Table 3.6 about here

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The total number of Texas high school campuses that provided data on White students who had taken an AP/IB Science exam ranged from a low of 452 campuses in the 2014-2015 school year to a high of 1,178 campuses in the 2013-2014 school year. The percentages of White students who had taken an AP/IB Science exam ranged from a low of 4.94% for students in the 2012-2013 school year to a high of 10.21% for students in the 2015-2016 school year. In all four school years, almost 90% of White students had not completed an AP/IB Science exam. Table 3.6 contains the descriptive statistics for White students.



With respect to Hispanic students, the total number of Texas high school campuses that provided data on Hispanic students who had taken an AP/IB Science exam ranged from a low of 471 campuses in the 2014-2015 school year to a high of 1,243 campuses in the 2013-2014 school year. The percentages of Hispanic students who had taken an AP/IB Science exam ranged from a low of 3.23% in the 2012-2013 school year to a high of 6.78% in the 2015-2016 school year. As such, more than 95% of Hispanic students had not taken an AP/IB Science exam in the four school years of data analyzed herein. Delineated in Table 3.6 are the descriptive statistics for Hispanic students.

Regarding Black students, the total number of Texas high school campuses that provided data on Black students who had taken an AP/IB Science exam ranged from a low of 332 campuses in the 2014-2015 school year to a high of 817 campuses in the 2013-2014 school year. The percentages of Black students who had taken an AP/IB Science exam ranged from a low of 3.01% in the 2012-2013 school year to a high of 8.08% in the 2015-2016 school year. Readers should note that more than 90% of Black students had not taken an AP/IB Science exam in these four school years. Presented in Table 3.6 are the descriptive statistics for Black students.

### **Results of All Students Who Scored at or Above the Criterion on an AP/IB Science Exam in the 2012-2013 Through the 2015-2016 School Year**

Descriptive statistics were calculated on Texas statewide data on all students who had scored at or above the criterion on an AP/IB Science exam in the 2012-2013 school year through the 2015-2016 school year. As delineated in Table 3.7, the total number of Texas high school campuses that provided data on all students who had scored at or above the criterion on an AP/IB Science exam ranged from a low of 290 campuses in the

2014-2015 school year to a high of 648 campuses in the 2013-2014 school year. The percentages of all students who had scored at or above the criterion on an AP/IB Science exam ranged from a low of 27.64% in the 2014-2015 school year to a high of 36.44% in the 2012-2013 school year. In all four school years, almost two thirds of all students who had taken an AP/IB Science exam failed to score at or above the criterion.

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Insert Table 3.7 about here  
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**Results by the Ethnicity/Race of Students Who Scored at or Above the Criterion on an AP/IB Science Exam in the 2012-2013 Through the 2015-2016 School Year**

Descriptive statistics were calculated on Texas statewide data on students by their ethnicity/race, who had scored at or above the criterion on an AP/IB Science exam in the 2012-2013 school year through the 2015-2016 school year. The total number of Texas high school campuses that provided data on Asian students who had scored at or above the criterion on an AP/IB Science exam ranged from a low of 123 campuses in the 2015-2016 school year to a high of 217 campuses in the 2013-2014 school year. The percentages of Asian students who had scored at or above the criterion on an AP/IB Science exam ranged from a low of 45.60% in the 2014-2016 school year to a high of 58.55% in the 2012-2013 school year. Of the Asian students who had taken an AP/IB Science exam, almost half of them failed to score at or above the criterion. Readers are directed to Table 3.8 for these descriptive statistics.

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Insert Table 3.8 about here

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Regarding White students, the total number of Texas high school campuses that provided data on White students who had scored at or above the criterion on an AP/IB Science exam ranged from a low of 200 campuses in the 2014-2015 school year to a high of 443 campuses in the 2013-2014 school year. The percentages of White students who had scored at or above the criterion on an AP/IB Science exam ranged from a low of 41.09% in the 2014-2015 school year to a high of 50.31% in the 2012-2013 school year. Almost half of all White students who had taken an AP/IB Science exam failed to score at or above the criterion. Table 3.8 contains the descriptive statistics for White students.

With respect to Hispanic students, the total number of Texas high school campuses that provided data on Hispanic students who had taken an AP/IB Science exam ranged from a low of 250 campuses in the 2014-2015 school year to a high of 488 campuses in the 2013-2014 school year. The percentages of Hispanic students who had scored at or above the criterion on an AP/IB Science exam ranged from a low of 21.57% in the 2014-2015 school year to a high of 29.30% in the 2012-2013 school year. Across the four school years, more than two thirds of all Hispanic students who had completed an AP/IB Science exam failed to at or score above the criterion. Delineated in Table 3.8 are the descriptive statistics for Hispanic students.

Concerning Black students, the total number of Texas high school campuses that provided data on Black students who had scored at or above the criterion on an AP/IB Science exam ranged from a low of 130 campuses in the 2014-2015 school year to a high

of 182 campuses in the 2013-2014 school year. The percentages of Black students who had scored at or above the criterion on an AP/IB Science exam ranged from a low of 18.86% in the 2014-2015 school year to a high of 25.01% in the 2013-2014 school year. Approximately three quarters of all Black students who had taken an AP/IB Science exam failed to score at or above the criterion. Delineated in Table 3.8 are the descriptive statistics for Black students.

### **Discussion**

In this investigation, the percentages of high school students who had taken and who had scored at or above the criterion on an AP/IB Mathematics and/or AP/IB Science advanced course in the 2012-2013 through the 2015-2016 school year were determined. Also addressed was the presence of trends regarding the percentages of students who had taken and who had scored at or above the criterion on an AP/IB Mathematics and/or AP/IB Science advanced course incorporating all four years of data. Four school years of statewide archival data were obtained and analyzed from the Texas Academic Performance Reports.

### **Connections with Existing Literature**

Results from this multiyear Texas statewide investigation were congruent with results of previous researchers (e.g., Barnes & Slate, 2014; Holmes et al., 2013; Jaschik, 2018; Judson & Hobson, 2015) regarding the presence of large gaps in AP/IB exam course-taking and AP/IB exam performance among Asian, White, Hispanic, and Black students. In this empirical statewide Texas investigation of four school years of data, very low percentages of Asian, White, Hispanic, and Black students had completed an AP/IB Mathematics and AP/IB Science exam. Furthermore, large gaps existed among

Asian, White, Hispanic, and Black students regarding their performance on scoring at or above the criterion on AP/IB Mathematics and AP/IB Science exams.

In a previous investigation by Judson and Hobson (2015), Asian and White students were far more likely to be enrolled in AP courses than were Hispanic and Black students. Judson and Hobson (2015) also revealed in their investigation that Asian and White students were far more likely to score a 3, 4, or 5 on their AP exams than Hispanic and Black students. Results of this investigation were congruent with their results. As such, more information is now available on students who had taken and who had scored above the criterion on AP exams, particularly related to their ethnicity/race and economic status.

### **Implications for Policy and Practice**

Based upon the results of this multiyear, Texas statewide investigation, several implications for policy and practice can be made. First, educational leaders and school administrators need to analyze the data concerning all students who had taken and who had scored at or above the criterion on AP/IB mathematics and AP/IB science exams. By auditing the data on student performance on AP/IB mathematics and AP/IB science exams, educational leaders and administrators could use this information to determine what action should be taken to provide better access and equity to students taking AP/IB mathematics and AP/IB science exams. Another implication is to examine the data on students who did not score at or above the criterion on AP/IB mathematics and AP/IB science exams and provide them with more support to help increase their likelihood of scoring at or above the criterion on AP/IB mathematics and AP/IB science exams. School district leaders must provide students who do not score at or above the criterion

on AP/IB mathematics and AP/IB science exams with additional intervention and support. Such interventions could include support from the school Mathematics and Science teachers to offer additional tutorials and provide additional formative assessment, including diagnostic testing, to improve student attainment and success on AP/IB mathematics and AP/IB science exams.

### **Recommendations for Future Research**

Several suggestions can be made for future research based upon the results of this Texas, multiyear investigation. Because this study was limited to high school students in Texas, researchers are encouraged to extend this study to students in other states. The extent to which the results delineated herein would be generalizable to high school students in other states is not known. Second, because AP/IB advanced courses are not limited to only mathematics and science, researchers are encouraged to analyze AP/IB performance in other course areas to ascertain whether results based only on mathematics and science performance would be generalizable to other areas. Third, because poverty has been linked to student performance, researchers are encouraged to investigate AP/IB performance as related to student poverty. Researchers are also encouraged to analyze data on other students of other ethnic/racial groups. Qualitative studies are recommended to obtain information directly from students and from mathematics and science teachers. Such information would provide a more nuanced approach to understanding the equity, access, and performance issues of students who take and score at or above the criterion on AP/IB mathematics and AP/IB science courses. Finally, only four school years of data were used in this study. As such, future researchers are encouraged to analyze data

from more years and more recent years to determine the extent to which results obtained herein would be generalizable.

### **Conclusion**

In this article, the percentages of high school students who had taken, who had scored at or above the criterion, and the presence of trends, on an AP/IB Mathematics and AP/IB Science course from the 2012-2013 school year through the 2015-2016 school year were determined. Findings from this multiyear Texas statewide investigation were congruent with results of previous researchers (e.g., Barnes & Slate, 2014; Holmes et al., 2013; Jaschik, 2018; Judson & Hobson, 2015) regarding the presence of large gaps in AP/IB exam course-taking and AP/IB exam performance among Asian, White, Hispanic, and Black students. The percentages of students who had completed an AP/IB mathematics and AP/IB science exam across all four school years was very low. Of the four years of data analyzed, and of the four ethnic/racial groups analyzed, Asian students had the highest percentage, on average, of students who had taken and who had scored at or above the criterion on an AP/IB Mathematics and Science exam.

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Table 3.1

*Descriptive Statistics for Percentages of All Students Who Had Taken an AP/IB*

*Mathematics Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013	1,309	3.68	6.38
2013-2014	1,318	4.17	7.26
2014-2015	502	5.30	8.99
2015-2016	507	5.14	8.28

Table 3.2

*Descriptive Statistics by the Ethnicity/Race of Students Who Had Taken an AP/IB*

*Mathematics Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year and Ethnicity/Race	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Asian	420	19.56	16.03
White	1,176	4.77	7.59
Hispanic	1,236	2.95	6.04
Black	802	2.91	8.07
2013-2014			
Asian	436	21.42	16.36
White	1,178	5.32	8.36
Hispanic	1,243	3.25	6.38
Black	817	3.15	7.75
2014-2015			
Asian	187	23.43	16.36
White	452	6.33	9.24
Hispanic	471	4.28	8.49
Black	332	3.87	10.09
2015-2016			
Asian	183	23.40	17.71
White	457	6.83	10.08
Hispanic	490	4.03	7.65
Black	345	3.97	9.32

Table 3.3

*Descriptive Statistics for Percentages of All Students Who Had Scored at or Above the Criterion on an AP/IB Mathematics Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013	661	39.12	28.69
2013-2014	670	39.80	28.68
2014-2015	295	37.99	29.35
2015-2016	297	40.88	29.15

Table 3.4

*Descriptive Statistics by the Ethnicity/Race of Students Who Had Scored at or Above the Criterion on an AP/IB Mathematics Exam in all Four School Years*

School Year and Ethnicity/Race	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Asian	205	59.18	26.88
White	430	52.05	27.25
Hispanic	454	34.54	27.49
Black	144	27.85	26.51
2013-2014			
Asian	207	62.19	22.70
White	437	52.65	27.50
Hispanic	486	35.56	28.60
Black	158	31.55	26.00
2014-2015			
Asian	106	56.93	25.97
White	200	53.42	26.85
Hispanic	233	33.15	27.61
Black	82	32.82	24.47
2015-2016			
Asian	109	60.57	25.62
White	194	55.72	26.69
Hispanic	237	34.76	28.87
Black	92	34.73	27.31

Table 3.5

*Descriptive Statistics for Percentages of All Students Who Had Taken an AP/IB Science Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013	1,309	3.98	7.66
2013-2014	1,318	4.45	8.15
2014-2015	502	7.85	11.68
2015-2016	507	8.08	12.02

Table 3.6

*Descriptive Statistics by the Ethnicity/Race of Students Who Had Taken an AP/IB Science Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year and Ethnicity/Race	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Asian	420	21.43	18.12
White	1,176	4.94	8.71
Hispanic	1,236	3.23	7.03
Black	802	3.01	8.03
2013-2014			
Asian	436	22.49	18.65
White	1,178	5.53	9.37
Hispanic	1,243	3.61	7.15
Black	817	3.46	8.35
2014-2015			
Asian	187	32.27	20.13
White	452	9.64	13.01
Hispanic	471	6.69	11.16
Black	332	6.79	12.55
2015-2016			
Asian	183	31.79	20.31
White	457	10.21	14.53
Hispanic	490	6.78	11.27
Black	507	8.08	12.02

Table 3.7

*Descriptive Statistics for Percentages of All Students Who Had Scored at or Above the Criterion on an AP/IB Science Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013	617	36.44	26.78
2013-2014	648	34.83	25.92
2014-2015	290	27.64	23.65
2015-2016	298	28.24	24.55



Table 3.8

*Descriptive Statistics by the Ethnicity/Race of Students Who Had Scored at or Above the Criterion on an AP/IB Science Exam in all Four School Years*

School Year and Ethnicity/Race	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
Asian	208	58.55	24.13
White	424	50.31	25.86
Hispanic	452	29.30	24.42
Black	156	24.47	24.29
2013-2014			
Asian	217	55.68	23.72
White	443	47.94	25.81
Hispanic	488	28.65	24.69
Black	182	25.01	25.81
2014-2015			
Asian	126	45.60	24.84
White	200	41.09	23.49
Hispanic	250	21.57	20.76
Black	130	18.86	20.28
2015-2016			
Asian	123	45.81	23.90
White	205	41.89	23.99
Hispanic	255	22.74	22.47
Black	131	18.95	21.19

**CHAPTER IV**

ECONOMIC STATUS DIFFERENCES IN ADVANCED PLACEMENT  
PERFORMANCE OF TEXAS STUDENTS: A MULTIYEAR, STATEWIDE  
INVESTIGATION

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This dissertation follows the style and format of *Research in the Schools (RITS)*.

### **Abstract**

In this investigation, the degree to which differences were present in the advanced course performance of Texas students as a function of their economic status (i.e., all students and students in poverty) was addressed. Archival data were obtained and analyzed from the Texas Academic Performance Reports for the 2012-2013 through the 2015-2016 school years. Trends on the percentages of all students and students in poverty who had taken and who had scored at or above the criterion on AP/IB exams were also addressed. Of the four school years analyzed, the percentages of all students and students in poverty were very low. Percentages of completion for all students who had taken an AP/IB exam ranged from 14.58% to 20.11% for all students and from 10.94% to 15.94% for students in poverty. In all four school years, all students had higher percentages than students in poverty who had taken and who had scored above the criterion on AP/IB exams. Recommendations for future research, along with suggestions for policy and practice, were provided.

**Keywords:** Advanced Course-Taking, Percent Scoring Above Criterion, Economic Status

ECONOMIC STATUS DIFFERENCES IN ADVANCED PLACEMENT  
PERFORMANCE OF TEXAS STUDENTS: A MULTIYEAR, STATEWIDE  
INVESTIGATION

With the passage of the Every Student Succeeds Act (2015), public school administrators have focused on growth and achievement. This approach offers a better way for school administrators to measure school effectiveness and to generate high levels of learning for all students, including students in poverty. This Every Student Succeeds Act (2015) was the reauthorization of the No Child Left Behind Act (U.S. Department of Education, 2004) in which a commitment was made to pursuing higher standards and more equitable outcomes for children across all social groups, much like the No Child Left Behind Act. Schools were required by the No Child Left Behind Act to set challenging standards by ensuring that all students reach academic proficiency within 12 years (U.S. Department of Education, 2004).

Today the economy of the United States demands a global knowledge-based citizen in which most careers require some postsecondary education. To be globally competitive all students need to be provided an opportunity to develop high-level literacy skills, quantitative reasoning skills, problem solving skills, and communication skills. Because of this need for students to acquire the necessary skills to be globally competitive, college-and career-ready standards have been implemented in all states (Achieve, 2014). College readiness has been defined by Conley (2007) as “the level of preparation a student needs in order to enroll and succeed-without remediation-in a credit-bearing general education course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program” (p. 5).

A decade ago, only Arkansas and Texas had adopted statewide college-and career-ready standards. In 2014, 14 states had not adopted college-and career-ready standards. In addition to the states who have adopted college-and career-readiness standards, many states have adopted different types of educational programs which serve to facilitate the academic transition from high school to college and to assist with improving postsecondary entrance, retention, persistence, and graduation rates. Of particular interest for this article are Advanced Placement courses and International Baccalaureate courses. The Advanced Placement (AP) program and the International Baccalaureate (IB) program are advanced and rigorous academic programs that are available to secondary school students (Texas Education Agency, 2016a).

Over the last 15 years, tremendous growth has occurred in AP/IB participation of high school students. Judson and Hobson (2015) documented that over the last 15 years, the number of students in Grades 9-12 who took an AP exam increased 6,360.2%. Although the number of high school students participating in AP exams has increased enormously over the last 15 years, Judson and Hobson (2015) have questioned whether the increase in AP course-taking has generated equitable access among all students (e.g., students in poverty).

Researchers (e.g., Harwell et al., 2017; Hegedus, 2018) over the last few decades have established a link between poor academic achievement and poverty. According to the National Center for Education Statistics (2017), in the United States 44.7% of public school students were eligible for free or reduced lunch and attended either a low-poverty or high-poverty school. In the United States, high school students who were eligible for free and reduced lunch performed 44 percentage points lower on student achievement

measures than students enrolled in schools considered high income and high achieving public schools (National Center for Education Statistics, 2017). Researchers at The Education Trust (2013) reported that over half a million students of low-income status are not participating in AP/IB courses, thus contributing to the educational attainment gap between students in poverty and students not in poverty.

Whereas almost all public high schools in America offer courses such as Algebra and Biology, disparities in access have been associated with AP courses with respect to school poverty levels. An example of disparities in AP course offerings is that only 60% of schools considered as schools of high-poverty offer at least one AP course compared to 80% of schools considered as schools of low-poverty (U.S. Government Accountability Office, 2018). Schools considered to be wealthy offer more AP courses than schools considered to be poor. Of note is that approximately 70% of schools considered as wealthy offered more than 10 different AP courses compared to only 30% of schools considered as poor.

Poverty adversely affects academic outcomes. For instance, The Texas Education Agency (2018a) reported that for the class of 2017, only 86.9% of Texas students in poverty graduated from high school in contrast to 92.6% of students who were not in poverty. In addition, students in poverty in the class of 2017 dropped out of high school at a rate almost twice that of their affluent peers (Texas Education Agency, 2018a). The National Center for Education Statistics (2014) reported that students from low-income families often earn bachelor's degrees at rates that are statistically significantly lower than are their more affluent peers.

Revealed in a report by the Texas Education Agency (2017) were gaps in access and equity among students in poverty and their peers who participated in AP/IB courses. The percentage of students in poverty who took at least one AP or IB English Language Arts exam in Grade 11 and 12 for the 2014-2015 school year was 11.0% compared to 19.1% of students who were not in poverty. Among Grade 11 and 12 students, 57.0% of students who were not economically disadvantaged who took an English Language Arts examine scored at or above the criterion compared to only 20.7% of students who were economically disadvantaged (Texas Education Agency, 2017).

In Texas, Grade 11 and 12 students in poverty were less likely to participate in AP/IB mathematics exams than their peers who were not in poverty. In addition, students in poverty were also less likely to outperform their peers not in poverty on the mathematics AP/IB exam. The percentage of students who were economically disadvantaged who took at least one AP/IB mathematics exam in Grade 11 and 12 for the 2014-2015 school year was only 4.0% compared to 9.5% of students who were not economically disadvantaged. Among Grade 11 and 12 students, 61.1% of students who were not economically disadvantaged who took a mathematics exam scored at or above the criterion compared to 29.3% of students who were economically disadvantaged (Texas Education Agency, 2017).

Science AP/IB participation and performance by student poverty status revealed even more inequity by student poverty status. According to the Texas Education Agency (2017), between Grade 11 and 12 students in Texas, a higher percentage of students who were not economically disadvantaged (13.3%) took at least one AP/IB science exam than students who were economically disadvantaged (7.0%). Almost three times as many

students who were not poor (45.7%) in Grade 11 and 12 scored at or above the criterion on at least one AP/IB science examination than students who were economically disadvantaged (16.0%).

With respect to Grade 11 and 12 Social Studies, a higher percentage of students who were not economically disadvantaged (18.2%) took at least one AP/IB exam than their peers in poverty (10.5%). More than half, 52.3%, of students who were not poor scored at or above the criterion on at least one AP/IB Social Studies examination than their peers who were poor, 19.0%. In Texas, of all four AP/IB subjects analyzed (i.e., English Language Arts, Mathematics, Science, and Social Studies), the achievement gaps between students in poverty and students not in poverty on their performance of AP/IB mathematics exams, English Language Arts exams, social studies exams, and science exams was, 39.8%, 36.3%, 33.3%, and 29.7%, respectively (Texas Education Agency, 2017).

### **Statement of the Problem**

Many of the researchers and educational leaders who have examined the issue of poverty as related to AP/IB course-taking and exam performance have mainly been national in scope (National Center for Education Statistics, 2014; United States Government Accountability Office, 2018) or on states other than Texas. The research investigations conducted in this area are also dated, with the majority of them at least five years old. Therefore, current findings regarding AP exam performance and economic status of high school students in Texas and current trends, if any, warrants further investigation.



**Purpose of the Study**

The purpose of this study was to examine the degree to which differences were present in AP/IB performance as a function of the economic status of Texas high school students, beginning with the 2012-2013 school year and ending with the 2015-2016 school year. The focus of this investigation was on the percentage of students in poverty who took AP/IB courses and the percentage of students in poverty who had scored at or above the criterion on AP/IB examinations. A final purpose of this study was to determine the degree to which trends were present in the percentage of students by their economic status who recently took AP/IB courses and who had scored at or above the criterion on the AP/IB examinations involving four school years of data.

**Significance of the Study**

Research exists (National Center for Education Statistics, 2014; United States Government Accountability Office, 2018) on AP/IB exam performance as a function of student economic status. Although the AP/IB exam performance of Texas students by their economic status has been examined in existing literature, much of the research is not recent. Findings obtained in this study will contribute to the research literature through bringing up-to-date information. Policymakers, legislators, and high school administrators might use the findings in this study when faced with important decisions regarding improving AP curriculum and improving equity in AP exam performance among students in poverty and students not in poverty. Educators might use the findings in this study to understand the unique challenges of students in poverty and their peers who took AP courses, those students who scored at or above the criterion, and to set meaningful goals go increase AP exam performance for all students.

## **Research Questions**

In this study, the following overarching research question was addressed: What is the difference in the AP/IB performance of Texas students as a function of their economic status? Specific subquestions under this overarching research question were: (a) What is the effect of economic status on the percentage of students who took AP/IB exams? and (b) What is the effect of economic status on the percentage of students scoring at or above the criterion on AP/IB exams? These research questions were repeated for the last four school years on which data were available at the Texas Academic Performance Report website.

## **Method**

### **Research Design**

A non-experimental causal-comparative research design was used for this study (Creswell, 2013). Archival data were obtained from the Texas Education Agency Texas Academic Performance Reports and were analyzed in this study. Because archival data collected for this study had occurred in the past, the dependent variable and the independent variable cannot be manipulated or changed (Johnson & Christensen, 2012). The economic status of high school students in Texas constituted the independent variables and the Advanced Course Performance (i.e., percentage who had taken and the percentage who had scored at or above the criterion) of high school students in Texas were the dependent variables. The archival data that were obtained for this study were assumed to be free and accurate of errors. This assumption is believed to be appropriate because the Texas Education Agency audits the data that are provided by each high school (Texas Education Agency, 2018b).

## **Instrumentation and Procedures**

The data that were used in this study were archival data from the Texas Academic Performance Reports website. Data on the economic status (i.e., students in poverty and students not in poverty) of students who took AP/IB exams (i.e., students who took one or more advanced level course and examination from six academic areas: English, History and Social Sciences, Mathematics, Computer Sciences, Sciences, and World Languages) and of the students who scored at or above the criterion on AP/IB exams (i.e., students who have valid AP scores in the range of 1 to 5 or valid IB scores in the range of 1 to 7 for at least one examination taken) for the 2012-2013, 2013-2014, 2014-2015, and 2015-2016 school years were downloaded and then analyzed. Students who were determined to be economically disadvantaged were individuals who were eligible for free or reduced price meals under the National School Lunch and Child Nutrition Program (Texas Education Agency, 2016b). Errors were assumed to be minimal in nature because these data were reported to the Texas Education Agency by individual school districts. The downloaded data were then transformed from an Excel datafile into a Statistical Package for Social Sciences (SPSS) format to conduct statistical analyses.

## **Results**

To address the first two research questions presented above, inferential statistical procedures were calculated. Because of the manner in which the Texas Education Agency reported student performance, paired samples *t*-tests were conducted. Performance on AP/IB exams was reported in the following manner by the Texas Education Agency: AP/IB performance of students in poverty for a specific school year. Accordingly, the student demographic characteristic, the dependent variable, and the

school year were all merged into the same variable. This situation limited the type of statistical analysis that could be conducted. Prior to performing parametric paired samples *t*-tests, its underlying assumptions, particularly of normality, were checked. Although all of the data were not normally distributed, a decision was made to use the more powerful, parametric paired samples *t*-test.

### **Results of Analyses for Research Question One**

With respect to the 2012-2013 school year, a statistically significant difference was revealed in the percentages of students who had taken an AP/IB exam between all students and students who were economically disadvantaged,  $t(1280) = 22.86, p < .001$ . This difference represented a large effect size (Cohen's *d*) of 0.91 (Cohen, 1988). The percentage of students in poverty who had taken an AP/IB exam was, on average, almost a third lower than the percentage of all students who had taken an AP/IB exam. Table 4.1 contains the descriptive statistics for this school year.

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 Insert Table 4.1 about here  
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Regarding the 2013-2014 school year, a statistically significant difference was revealed between all students and students in poverty in their percentages who had taken an AP/IB exam,  $t(1302) = 23.34, p < .001$ . This difference represented a large effect size (Cohen's *d*) of 0.92 (Cohen, 1988). The percentage of students in poverty who had taken an AP/IB exam was, on average, was almost a third lower than the percentage of all students who had taken an AP/IB exam. Delineated in Table 4.1 are the descriptive statistics for this school year.

Concerning the 2014-2015 school year, a statistically significant difference was revealed between all students and students in poverty in their percentages who had taken an AP/IB exam,  $t(494) = 15.22, p < .001$ . This difference represented a large effect size (Cohen's  $d$ ) of 0.97 (Cohen, 1988). The percentage of students in poverty who had taken an AP/IB exam was, on average, almost a third lower than the percentage of all students who had taken an AP/IB exam. Table 4.1 contains the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between all students and students in poverty in their percentages who had taken an AP/IB exam,  $t(501) = 15.40, p < .001$ . This difference represented a very large effect size (Cohen's  $d$ ) of 0.97 (Cohen, 1988). As revealed in Table 4.1, the percentage of students in poverty who had taken an AP/IB exam was, on average, almost one fourth lower than the percentage of all students who had taken an AP/IB exam.

### **Results of Analyses for Research Question Two**

With respect to the 2012-2013 school year, a statistically significant difference was revealed between all students and students in poverty in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(705) = 10.16, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.54 (Cohen, 1988). The percentage of students in poverty who had scored at or below the criterion on an AP/IB exam was, on average, almost one fourth lower than the percentage of all students who had scored at or below the criterion on an AP/IB exam. Table 4.2 contains the descriptive statistics for this school year.

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Insert Table 4.2 about here  
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Regarding the 2013-2014 school year, a statistically significant difference was revealed between all students and students in poverty in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(730) = 10.67, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.56 (Cohen, 1988). The percentage of students in poverty who had scored at or above the criterion on an AP/IB exam was almost one fourth lower, on average, than the percentage of all students who had taken an AP/IB exam. Delineated in Table 4.2 contains the descriptive statistics for this school year.

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Insert Table 4.2 about here  
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Concerning the 2014-2015 school year, a statistically significant difference was revealed between all students and students in poverty in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(308) = 8.98, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.72 (Cohen, 1988). The percentage of students of poverty who had scored at or above the criterion on an AP/IB exam was almost one fourth lower, on average, than the percentage of all students who had scored at or above the criterion. Revealed in Table 4.2 are the descriptive statistics for this school year.

For the 2015-2016 school year, a statistically significant difference was revealed between students of poverty and all students in their percentages who had scored at or above the criterion on an AP/IB exam,  $t(309) = 6.59, p < .001$ . This difference represented a moderate effect size (Cohen's  $d$ ) of 0.53 (Cohen, 1988). As presented in Table 4.2, the percentage of students in poverty who had scored at or above the criterion on an AP/IB exam was almost one fourth lower, on average, than the percentage of all students.

Delineated in Table 4.3 are the percentage differences in the percentage of students in poverty and all students who took an AP/IB exam in all four school years. The difference in their percentages ranged from a low of 3.64% in the 2012-2013 school year to a high of 4.34% in the 2014-2015 school year. In all four school years, lower percentages of students in poverty had taken an AP/IB exam than students who were not in poverty.

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 Insert Table 4.3 about here  
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Revealed in Table 4.4 are the percentage differences in the percentage of students in poverty and all students who scored at or above the criterion on an AP/IB exam in all four school years. The difference in their percentages ranged from a low of 3.19% in the 2015-2016 school year to a high of 4.14% in the 2014-2015 school year. In all four school years, lower percentages of students in poverty had scored at or above the criterion on an AP/IB exam than students who were not in poverty.

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Insert Table 4.4 about here  
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### **Discussion**

In this investigation, the extent to which differences were present in the advanced course performance of Texas students as a function of their economic status (i.e., all students and students in poverty) in the 2012-2013 through the 2015-2016 school year was addressed. Specifically examined in this multiyear, statewide investigation was the effect of poverty on the percentage of students who had taken AP/IB exams and who had scored at or above the criterion on AP/IB exams. Four years of statewide archival data were obtained and analyzed from the Texas Academic Performance Reports.

### **Connections with Existing Literature**

Results from this multiyear Texas statewide investigation were congruent with results of previous researchers (Harwell et al., 2017; Hegedus, 2018; Texas Education Agency, 2017; The Education Trust, 2013) regarding the presence of access and equity gaps among students in poverty and their peers who participated in AP/IB courses. In this empirical statewide Texas investigation of four school years of data, very low percentages of both groups of students had completed an AP/IB exam. Percentages of completion ranged from 14.58% to 20.11% for all students and from 10.94% to 15.94% for students in poverty.

In a previous investigation by the Texas Education Agency (2017), students in poverty were less likely to participate in AP/IB exams than their peers who were not in poverty. Reported by the Texas Education Agency (2017) was that Grade 11 and 12



students in poverty were less like to participate in AP/IB Mathematics, English Language Arts, Science, and Social Studies exams. The Texas Education Agency (2017) also documented that of all four AP/IB subjects analyzed (i.e., English Language Arts, Mathematics, Science, and Social Studies), achievement gaps between students in poverty and their peers who were not in poverty on their AP/IB performance ranged from a low of 29.7% to a high of 39.8%.

### **Implications for Policy and Practice**

Based upon the results of this multiyear, Texas statewide investigation, several implications for policy and practice can be made. First, educational leaders and school administrators need to analyze the data concerning all students and students in poverty who take and who score at or above the criterion on AP/IB exams. After analyzing the data on AP/IB exam course-taking and performance among all students and students in poverty, educational leaders and school administrators need procedures that decrease the large achievement gaps among all students and students in poverty. Educational leaders and administrators could use this information to determine what action should be taken to provide better access and equity to all students taking AP/IB exams. Another implication is to examine the data on students in poverty who did not score at or above the criterion and provide them with more in-school support to help increase their likelihood of scoring at or above the criterion on AP/IB exams. The issue of equity and access among students in poverty who score at or above the criterion on AP/IB exams should also be addressed by providing students in poverty with the necessary skills and intensive intervention to support their success. Such interventions and support could include teacher mentors, peer

tutoring, after-school individual tutoring, and formative assessment, including diagnostic testing, to improve student attainment and success on AP/IB exams.

### **Recommendations for Future Research**

Several suggestions can be made for future research based upon the results of this Texas, multiyear investigation. Because this study was limited to high school students in Texas, researchers are encouraged to extend this study to students in other states. The extent to which the results delineated herein would be generalizable to high school students in other states is not known. Second, because AP/IB advanced courses are not limited to only mathematics and science, researchers are encouraged to analyze AP/IB performance in other course areas to ascertain whether results based only on mathematics and science performance would be generalizable to other areas. Third, because poverty has been linked to student performance, researchers are encouraged to investigate AP/IB performance as related to student poverty. Researchers are also encouraged to analyze data on other students of other ethnic/racial groups. Qualitative studies are also recommended to obtain information directly from students, parents, teachers, and school administrators. Such information would provide a more nuanced approach to understanding the equity, access, challenges, and performance issues of students in poverty who take and score at or above the criterion on AP/IB exams. Finally, only four school years of data were used in this study. As such, future researchers are encouraged to analyze data from more than four years and more recent years to determine the extent to which results obtained herein would be generalizable over time.

## **Conclusion**

In this article, the percentages of students who were not in poverty as well as those students who were in poverty who had taken and who had scored at or above the criterion on AP/IB exams from the 2012-2013 through the 2015-2016 school year were determined. Findings from this multiyear, Texas statewide investigation were congruent with results of previous researchers (Harwell et al., 2017; Hegedus, 2018; Texas Education Agency, 2017; The Education Trust, 2013) regarding the presence of access and equity gaps among students in poverty and students not in poverty who participated in AP/IB exams. The percentages of students in poverty who had completed an AP/IB exam across all four school years was low. Percentages of completion on AP/IB exams for students in poverty ranged from 10.94% to 15.94%. Of the four years of data analyzed and of students analyzed (e.g., all students and students in poverty), students in poverty had the lowest percentage, on average, of all students who had taken and who had scored at or above the criterion on AP/IB exams.

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Table 4.1

*Descriptive Statistics for All Students and Students in Poverty Who Had Taken an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year and Student Group	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
All Students	1,281	14.58	15.81
Economically Disadvantaged	1,281	10.94	14.02
2013-2014			
All Students	1,303	16.05	17.55
Economically Disadvantaged	1,303	11.94	15.53
2014-2015			
All Students	495	19.65	20.32
Economically Disadvantaged	495	15.31	18.86
2015-2016			
All Students	502	20.11	20.62
Economically Disadvantaged	502	15.94	19.25

Table 4.2

*Descriptive Statistics for All Students and Students in Poverty Who Had Scored at or Above the Criterion on an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year and Student Group	<i>n</i> of campuses	<i>M</i> %	<i>SD</i> %
2012-2013			
All Students	706	41.51	23.74
Economically Disadvantaged	706	38.10	23.06
2013-2014			
All Students	731	41.72	23.79
Economically Disadvantaged	731	38.00	23.36
2014-2015			
All Students	309	41.78	24.00
Economically Disadvantaged	309	37.64	23.28
2015-2016			
All Students	310	42.13	23.56
Economically Disadvantaged	310	38.94	23.12



Table 4.3

*Descriptive Statistics for the Differences Between the Mean of Both Groups, and the Group Performing Poorer Who Had Taken an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	Percentage Difference Between Groups	Group Performing Poorer
2012-2013	3.64	Economically Disadvantaged
2013-2014	4.15	Economically Disadvantaged
2014-2015	4.34	Economically Disadvantaged
2015-2016	4.17	Economically Disadvantaged

Table 4.4

*Descriptive Statistics for the Differences Between the Mean of Both Groups, and the Group Performing Poorer Who Had Scored at or Above the Criterion on an AP/IB Exam in the 2012-2013 Through the 2015-2016 School Year*

School Year	Percentage Difference Between Groups	Group Performing Poorer
2012-2013	3.41	Economically Disadvantaged
2013-2014	3.72	Economically Disadvantaged
2014-2015	4.14	Economically Disadvantaged
2015-2016	3.19	Economically Disadvantaged

## **CHAPTER V**

### **DISCUSSION**

The purpose of this journal-ready dissertation was to examine the extent to which ethnic/racial and economic status differences might be present in the advanced course performance of Texas students. In the first article, the extent to which ethnic/racial (i.e., Asian, White, Hispanic, Black) differences might exist in advanced course performance of Texas students was examined. In the second article, a descriptive analysis of mathematics and science advanced course taking was conducted focusing on ethnicity/race (i.e., Asian, White, Hispanic, and Black). In the third study, the advanced course taking performance of Texas students in poverty was determined. Lastly, the final purpose of this study was to ascertain the extent to which trends were present in each of the three articles. In this Chapter V is a discussion of the results of each of the three articles. Implications for policy and practice are also included. Finally, recommendations for future research are given.

#### **Summary of Results of Article One**

In the first study, the extent to which differences were present in the advanced course performance of Texas students as a function of their ethnicity/race (i.e., Asian, White, Hispanic, Black) in the 2012-2013 through the 2015-2016 school year were addressed. Also examined in this multiyear, statewide investigation was the presence of trends on the percentages of students by ethnicity/race who had taken and who had scored at or above the criterion on an AP/IB course incorporating all four years of data. Four years of statewide archival data were obtained and analyzed from the Texas Academic Performance Reports.

Results from this first multiyear, Texas statewide investigation were congruent with results of previous researchers (e.g., Barnes & Slate, 2014; Holmes et al., 2013; Jaschik, 2018) regarding the presence of large gaps in AP/IB exam course-taking and AP/IB exam performance among Asian, White, Hispanic, and Black students. In the first article, very low percentages of the four groups of students had completed an AP/IB exam. Percentages of completion ranged from lows of 45.19% for Asian students, 18.11% for White students, 13.27% for Hispanic students, and 11.70% for Black students, respectively. Furthermore, large gaps existed among Asian, White, Hispanic, and Black students regarding their performance on scoring at or above the criterion on AP/IB exams. Of the four years of data analyzed and of the four ethnic/racial groups analyzed, Asian students had the highest percentage, on average, of students who had taken and who had scored above the criterion on an AP/IB exam followed by White, Hispanic, and Black students, respectively.

In a previous investigation by Judson and Hobson (2015), White and Asian students were far more likely to be enrolled in AP courses than were Hispanic and Black students even when levels of college readiness were equivalent. Judson and Hobson (2015) also revealed in their investigation that Asian and White students were far more likely to score a 3, 4, or 5 on their AP exams than Hispanic and Black students. Results of this first article were congruent with their results. As such, more information is now available on students who had taken and who had scored at or above the criterion on AP/IB exams, particularly related to their ethnicity/race.

### **Summary of Results of Article Two**

In the second article, the percentages of high school students who had taken and who had scored at or above the criterion on an AP/IB Mathematics and/or AP/IB Science advanced course in the 2012-2013 through the 2015-2016 school year were determined. Also addressed was the presence of trends regarding the percentages of students who had taken and who had scored at or above the criterion on an AP/IB Mathematics and/or AP/IB Science advanced course incorporating all four years of data. Four school years of statewide archival data were obtained and analyzed from the Texas Academic Performance Reports.

Results from this second article were commensurate with results of previous researchers (e.g., Barnes & Slate, 2014; Holmes et al., 2013; Jaschik, 2018; Judson & Hobson, 2015) regarding the presence of large gaps in AP/IB exam course-taking and AP/IB exam performance among Asian, White, Hispanic, and Black students. In this second study of this journal-ready dissertation involving four school years of data, very low percentages of Asian, White, Hispanic, and Black students had completed an AP/IB Mathematics and AP/IB Science exam. Furthermore, large gaps existed among Asian, White, Hispanic, and Black students regarding their performance on scoring at or above the criterion on AP/IB Mathematics and/or AP/IB Science exams.

### **Summary of Results of Article Three**

In this third article in this journal-ready dissertation, the extent to which differences were present in the advanced course performance of Texas students as a function of their economic status (i.e., all students and students in poverty) in the 2012-2013 through the 2015-2016 school year was addressed. Specifically examined in this

third article was the effect of poverty on the percentage of students who had taken AP/IB exams and who had scored at or above the criterion on AP/IB exams. Four years of statewide archival data were obtained and analyzed from the Texas Academic Performance Reports.

Findings from this third multiyear, Texas statewide investigation were congruent with results of previous researchers (Harwell et al., 2017; Hegedus, 2018; Texas Education Agency, 2017; The Education Trust, 2013) regarding the presence of access and equity gaps among students in poverty and students not in poverty who participated in AP/IB exams. The percentages of students in poverty who had completed an AP/IB exam across all four school years was low. Percentages of completion on AP/IB exams for students in poverty ranged from 10.94% to 15.94%. Of the four years of data analyzed and of students analyzed (e.g., all students and students in poverty), students in poverty had the lowest percentage, on average, of all students who had taken and who had scored at or above the criterion on AP/IB exams.

In a previous investigation by the Texas Education Agency (2017), students in poverty were less likely to participate in AP/IB exams than their peers who were not in poverty. Reported by the Texas Education Agency (2017) was that Grade 11 and 12 students in poverty were less like to participate in AP/IB Mathematics, English Language Arts, Science, and Social Studies exams. The Texas Education Agency (2017) also documented that of all four AP/IB subjects analyzed (i.e., English Language Arts, Mathematics, Science, and Social Studies), achievement gaps between students in poverty and their peers who were not in poverty on their AP/IB performance ranged from a low of 29.7% to a high of 39.8%.

### **Connections with Existing Research Literature**

Results from the three articles in this journal-ready dissertation were congruent with results of previous researchers (e.g., Barnes & Slate, 2014; Harwell et al., 2017; Hegedus, 2018; Holmes et al., 2013; Jaschik, 2018) regarding the presence of gaps in access and equity among students by their ethnicity/race and by their economic status. In the analyses of four school years of data in each of the three articles, very low percentages of all four groups of students and students in poverty completed and scored at or above the criterion on AP/IB exams.

In a previous investigation by Judson and Hobson (2015), Asian and White students were far more likely to score a 3, 4, or 5 on their AP/IB exams than Hispanic and Black students. Also reported in a previous investigation by Barnes and Slate (2014), college readiness rates of White students were statistically significantly higher than the college readiness rates of Black and Hispanic students in reading, mathematics, and both subjects. Results of the three investigations in this journal-ready dissertation were congruent with their results. As such, more information is now available on the extent to which differences were present in the advanced course performance of Texas students as a function of their ethnicity/race and economic status.

### **Implications for Policy and for Practice**

Based upon the results of the three articles conducted in this journal-ready dissertation several implications for policy and practice can be made. First, educational leaders and school administrators need to analyze the data concerning ethnicity/race and students in poverty who take and who score at or above the criterion on AP/IB exams. After analyzing the data on AP/IB exam course-taking and performance among all

students of ethnicity/race and students in poverty, educational leaders and school administrators need procedures that decrease the large achievement gaps among ethnicity/race and students in poverty. Educational leaders and administrators could use this information to determine what action should be taken to provide better access and equity to all students taking AP/IB exams. Another implication is to examine the data on ethnicity/race and students in poverty who did not score at or above the criterion and provide them with more in-school support to help increase their likelihood of scoring at or above the criterion on AP/IB exams. The issue of equity and access among ethnicity/race and students in poverty who score at or above the criterion on AP/IB exams should also be addressed by providing all students of ethnicity/race and students in poverty with the necessary skills and intensive intervention to support their success. Such interventions and support could include teacher mentors, peer tutoring, after-school individual tutoring, and formative assessment, including diagnostic testing, to improve student attainment and success on AP/IB exams.

### **Recommendations for Future Research**

Several suggestions can be made for future research based upon the results of this Texas, multiyear investigation. Because this study was limited to high school students in Texas, researchers are encouraged to extend this study to students in other states. The extent to which the results delineated herein would be generalizable to high school students in other states is not known. Second, because AP/IB advanced courses are not limited to only mathematics and science, researchers are encouraged to analyze AP/IB performance in other course areas to ascertain whether results based only on mathematics and science performance would be generalizable to other areas. Third, because poverty



has been linked to student performance, researchers are encouraged to investigate AP/IB performance as related to student poverty.

Researchers are also encouraged to analyze data on other students of other ethnic/racial groups. Qualitative studies are also recommended to obtain information directly from students, parents, teachers, and school administrators. Such information would provide a more nuanced approach to understanding the equity, access, challenges, and performance issues of students in poverty who take and score at or above the criterion on AP/IB exams. Finally, only four school years of data were used in this study. As such, future researchers are encouraged to analyze data from more than four years and more recent years to determine the extent to which results obtained herein would be generalizable.

### **Conclusion**

In this journal-ready dissertation, three multiyear empirical analyses of the advanced course performance of Texas students were conducted. Results from the three articles in this journal ready dissertation were congruent with results of previous researchers (e.g., Barnes & Slate, 2014; Harwell et al., 2017; Hegedus, 2018; Holmes et al., 2013; Jaschik, 2018; Judson & Hobson, 2015; Koch et al., 2013; Texas Education Agency, 2017; The Education Trust, 2013; Wilson et al., 2014) regarding the presence of gaps in access and equity by student ethnicity/race and student economic status who completed and scored at or above the criterion on AP/IB exams. Results were consistent across all four ethnic/racial groups, for students in poverty, and across all four school years of data analyzed. Clearly established in the three articles of this journal-ready dissertation was the presence of large gaps in access and equity among students of

ethnicity/race and student economic status who completed and scored at or above the criterion on AP/IB exams. As such, these inequities were indicative of unequal access and equity for all Texas high school students to prepare themselves for success at a postsecondary institution. If educational leaders and policymakers do not give our underrepresented high school students the access and equity in the preparation for a rigorous curriculum to succeed in a postsecondary setting, then we are setting them up for failure by not preparing them for the rigor of postsecondary education.

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## Appendix

TO: Brian Flores

John Slate

FROM: SHSU IRB

PROJECT TITLE: DIFFERENCES IN ADVANCED COURSE PERFORMANCE OF TEXAS STUDENTS AS A FUNCTION OF THEIR ETHNICITY/RACE AND ECONOMIC STATUS: A MULTIYEAR, STATEWIDE INVESTIGATION

PROTOCOL #: IRB-2019-20

SUBMISSION TYPE: Initial

ACTION: Exempt

DECISION DATE: February 12, 2019

EXEMPT REVIEW CATEGORY: Category 4. Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met:

- (i) The identifiable private information or identifiable biospecimens are publicly available;
- (ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;
- (iii) The research involves only information collection and analysis involving the investigator's use of identifiable health information when that use is regulated under 45 CFR parts 160 and 164, subparts A and E, for the purposes of "health care operations" or "research" as those terms are defined at 45 CFR 164.501 or for "public health activities and purposes" as described under 45 CFR 164.512(b); or
- (iv) The research is conducted by, or on behalf of, a Federal department or agency using government-generated or government-collected information obtained for nonresearch activities, if the research generates identifiable private information that is or will be maintained on information technology that is subject to and in compliance with section 208(b) of the E-Government Act of 2002, 44 U.S.C. 3501 note, if all of the identifiable private information collected, used, or generated as part of the activity will be maintained in systems of records subject to the Privacy Act of 1974, 5 U.S.C. 552a, and, if applicable, the information used in the research was collected subject to the Paperwork Reduction Act of 1995, 44 U.S.C. 3501 et seq.

Greetings,

Thank you for your submission of Initial Review materials for this project. The Sam Houston State University (SHSU) IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

**Findings: This study is exempt under Category 4.ii.**

We will retain a copy of this correspondence within our records.

**\*What should investigators do when considering changes to an exempt study that could make it nonexempt?**

It is the PI's responsibility to consult with the IRB whenever questions arise about whether planned changes to an exempt study might make that study nonexempt human subjects research.

In this case, please make available sufficient information to the IRB so it can make a correct determination.

If you have any questions, please contact the IRB Office at 936-294-4875 or [irb@shsu.edu](mailto:irb@shsu.edu). Please include your project title and protocol number in all correspondence with this committee.

Sincerely,

Donna Desforges

IRB Chair, PHSC

## VITA

### Brian R. Flores

#### Educational History

Doctorate of Education-Educational Leadership, May 2019

*Sam Houston State University, Huntsville, TX*

Dissertation: Differences in Advanced Course Performance of Texas Students as a Function of Their Ethnicity/Race and Economic Status: A Multiyear, Statewide Investigation

Master of Education, Administration and Supervision, May 2003

*University of Houston, Houston, TX*

Bachelor of Science, Psychology, May 1989

*University of Houston-Victoria, Victoria, TX*

#### Professional Licensure and Certifications

State of Texas Principal Certification (EC-12)

State of Texas Secondary Psychology (6-12)

State of Texas Secondary Generic Special Education (6-12)

State of Texas Educational Aide III

#### Presentations

Flores, B. R. (2018, February) *Differentiating at-risk student status by college-readiness variables*. Paper presented at the Southwest Educational Research Association (SERA) annual meeting, New Orleans, LA.

Sechelski, A. N., Alsakran, R. I., Boyd, C. D., Flores, B.R., Ingram, K. R. & Tritico, B. (2017, October) *Experiences of select higher education doctoral students who persisted to graduation*. Paper presented at the Southwest Educational Research Association (SERA) annual meeting, San Antonio, TX.

Flores, B. R., Dishner, A. D. (1998, July). *Classroom management: A teachable moment*. Texas Middle School Association Annual Conference, Austin, TX.

#### Grant Writing

Flores, B. R., Comeaux, E. (2016). U.S. Department of Education Educational Talent Search, Lone Star College, 2016-2021, Houston, TX. Funded \$1,333,320.

#### Invited Presentations

Flores, B. R. (2017, July). *PLAN ahead to ace the ACT/SAT*. Educational Talent Search Summer Leadership Academy, Lone Star College-North Harris. Houston, TX.

Flores, B. R. (2017, April). *How to effectively use evidence-based models to support grant objectives*. LSC Grant Summit: Bright Ideas, Big Money, Lone Star College System, Houston, TX.

- Flores, B. R. (2017, April). *Financial stewardship: A discussion on how to effectively manage a grant budget*. LSC Grant Summit: Bright Ideas, Big Money, Lone Star College System, Houston, TX.
- Flores, B. R. (2016, April; 2015, October). *Conflict resolution: Supporting alternative dispute resolutions*. Lone Star College-North Harris faculty and staff, Houston, TX.
- Flores, B. R. (2016, April). *Workforce degrees and programs: Lone Star College*. Thompson Elementary, Houston Independent School District, Houston, TX.
- Flores, B. R. (2015, August; 2014, July). *ACT vs. SAT: Which one do I take?* Educational Talent Search Summer Leadership Academy, Lone Star College-North Harris, Houston, TX.
- Flores, B. R. (2015, April). *My story: Canary Islands to Texas*. Lone Star College-North Harris, College Awareness Readiness Program (C.A.R.E.) College Summer Leadership Conference, Houston, TX.
- Flores, B. R. (2006, June). *Principles that guide student achievement in high performing schools*. Houston Independent School District Teacher Pre-Service Training, Houston, TX.
- Flores, B. R. (2005, July). *Transformational coaching: How to create a high-performing coaching culture*. Houston Independent School District Teacher Pre-Service Training, Houston, TX.
- Flores, B. R. (2003, August). *Understanding poverty: A framework*. Houston Independent School District Teacher Pre-Service Training, Houston, TX.
- Flores, B. R., Dishner, A. D. (1999, June). *Classroom management: Managing your classroom with style and dignity*. Tri-Cities Public School System, Tri-Cities, Virginia.

### **Work or Professional Experience**

Director, Educational Talent Search, University of Houston-Downtown, 2018-Current  
 Program Manager, Educational Talent Search, Lone Star College-North Harris, 2012-2018  
 Principal, EAGLE Academy High School, Houston Independent School District, 2010-2012  
 Principal, J. Will Jones Elementary, Houston Independent School District, 2003-2010  
 Assistant Principal, Lanier Middle School, Houston Independent School District, 2001-2003  
 Special Education Coordinator, Central District, Houston Independent School District, 2000-2001

Special Education Case Manager, Lanier Middle School, Houston Independent School District, 1999-2000

Special Education Teacher, Elementary, Middle, and High School, Austin Independent School District, 1991-1999

Theatre Arts and Debate Teacher, Patti Welder Intermediate, Victoria Independent School District, 1989-1991

### **Honors and Awards**

Dean's Award for Exceptional Graduate Student Research, Southwest Educational Research Association (SERA) Annual Conference, New Orleans, LA, 2018

Dean's Award for Exceptional Graduate Student Research, Southwest Educational Research Association (SERA) Annual Conference, San Antonio, TX, 2017

Next Generation Leadership Academy for Aspiring Higher Education Leaders, Cohort 2, Lone Star College System, Houston, TX, 2017-2018

LSC 20/20 Award, Lone Star College System, Houston, TX, 2017

Full Time Staff Excellence Award, Lone Star College System, Houston, TX, 2016

Outstanding Elementary School Principal, Houston Independent School District, 2009

New Visions in Leadership Alumni, Houston Annenberg Foundation A+, 2006

Texas Governor's Educator Excellence Award, Houston Independent School District, 2006, 2005, 2004

Special Education Teacher of the Year, Houston Independent School District, 2000

### **Professional Service**

University of Texas Community Based Organization Advisory Board, 2019

Association for the Study of Higher Education (ASHE), Chair, 2017, Houston, TX

American College Personnel Association (ACPA), College Student Educators

International Member and Volunteer, 2018, 2017

Council for Opportunity in Education Member, 2019, 2018, 2017, 2016, 2015

President, Houston Area Alliance of TRIO, 2017, 2016, 2015

Leadership Circle Member of the Montrose Society, Montrose Center of Houston, 2017, 2016, 2015

Chairman Employee Giving Campaign, Lone Star College, 2016

Chairman TRIO Achiever Awards, Texas Association of Student Special Services Programs of Texas (TASSSP), 2015

Parent Teacher Organization (PTO) Lifetime Member